APO
Productivity Readiness
2020

The Asian Productivity Organization (APO) is an intergovernmental organization committed to improving productivity in the Asia-Pacific region. Established in 1961, the APO contributes to the sustainable socioeconomic development of the region through policy advisory services, acting as a think tank, and undertaking smart initiatives in the industry, agriculture, service, and public sectors. The APO is shaping the future of the region by assisting member economies in formulating national strategies for enhanced productivity and through a range of institutional capacity-building efforts, including research and centers of excellence in member countries.

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APO Productivity Readiness 2020

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FOREWORD

A country needs to be "productivity ready" as its productivity performance is a primary driver of improvement in the standard of living. Readiness is key because strong, sustained productivity growth requires a broad range of prerequisites. In addition, productivity opportunities are uncertain in nature and timing, making readiness even more important. Adverse events such as the ongoing global pandemic, which is predicted to have long-lasting impacts on decelerating growth trends, weaken national productivity readiness. Therefore, focusing on factors determining readiness is critical.

This research report presents detailed country diagnoses based on four factors representing productivity readiness. A Productivity Readiness Index was constructed to measure the degree to which those four determinants can assist APO member countries to take advantage of opportunities for productivity improvement. A framework of 17 key determinants of productivity performance was developed, and more than 50 indicators were identified to assess where APO economies currently stand. Indexes of performance in motivation, capabilities, efficiency of markets, and stability derived from the values of those 50+ indicators also show specific strengths and weaknesses in terms of their productivity readiness.

The country studies were conducted from December 2019 to November 2020 by a team of researchers led by Dean Parham and Robert Breunig of Australia National University on all APO member countries except for Turkey, which was not yet a member when the project started. The assessment of member countries' productivity readiness may be carried out on a regular basis in the future and is primarily intended to fulfill the role of the APO as a clearinghouse for productivity information.

Regulatory quality, government effectiveness, and the rule of law are the most influential in determining productivity readiness and growth. Readiness is also affected by infrastructure and openness to trade and investment and negatively impacted by corruption and political instability. These are common areas for all countries to improve for sustained productivity growth. They include relaxing barriers to trade, reducing labor market rigidities, and relieving tax burdens. Known productivity weaknesses appear frequently in all APO member countries in the form of regulatory burdens, unequal access to education, and labor market inflexibility. The potential for infrastructure improvements to reduce the cost of production and trade is also frequently cited in the report.

In addition to the providing a comprehensive set of productivity determinants at individual-country level, the report is intended to complement the APO Productivity Databook. The two sources combined give a clearer picture of national productivity status and its underlying factors. This publication is part of ongoing efforts to support APO member governments in determining focus areas for increasing their productivity readiness and strengthening related ecosystems. It is hoped that Productivity Readiness for APO Member Countries will contribute to a better understanding of the fundamental factors affecting national productivity readiness by all stakeholders in productivity movements in the Asia-Pacific region.

Dr. AKP Mochtan
Secretary-General

PREFACE

The importance of productivity growth for a nation is often acknowledged. Productivity growth is the vital source of improvements in living standards. Paul Krugman captured it well in his often-quoted adage, 'Productivity isn't everything, but in the long run, it is almost everything'.

However, the practicalities of how to lift productivity growth do not seem to be as widely understood.

This project came about because the Asian Productivity Organization (APO) wanted a distillation, from the economics literature, of the key factors that determine productivity growth and detailed assessments of the strengths and weaknesses of APO countries regarding those productivity determinants. These would provide indications for possible policy actions in member countries.

In responding to the APO's brief, we have taken a comprehensive long-term view of productivity determinants, assembled the indicators of countries' positions on those determinants, developed summary indicators of countries' preparedness to improve productivity, and undertaken detailed assessments of productivity performance and challenges in each member country.

The study drew heavily on data from the APO Productivity Database 2019, which has provided comprehensive productivity and related measures in the mold of modern statistical practices. However, getting other data related to indicators of productivity determinants was more of a challenge in relation to some countries and some determinants. Steps to improve data would be desirable and, as data improves, the exercise undertaken in the report can be extended and improved.

The report benefits enormously from the contributions of our collaborators. We thank Ben Conigrave, Omer Majeed, Trevor Rose, Julia Sloniewsky, and Carina Stone for their enthusiasm and dedication.

We were fortunate to have Prof. Christopher Findlay make content suggestions along the way and review an earlier draft of the report. We thank him for his valuable inputs.

We also thank Arsyoni Buana, from the APO, for his coordination and clarifications on the project and comments on a draft of the report.

Dean Parham
Robert Breunig

Canberra
31 December 2020

EXECUTIVE SUMMARY

A country's productivity performance is central to its standard of living. There are major differences across APO countries in average incomes and these are mostly down to differences in productivity growth over the last 50–70 years. If APO countries are to continue to improve their standards of living, and if those countries with lower average incomes are to catch up with APO leaders, they need strong and sustained productivity growth.

Attaining strong and sustained productivity growth can be elusive, as the recent experiences of many OECD countries attest. Many different factors need to be in place. There is no single 'silver bullet.' Rather, a nation needs to be 'productivity-ready' on many fronts to make the most of productivity opportunities as they arise. Being ready is the key because the nature and timing of productivity opportunities cannot be predicted with certainty.

This Executive Summary outlines

- a measure of the productivity readiness of APO member countries, i.e., the Productivity Readiness Index (PRI);
- the main elements of the PRI, which measure the broad strengths and weaknesses of APO member countries in relation to productivity readiness;
- specific areas of countries' strengths and weaknesses; and
- overarching insights from the report.

Overall Productivity Readiness

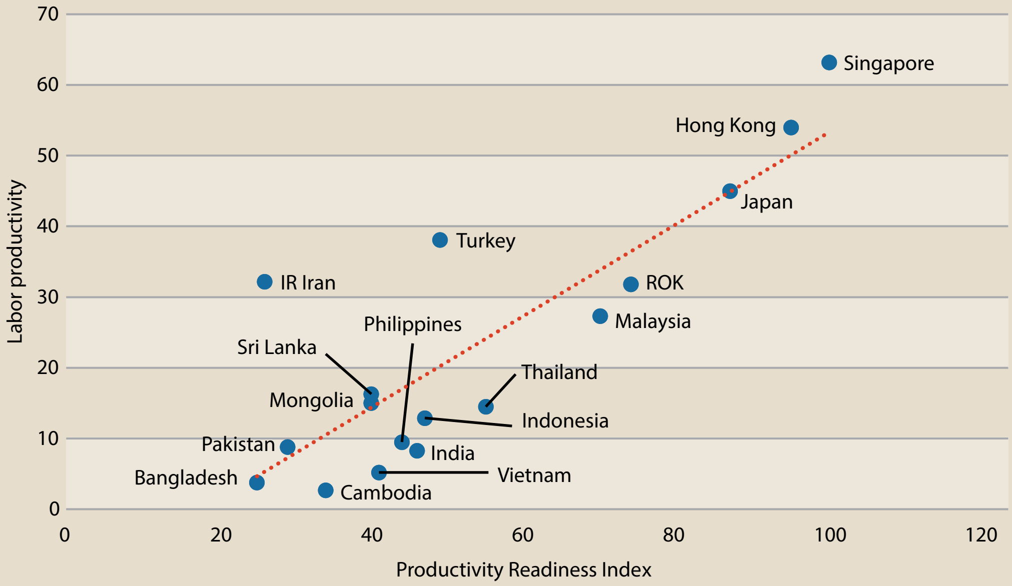
This report has developed a Productivity Readiness Index and presents a PRI measure for all APO member countries with complete data. The PRI values for countries are shown in Figure 1, together with their levels of labor productivity. Clearly, greater productivity readiness brings stronger productivity levels over the long term.

Singapore is a stand-out performer, both within APO and globally, with a PRI score of 100. Hong Kong and Japan have scores above 85, while the Republic of Korea (ROK) and Malaysia have scores above 65. Thailand is the only other country with a score above 50. Turkey and IR Iran are outliers, with productivity levels above the predictions based on their productivity readiness scores.

The scores for other countries suggest there is plenty of scope to implement changes that would take them closer to the productivity readiness of the countries with high productivity levels. Improving productivity readiness will help these countries catch up more rapidly with the living standards of Japan and the Asian Tigers.

FIGURE 1

PRODUCTIVITY READINESS BRINGS PRODUCTIVITY RESULTS.



The report shows that, while APO countries are not as productivity-ready as OECD countries, they are more productivity-ready than non-APO, non-OECD countries.

Broad Strengths and Weaknesses

Productivity readiness encompasses four elements, namely, motivation, capabilities, efficiency of markets, and stability. The Productivity Readiness Index has been constructed from indices that represent these elements:

Motivation: Firms need to be motivated to incur the effort and costs of improving their productivity performance. For example, stronger competition has been shown to drive innovation. On the other hand, needless tax and regulatory burdens can sap firms' motivation to undertake the changes necessary to improve productivity.

Capabilities: Improvements in productivity, especially in the long term, require capabilities in areas such as skills, competencies, and infrastructure. These make productivity improvements possible.

Efficiency of markets: Resources need to be allocated and capabilities need to be developed where they can make stronger productivity contributions. This requires flexibility to respond to changing economic circumstances as well as to the right signals for making the most productive long-term investment decisions. Generally speaking, this means removing distortions in market signals and stepping in where markets fail to give the right signals.

Stability: While changes in economic circumstances will always take place, firms need elements of certainty for making productive long-term investment decisions. They need the economic and political stability that comes with a sound set of policy frameworks and institutions.

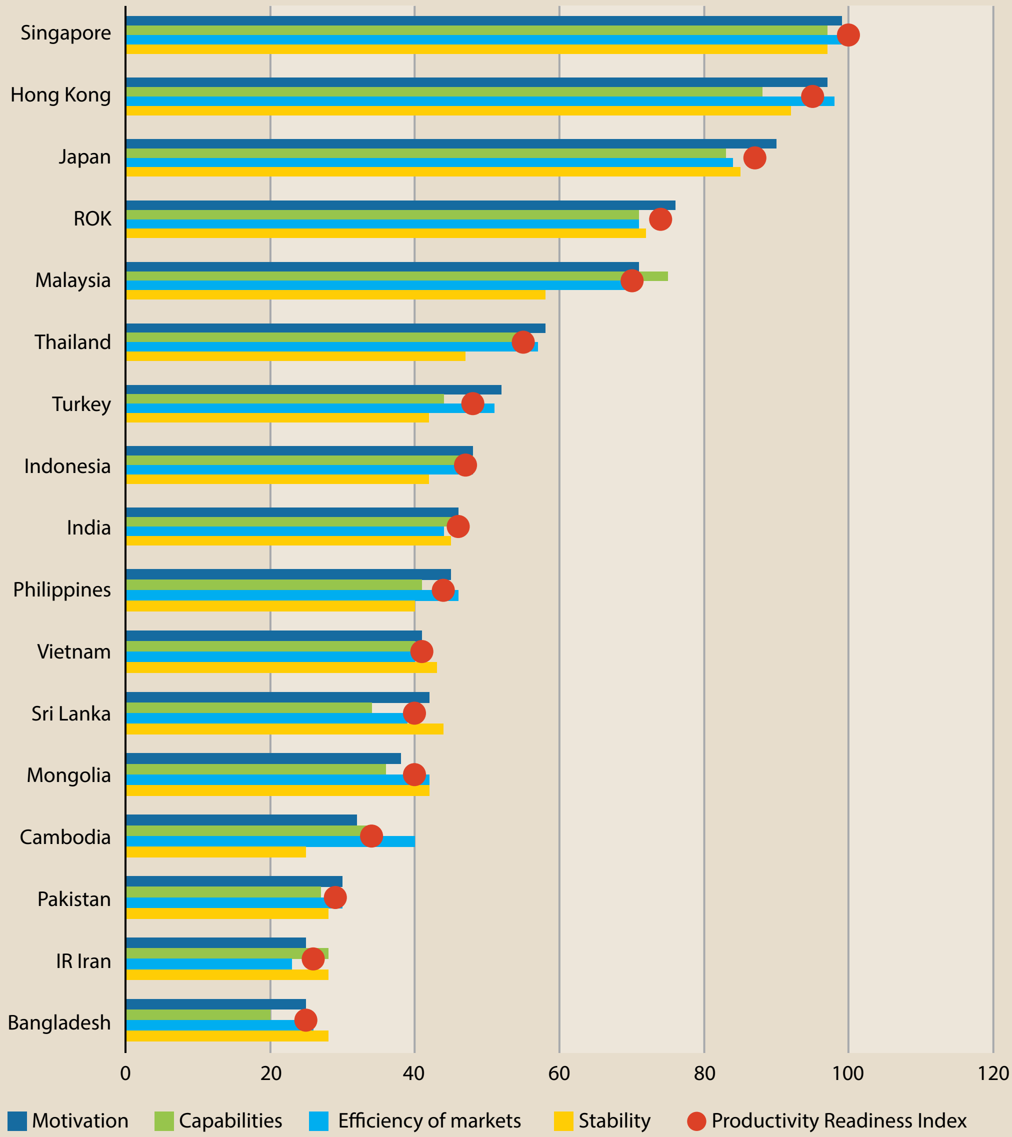
Importantly, all four elements are needed simultaneously and in an enduring fashion to bring about strong and sustained productivity growth in the long term.

The four elements appear to have around equal importance when viewed across the board (see Figure 2). This reinforces the importance of working on several fronts at the same time to improve productivity readiness and performance.

However, stability is a notable point of weakness for a number of countries. While they have implemented some reforms, often to attract foreign investments, they need to go further to develop institutional and policy structures that provide greater economic and political stability. Improvements in this area will bring productivity gains in the long run.

FIGURE 2

PRODUCTIVITY READINESS SCORES FOR APO COUNTRIES.



Note: Scores could not be calculated for ROC, Fiji, Lao PDR, and Nepal due to lack of data.

Specific Strengths and Weaknesses

This report develops a framework of 17 key determinants of productivity performance and identifies over 50 indicators to assess where APO countries currently stand on the 17 determinants. Indices of performance on motivation, capabilities, efficiency of markets and stability were formed from values of the 50+ indicators.

The 50+ indicators identify specific strengths and weaknesses of countries in terms of their productivity readiness. Table 1 provides an indication of strengths and weaknesses. However, it does not exhaust the issues found in the detailed country studies contained in this report.

TABLE 1

KEY STRENGTHS AND WEAKNESSES OF APO ECONOMIES ON PRODUCTIVITY READINESS.

Country	Strengths	Weaknesses
Bangladesh	• Government adoption of technology and responsiveness to change • Railroad and airport connectivity	• Quality of education system • Institutional weaknesses, corruption control, low government effectiveness • Business environment dynamism
Cambodia	• Openness to foreign investment • Labor market flexibility	• High administrative requirements, poor regulatory quality, and low control of corruption • Infrastructural underdevelopment • Quality of education system
Fiji	• Flexible labor market • Institutions	• High administrative requirements and poor regulatory quality • Trade and investment barriers • Skills shortages
Hong Kong	• Highly educated workforce • Foreign investment and trade openness • Highly developed infrastructure and institutions	• Administrative requirements • Inequality
India	• Entrepreneurial culture • Innovation capability • Transportation infrastructure	• Burdensome administrative requirements • Labor market inflexibility • Inadequate access to education
Indonesia	• Entrepreneurial culture • Domestic competition • Social capital	• Labor market inflexibility • Barriers to trade and foreign investment • Internet adoption
IR Iran	• Educated workforce • High share of medium- and high-tech manufacturing	• Public sector's ineffectiveness and corruption • Low domestic competition • Labor market inflexibility
Japan	• Highly educated workforce • Highly developed infrastructure and strong institutions • Technological advancement	• High tax burden • Labor market rigidities • Slow SME productivity growth
ROK	• Highly developed infrastructure and strong institutions • Highly educated workforce • High technological advancement	• High tax burden • Labor market rigidities • Trade barriers

(Continued on next page)

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Country	Strengths	Weaknesses
Lao PDR	• Low tax burden • Trade openness	• Burdensome administrative requirements • Poor regulatory quality • Public-sector capacity • Low access to technology
Malaysia	• Entrepreneurial culture • Quality of education system • Technological advancement	• Administrative requirements • Barriers to services trade
Mongolia	• Openness to foreign investment • Labor market freedom • Low tax burden	• Infrastructural underdevelopment • Burdensome government regulation and administrative requirements • Limited domestic competition
Nepal	• Relatively low tax burden • High educational expenditure	• Weak institutions and political instability • Low human capital • Barriers to trade and foreign investment
Pakistan	• Moderate administrative requirements to start a business • Above-average availability of the latest technologies • Young population	• Poor regulatory quality, government ineffectiveness, and low control of corruption • Lack of business freedom and labor market rigidities • Weak institutions and political instability
Philippines	• Workforce skills • Entrepreneurial culture • ICT skills	• Political instability, control of corruption and rule of law • Burdensome administrative requirements • Underdeveloped infrastructure
ROC	• Highly educated workforce • Highly developed infrastructure and strong institutions • Advanced innovation system	• High tax burden • Inadequate labor freedom • Administrative requirements
Singapore	• Highly educated workforce • Highly developed infrastructure and strong institutions • High technological advancement • Foreign investment openness	• Barriers to services trade • Insolvency regulation • Lack of press freedom and political expression
Sri Lanka	• Relatively developed infrastructure, particularly in access to electricity • Health system • Relatively low tax burden	• Labor market inflexibilities • High barriers to trade and foreign investment • Public sector's ineffectiveness
Thailand	• Efficient administrative requirements and business freedom • ICT adoption • Financial depth and stability	• Labor market inflexibility • Skills shortages • Political instability
Vietnam	• Relative openness to trade • Reasonably developed infrastructure	• Poor regulatory quality and low control of corruption • Relatively high tax burden • Poor transport infrastructure • Education system

The identified issues could form an agenda for countries to progress. However, large improvements in productivity readiness cannot happen overnight. Reform requires time and sustained effort.

While there are important differences across countries, the analysis in the report finds that regulatory quality, government effectiveness, and rule of law are influential in determining productivity readiness and growth. Other areas identified as having important implications for productivity include infrastructure, openness to trade and investment, and the negative effects of corruption and political instability.

There are areas for all countries to work on. These include the high-income, high-productivity countries, which need stronger productivity growth to counteract the effects of ageing populations on their living standards and the increasing demands for social services. Examples of areas that require attention include relaxing barriers to trade, reducing labor market rigidities, and relieving the burden of taxes.

High regulatory burdens appear frequently as a weakness in many APO countries. Several countries need to improve their education systems and work to ensure access to education for all including those in rural areas. Labor market inflexibility is a weakness in one way or the other for nearly every APO country. The potential for infrastructural improvements to reduce the cost of production and trade was also frequently identified.

Further Observations

Much of the development of APO member countries has taken place through the accumulation of inputs, especially capital. Strong labor productivity growth has been based on strong capital deepening. TFP growth has varied over time and countries, but it needs to become more of a consistent focus for future labor productivity growth, as the contribution from capital deepening inevitably diminishes. This requires attention to skills, innovation, and how best capital and labor can work together to generate output and income.

Participation in global value chains has provided countries at earlier stages of development with opportunities to industrialize without the need to set up entire industries. Low labor costs have provided many countries with a comparative advantage, although they have also offered further enticements to foreign capital through measures such as tariff reductions and tax breaks. However, as GVCs have become more complex, and as labor costs have risen in some countries, the need for higher skills and more fundamental reforms has emerged.

Governments in these economies should strive to bring reforms to their entire economies and not just the export-oriented participation in GVCs. This will broaden the base for productivity improvements and bring larger improvements in productivity and competitiveness.

The need for political and economic stability, improved government effectiveness, and better control of corruption, which are more prominent in the middle- and lower-productivity countries, are common themes coming from the country studies. An important part of avoiding the middle-income trap is to raise skills and remove stifling bureaucracy and regulation. However, it can be difficult to do the latter if trust is low because of corruption or government ineffectiveness.

While many countries have improved their openness to trade and investment, there is more to be done. With the growing importance of services trade; and the role of services in reducing input costs and coordinating cross-border trade in goods; reducing barriers to trade in services should also be a priority for countries.

Most APO countries could lift their IT engagement. Increased IT capital and greater capacity among countries' workforces should have productivity payoffs as it has in OECD countries.

Finally, resource allocation and structural change affects productivity. Governments can distort the allocation of resources by overregulating markets for goods and services or by shielding specific firms from competition. Policies that discriminate based on businesses' size get in the way of expansion of young, high-productivity firms, which would lift overall productivity. Well-functioning financial markets are also needed to ensure that capital goes to those firms with a productive future.

In the end, productivity growth is much more about firms, and the general conditions in which they prosper, than it is about industries. The ideal course would be to apply policies to firms generally, irrespective of their characteristics, such as size or industry of operation.

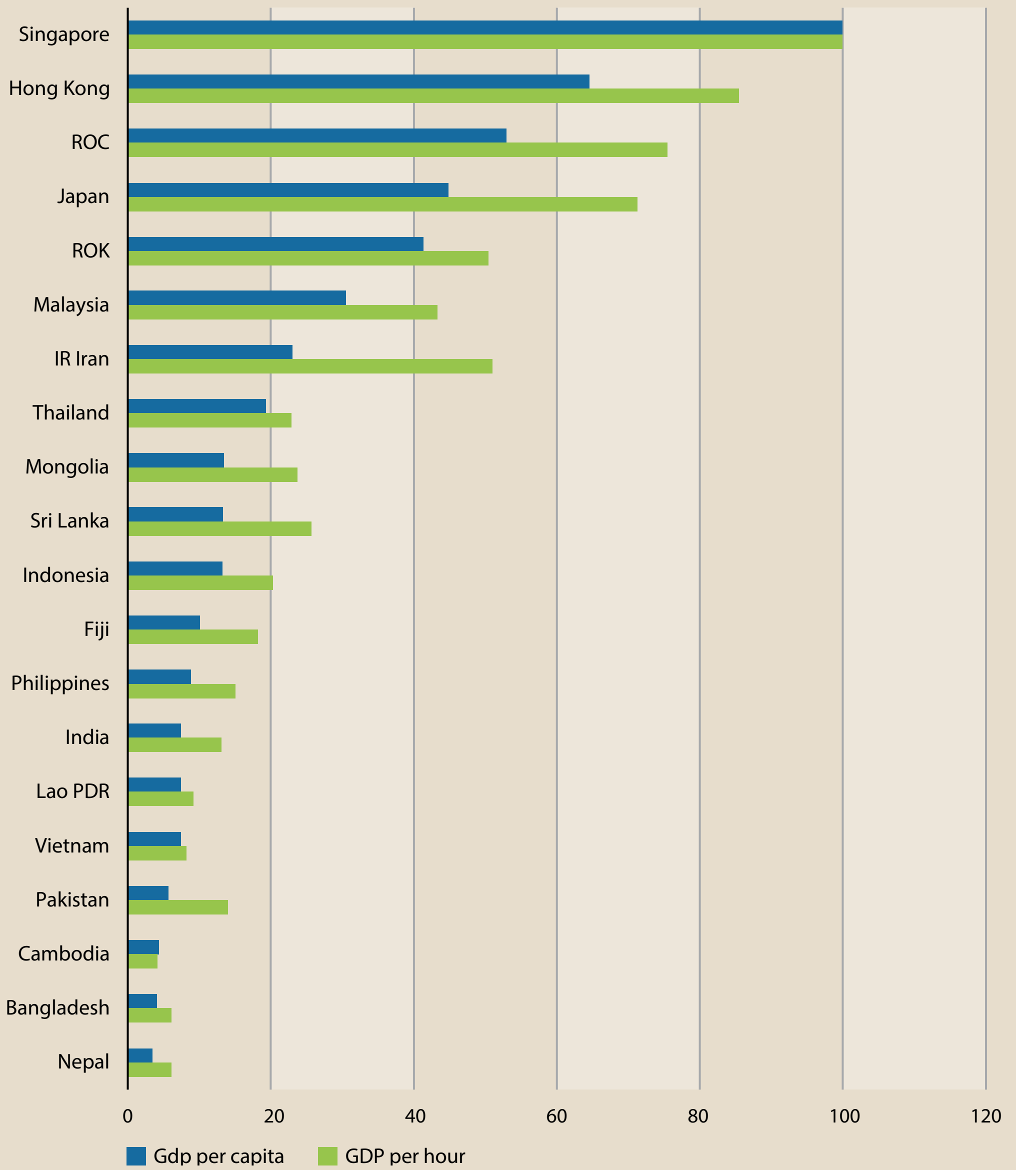
PART A
CHAPTERS

INTRODUCTION

Productivity matters a lot. A country's standard of living depends overwhelmingly on productivity. Figure 1 makes this clear by showing how per capita income and productivity vary in steps across member countries of the APO. The correlation coefficient between average income and productivity is 0.96. Clearly, more productivity means higher living standards.

FIGURE 1

GDP PER CAPITA AND LABOR PRODUCTIVITY IN APO COUNTRIES IN 2017.



Note: All other countries' data are given in percentages of Singapore's data.
Source: APO Productivity Database 2019.

Figure 1 also makes it clear that prosperity differs greatly across APO member countries. Singapore has one of the highest average income levels in the world. Hong Kong, the Republic of China (ROC), Japan, and the Republic of Korea (ROK) have per capita incomes between 40% and 65% of Singapore's level. These five nations are classified by the World Bank as high-income countries [29]. Countries classified as upper-middle-income countries, i.e., Malaysia, IR Iran, Thailand, Sri Lanka, and Fiji, have average incomes between 10% and 30% of Singapore's level. The remaining 10 APO countries mostly have average incomes at less than 10% of Singapore's level.

Attaining sustained productivity growth can be elusive. It requires many different factors or productivity determinants to be in place and work together.

That is what this study is about. It seeks to identify and measure the factors that need to be in place to bring about strong and sustained productivity growth in APO member countries. Rather than focusing on productivity trends, the report focuses on the key factors that countries can operate upon to improve their productivity performances.

About this Study

The APO commissioned this study as an investigation into the factors that determine improved productivity performance. Specifically, the APO wanted deeper analysis of how APO countries are positioned in relation to productivity determinants and where they could focus attention to improve their productivity performances. This is to be supported by a range of indicators to show the strengths and weaknesses of APO countries on the productivity determinants.

Outline of this Study and Report

While productivity trends are not a major focus of this report, some perspective is needed. An overview of productivity trends in APO member countries, presented in the next chapter, highlights the changes in productivity growth in the 2010s compared with the 2000s. It also reviews the reliance that countries have placed on productivity, as opposed to the accumulation of inputs, as a source of growth. Supporting details for the chapter are given in Appendix A.

Development of a comprehensive set of productivity determinants was a central task. A review of the productivity literature, included as Appendix B, informed the framework of productivity determinants presented in Chapter 3.

Indicators of each of the productivity determinants have been assembled and presented in Chapter 4. There are 48 of them. The indicators are currently available and can be carried forward to monitor countries' progress over time. A review of the current ratings of APO countries on the diagnostic indicators is provided.

That chapter also develops four overarching themes from the productivity determinants. These are key features that must be in place to generate strong and sustained productivity growth. They become touchstones for policy action. The themes are:

- motivation (firms must have a driving reason to be more productive);
- capabilities (firms need the means to be more productive);

- efficiency of markets (resources should be able to move flexibly to where they can be used most productively); and
- stability (having a level of certainty allows firms and individuals to make long-term investment decisions).

A way of capturing these four overarching themes from the indicators is laid out in Chapter 5. The indicators of underlying determinants are combined in indices representing each of the above mentioned four themes. This makes it possible to measure how APO countries are performing in these four overarching areas. An overall Productivity Readiness Index (PRI) is developed as a measure of the extent to which APO countries have set their productivity determinants in ways that will develop and take advantage of opportunities for productivity improvement.

Chapter 5 also analyzes the relationship between productivity readiness and productivity growth to establish that there is a payoff from becoming more productivity ready.

Chapter 6 examines several issues that have a potentially important bearing on productivity performance in APO countries, but did not come to the forefront in the work on productivity determinants and productivity readiness. First, there is the issue of the extent to which countries with lower productivity will experience more rapid productivity growth in catching up with the productivity leaders. Second, the industry mix and structural changes influence APO countries' productivity growth in certain ways. Third, several Asian countries are integrated in global value chains (GVCs) and it is important to understand the influence that GVCs have on productivity growth. Fourth, with digital technologies being a major focus for innovation and productivity growth, an examination of the engagement of APO countries in digital technologies is warranted. Finally, with the growing importance of trade in services (and its intersection with GVCs) it is important to review whether countries are doing whatever they can to be competitive and productive in the services area.

Studies of each of the APO member countries have been undertaken (with the exception of Turkey). These review past productivity trends and assess standings on the diagnostic indicators to suggest strengths and weaknesses on productivity determinants. These provide pointers to where individual countries could devote policy attention to improve productivity performance. The country studies are presented in Part B of this report.

Turkey became a member of the APO after this project got underway. While a detailed country study was therefore not undertaken, information on Turkey's position on productivity readiness and associated indices could be obtained from the statistical analysis (Chapter 5).

Conclusions from the study are presented in Chapter 7 of Part A.

Appendixes are given in Part C of the report.

Public-sector Productivity

While the report focusses on the factors that foster productivity growth in the private sector, this in no way dilutes the importance of productivity in the public sector. The public sector is a large part of modern economies and the quest should be to improve productivity in the public sector so that more can be done within the funding constraints.

Some of the principles and determinants discussed in this report apply equally to the public sector. However, the absence of strong market mechanisms in the public sector means there are also important differences in the way production is organized and motivated.

However, improving public-sector productivity is outside the scope of this report.

The Impact of Covid-19

The report does not give a lot of consideration to the effect that the Covid-19 pandemic has had on productivity trends or on the economic outlook for APO countries. Mentions are made in passing in several places.

It is likely that the pandemic will have a damaging effect on productivity for some time. It is likely to reduce investment, erode human capital because of lower employment, and disrupt supply chains, which have been a feature for many APO countries [1].

From a practical point of view, the effect of the pandemic to date could not be analyzed in this study because the databases available do not include sufficiently recent observations to cover the pandemic.

Most importantly, however, the focus of the study has been on the steps that countries can take to improve productivity performance in the long term. That focus remains valid, irrespective of the pandemic. Indeed, the relevance of the pandemic is more in that it sharpens the imperative for countries to take productivity-enhancing actions, since lifting productivity growth is an important way to enhance recovery. Some strategic reassessments may be required because of Covid-19 (such as dealing with supply chains), but it would be a mistake for countries to get locked in decisions that hurt their long-term prospects for productivity growth.

PRODUCTIVITY TRENDS

This chapter provides an overview of the productivity performances of APO countries, with focus on the 2010s and the changes from the 2000s to the 2010s. The chapter also covers the reliance that APO countries have placed on productivity, as opposed to input accumulation, as a source of economic growth.

Details of the productivity trends are provided in Appendix A. Productivity trends in individual APO countries are examined in the country studies in Part B of this report.

Trends are calculated from data sourced from the *APO Productivity Database 2019*. The database provides estimates up to 2017. Unless otherwise indicated, the use of 'the 2010s' refers to the period 2010 to 2017.

Key Concepts

Productivity, at its simplest, is the ratio of output produced to inputs used. It measures the efficiency of production in generating outputs from inputs. Colloquially, it is 'what we get from what we use.'

Labor productivity is the ratio of output produced to labor input used. In other words, it is the rate at which labor is used to generate output. The labor input measure includes all those involved, whether they be direct production workers, back-office people, or managers. It includes the self-employed, as well as those employed by others.

Capital productivity is the rate at which output is produced from the capital employed. Capital covers all assets relevant to production including buildings, machines, equipment, and land.

Total factor productivity (TFP), which is also referred to as multifactor productivity, is the rate at which output is produced from a combination of the inputs used. Typically, labor and capital inputs are included in the combined inputs measure, but other inputs can be included as well. As will be seen, the measures used in this report include another input, labor quality. TFP captures the efficiency and effectiveness with which inputs are combined to generate output.

Labor productivity growth can be attributed to two components: capital deepening plus total factor productivity (TFP) growth. Capital deepening is essentially growth in the capital–labor ratio. It increases labor productivity (LP) because adding more or better capital per hour worked makes each hour of work more productive, e.g., when a process is mechanized. TFP growth raises LP growth by lifting the efficiency and effectiveness with which labor combines with capital to generate output.

While all productivity measures are indicators of the efficiency of production, TFP is the most comprehensive measure. It indicates how efficiently and effectively labor, skills, and capital combine to generate output (and income). New technologies or different management practices are examples of factors that can improve the rate at which output is produced from the inputs used.

A Perspective on Productivity Trends

A perspective on labor productivity levels is a good starting point, as rapid growth can be off a relatively low base. A glance at productivity levels also indicates how far other countries have to go if they were to catch up fully with the leaders.

The productivity indicators in the APO Productivity Database use the economy-wide measure of GDP as the output measure. The number of hours worked serves as the labor quantity measure in this chapter. Labor productivity is therefore represented by GDP per hour worked.

There is a wide variation across APO countries in LP levels (see Figure 1). In international currency at purchasing power parity, Singapore had a productivity level more than 10 times the five countries with the lowest levels in 2017. The high-income APO countries, namely, Singapore, Hong Kong, the Republic of China (ROC), Japan, and the Republic of Korea (ROK), have the highest levels of labor productivity, in a range from USD31.8 to USD63.2 per hour. Singapore's level falls just 9% short of the USD69.4 that the USA's economy produced per hour (the USA is generally considered to be at the productivity 'frontier'). One of the upper-middle-income countries, IR Iran, had an LP level marginally above the ROK's. Three other upper-middle-income countries, Malaysia, Sri Lanka, and Thailand also had productivity levels above the APO average. The countries below the average produce less than a fifth of the output that Singapore does in an hour.

Another way to state the difference between economies is that production in the lower-productivity economies is more labor-intensive than in the higher-productivity economies. A unit of output in the lower-productivity economies uses more labor and less capital, skills, and technology. In a static sense, an abundance of relatively cheap labor makes it sensible for them to employ labor-intensive methods. As the lower-productivity countries develop, however, they will accumulate more capital, skills, and technology.

As demonstrated in Chapter 1, there is a close link between levels of productivity and standards of living across APO countries. The higher-productivity countries also have commensurately higher income per capita.

Change in Productivity Growth in the 2010s

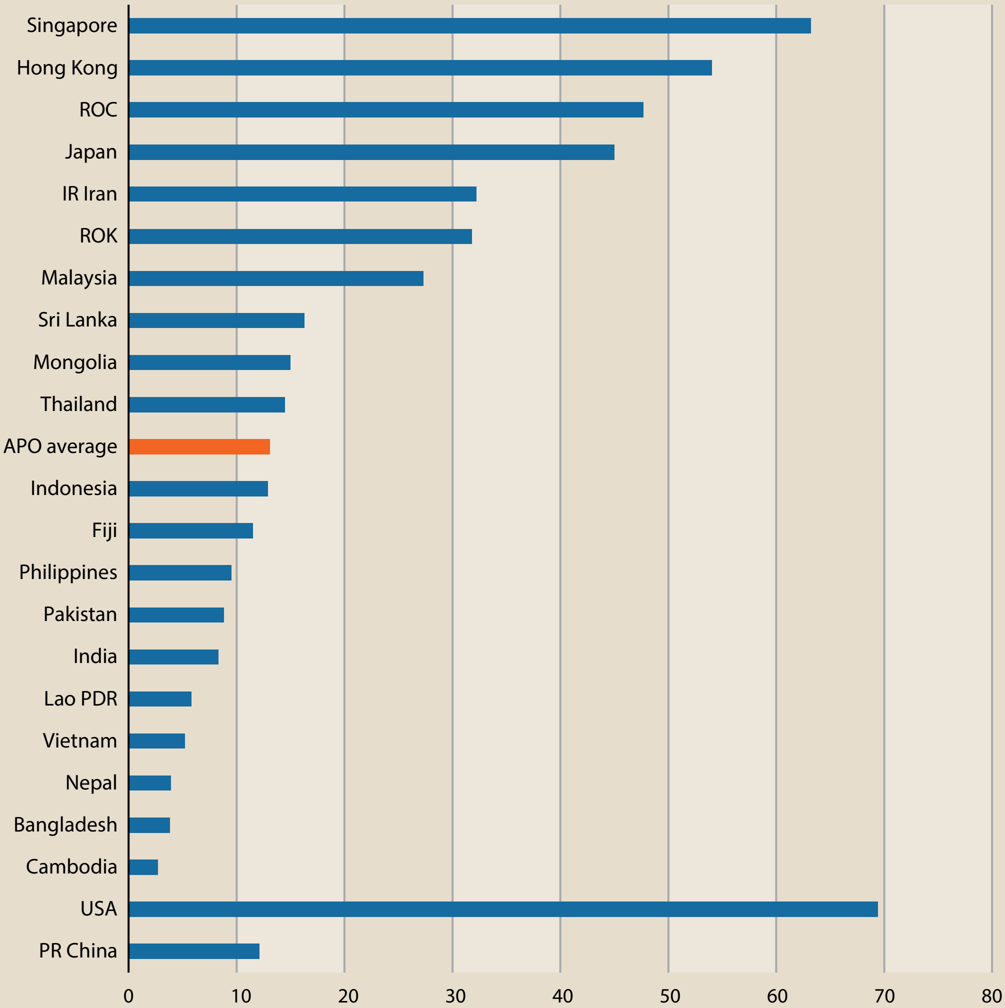
There has been a productivity-growth slowdown across most of the world since the mid- to late-2000s (Appendix A). While a slowdown is evident for some APO countries, many have sustained or even increased their rate of productivity growth.

For the 20 APO countries as a group, the average annual rate of growth in labor productivity increased from 2.8% in the 2000s to 3.3% in the 2010s [2]. There are also signs of an even stronger growth in the most-recent data. While the annual average rate of LP growth was 3.1% between 2010 and 2015, it increased to 4% between 2015 and 2017.

The increase for the group was due to the performance of middle- and lower-productivity countries. Figure 2 shows the change in LP growth from the 2000s to the 2010s for individual countries, arranged in the order from highest to lowest levels of labor productivity. The high-productivity economies on the left in the figure had slowdowns in LP growth. This was in keeping with the experience of other high-productivity countries around the world. Most of the middle- and lower-productivity countries, on the other hand, had productivity accelerations. Bangladesh, Pakistan,

FIGURE 1

LEVELS OF LABOR PRODUCTIVITY IN APO COUNTRIES, PR CHINA, AND THE USA.
(GDP PER HOUR, USD AT PPP IN 2017)



Source: Author's estimates based on data from APO Productivity Database 2019.

and the Philippines had very strong LP accelerations of around 2 or more percentage points. Thailand, Mongolia, and Lao PDR had accelerations of over 1 percentage point.

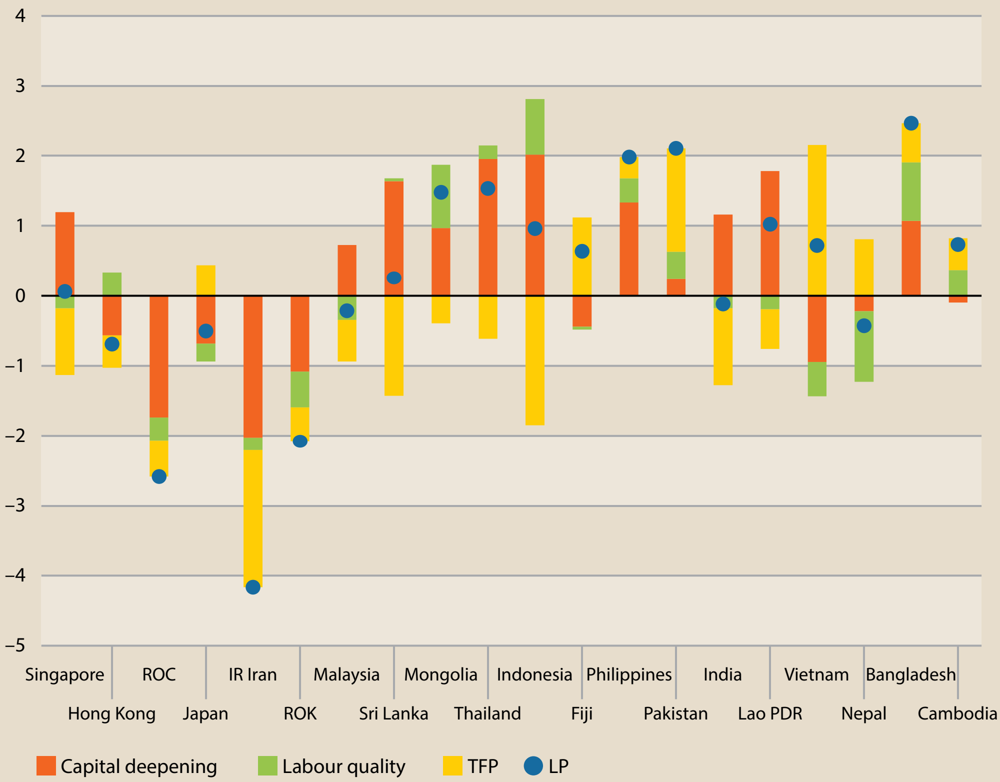
A large part of the acceleration in LP growth for the medium- to lower-productivity countries came from stronger capital deepening (see Figure 2). All but one of the high-productivity countries had a downturn in the rate of capital deepening.

Another component of LP growth, TFP growth, was mostly weaker across the board, as seen clearly in Figure 3. It was much weaker in Indonesia, for example. The major exceptions were Vietnam and Pakistan, both of which had much stronger TFP growth. For Vietnam, it was a case of going from a small negative in the 2000s to a strongly positive TFP growth rate in the 2010s, whereas Pakistan's acceleration was a strong buildup on an already solid rate of TFP growth in the 2000s.

FIGURE 2

CHANGES IN LABOR PRODUCTIVITY GROWTH RATE FROM THE 2000S TO THE 2010S AND THEIR COMPOSITION.

(PERCENTAGE POINTS)



Source: Author's estimates based on data from APO Productivity Database 2019.

Labor quality, which represents a shift in the composition of employment toward higher skills and experience, also made a range of stronger and weaker contributions to LP growth (see Figure 2).

It is to be noted that the APO Productivity Database identifies three inputs, namely, labor hours, labor quality (skills), and capital. TFP growth is a residual measure of the output growth remaining once the growth due to inputs has been counted. Consequently, inclusion of labor quality as an additional input means that there is a smaller TFP growth residual, compared with the case in which only labor hours and capital are included as inputs. To put it another way, some of the usual TFP growth measure is carved out of the residual and attributed to increases in skills.

How 2010s LP Growth Varied across Countries

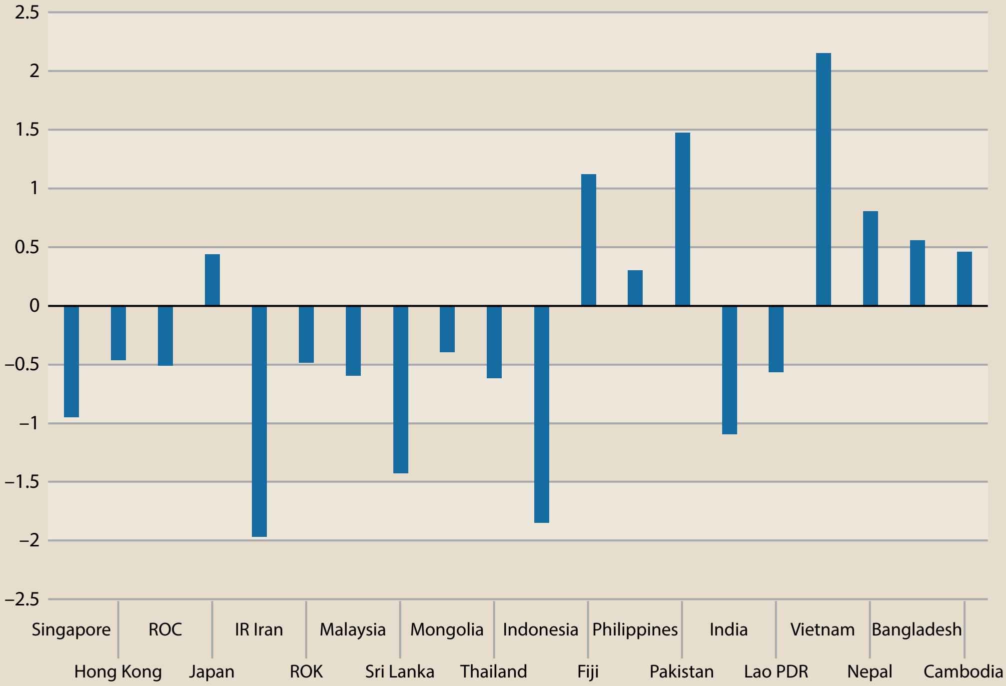
The accelerations meant that LP growth was very strong in most of the middle- and lower-productivity countries in the 2010s (see Figure 4). Six countries had annual average LP growth of over 5%. They were Vietnam, Bangladesh, India, Lao PDR, Mongolia, and Thailand. Two other countries, Cambodia and the Philippines, had annual average growth of over 4%.

The rate of LP growth in the high-productivity countries was low (2.6% a year or below). It was very low in the ROC and Japan.

FIGURE 3

CHANGES IN TFP GROWTH FROM THE 2000S TO THE 2010S.

(PERCENTAGE POINTS)



Source: Author's estimates based on data from APO Productivity Database 2019.

Most of the countries relied heavily on capital deepening as part of their development process. Capital deepening contributed over 4 percentage points to LP growth in Sri Lanka and Bangladesh and over 3 percentage points in India, Indonesia, Vietnam, Lao PDR, and Thailand.

The rate of TFP growth, and hence the TFP contribution to LP growth, varied considerably across countries. It was strongest (at 2.4% a year) in Pakistan. Four other countries, including Hong Kong with high productivity, had rates over 1.5% a year. However, eight countries had TFP growth of less than 0.6% a year, including Indonesia with a negative rate of –1.5% a year. In general, there was not a strong reliance on TFP growth.

Growth in skills made noticeable contributions to LP growth in most countries and was especially strong in Indonesia, Thailand, and Mongolia. Indonesia's skill contribution outweighed its negative TFP contribution.

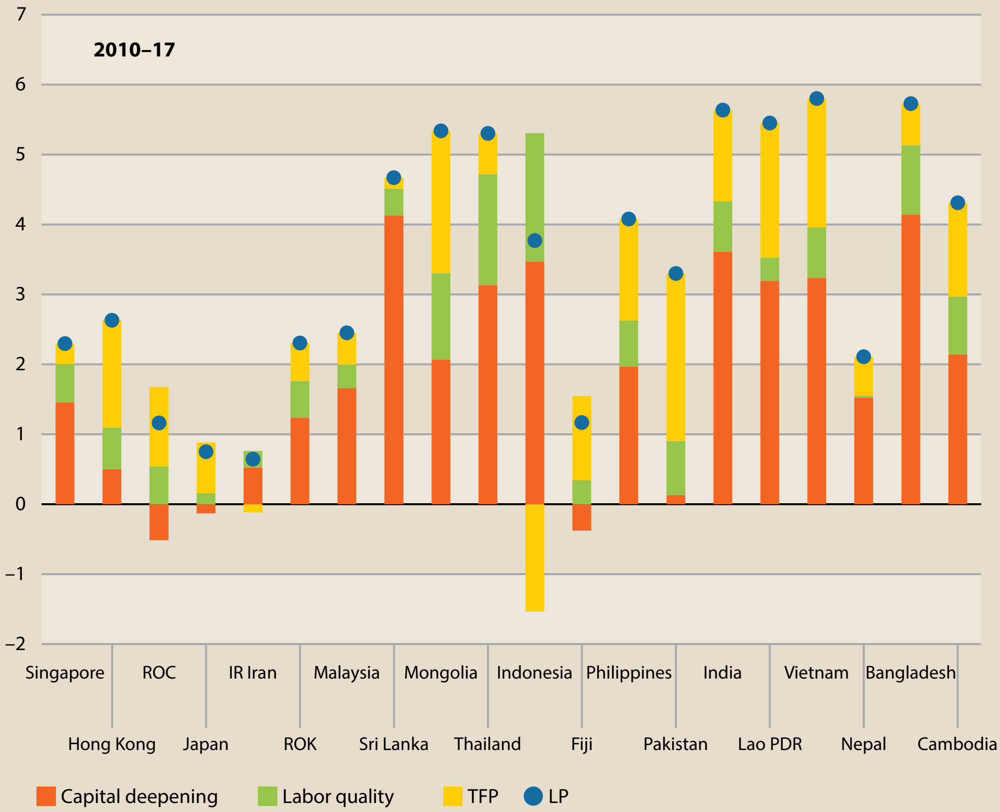
The Strength of Output Growth

Since productivity is the ratio of outputs to inputs, clearly the rate of output growth influences the rate of productivity growth. There can be short-term downturns in output growth owing to recessions. Otherwise, output growth responds to a combination of demand- and supply-side conditions.

There was strong output growth in the APO region in the 2010s. Output growth at over 4% a year was quite common among the lower-productivity economies (see the green bars in Figure 5). Output growth was weaker in the high-productivity countries.

FIGURE 4

LABOR PRODUCTIVITY GROWTH AND ITS COMPOSITION IN THE 2010S.
(IN % PER YEAR (LP) AND PERCENTAGE POINTS)



Source: Author's estimates based on data from APO Productivity Database 2019.

The strong output growth also meant a strong labor productivity growth. Figure 5 shows that output growth was stronger than hours growth in all countries in the 2010s. Growth in hours worked was generally under 2% a year, although it was stronger in Cambodia, Malaysia, Mongolia, and Nepal. Thailand was unique in having a cutback in hours worked, which made a positive contribution to its LP growth.

As detailed in Appendix A, the more-rapid LP growth in the 2010s for the APO countries was associated with weaker growth in hours worked, while output growth remained around the same. This contrasts with OECD countries where output growth weakened, while labor growth rose.

However, there were different experiences across APO countries. LP growth mostly fell in the high-productivity countries because of weaker output growth. However, it (LP growth) mostly increased in other APO countries through a combination of stronger output growth and weaker growth in hours worked (Appendix A).

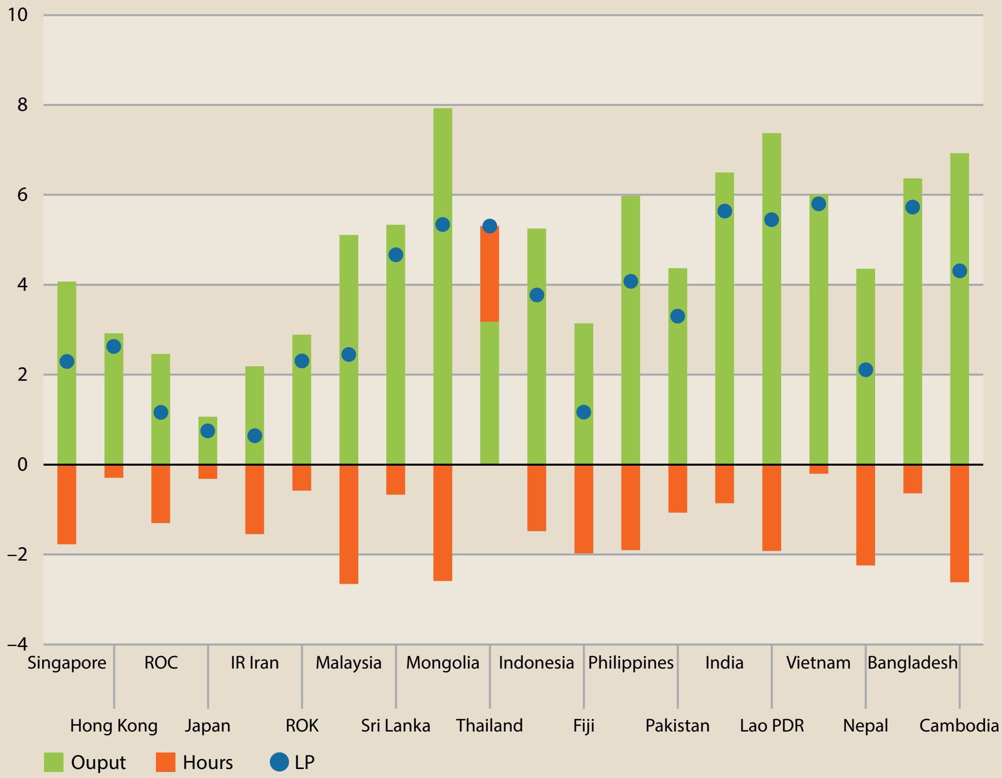
Sources of Output Growth: Inputs or TFP?

The prominence of capital deepening and the general weakness in TFP growth suggests that many APO countries have relied on input accumulation, rather than TFP growth, as a source of output growth. This

FIGURE 5

OUTPUT AND CONTRIBUTIONS OF HOURS WORKED TO LP GROWTH IN APO COUNTRIES IN THE 2010s.

(PERCENTAGE POINTS)



Source: Author's estimates based on data from APO Productivity Database 2019.

may be appropriate for countries at a stage of rapid development when there are large returns to investment in capital. However, as economies develop, diminishing returns can set in and countries become more reliant on innovation and efficiency gains, i.e., TFP growth, as a source of growth.

Figure 6 shows the contributions of input growth and TFP growth to average annual rates of output growth in APO countries. Part A of the figure refers to growth over the period from 1970 to 2000, while Part B refers to growth during 2000 to 2017.

Countries fall roughly in three groups. First, the high-productivity countries toward the left end of the graph had a generally strong reliance on TFP growth and on growth in skills (labor quality can be viewed as TFP growth due to increases in skills and experience). The Asian Tiger economies had rapid output growth and strong contributions from TFP and labor quality in the earlier period. Input accumulation was more important in Singapore, accounting for three-quarters of output growth, whereas TFP and labor quality accounted for around 40% of output growth in Hong Kong, the ROK, and the ROC. Japan had slower output growth, but TFP and labor quality contributed a little over 40% to the output growth. Output growth in these countries was lower in the second period, although they maintained a reliance on TFP and labor quality in proportional terms.

FIGURE 6

SOURCES OF OUTPUT CONTRIBUTIONS IN APO COUNTRIES.

(PERCENTAGE POINTS)

Source: Author's estimates based on data from APO Productivity Database 2019.

The second group comprises Malaysia, Thailand, and Indonesia. While they also had high output growth, which later slowed, they relied heavily on input accumulation. This group had very strong capital contributions, which, in the first period, accounted for about three-quarters of output growth in Malaysia and Indonesia and about half in Thailand. TFP growth was negative. Output growth slowed in these countries after 2000, but they increased their reliance on productivity growth.

Nearly all other countries form the third group. Their output growth accelerated, along with the productivity growth. Output growth was weaker in the first period and capital provided the strongest contribution to growth. The contributions of TFP and labor quality were strong in three of these countries, namely, Pakistan, India, and Sri Lanka, but weak elsewhere. Output growth was generally stronger in the second period. While there was still a heavy reliance on input accumulation, the additional output growth came mainly from productivity growth. There were strong TFP-cum-labor quality contributions in the 2010s in Mongolia, India, Lao PDR, Pakistan, the Philippines, Bangladesh, and Vietnam.

In summary, APO countries have mostly relied on input accumulation as the key source of output growth, but by varying degrees. Accumulation of capital inputs has been more important than accumulation of labor inputs. TFP growth has been variable but featured in countries and periods of strong output growth. Except perhaps for Singapore, the high-productivity countries have shown greater reliance than other countries on the contributions of TFP and skills growth. While the other countries have maintained a reliance on capital accumulation, their TFP growth has increased as a source of additional output growth.

Capital Productivity Trends

While capital productivity is not always a focus of attention, it can be of interest as an indicator of the extent to which capital is productively employed. In a long-term equilibrium, capital productivity could be expected to be stable, i.e., have zero growth (see Box). A negative rate might signal a poor investment decision while a positive rate might signal that productive opportunities remain.

INTERPRETING CAPITAL PRODUCTIVITY TRENDS.

Capital productivity tends to show little or no growth over a long period. However, this is not always the case.

Economic theory suggests that, if an economy is in a steady-state equilibrium, capital productivity will tend to show no growth. If there is a constant share of income going to capital, an increase in capital productivity indicates higher returns to capital. This would induce further investment and drive capital productivity and returns back to their long-term levels.

Consequently, a rise in capital productivity would indicate an underinvestment in capital, all other things being equal. If there were no inhibitions to investment flows, a correcting uptick in investment could be expected. Similarly, a decline in capital productivity would indicate an overinvestment in capital and induce a reduction in the rate of investment.

The interpretation is not as straightforward as this in practice. A decline in capital productivity can be temporary, associated with a temporary decline in output growth or there may be a major capital investment program that takes time to produce its expected rate of output. Further, capital productivity can change because of changes in industry mix since different industries have different capital intensities. Moreover, a change in the cost of capital or the share of income going to capital can mean that a change in capital productivity is not an indication of an under- or over-investment in capital.

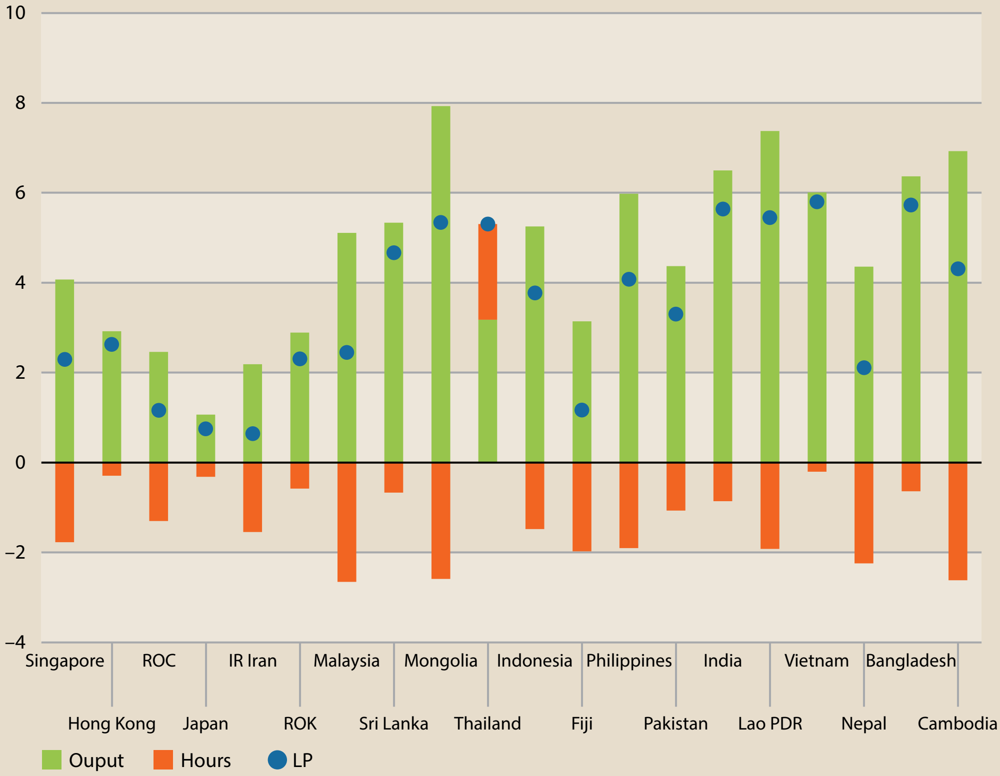
The OECD [3] noted that there had been a fall in capital productivity in advanced economies over the past 20 years, due to a fall in the cost of capital.

There is no clear pattern in APO countries, with a diversity of experience from strongly positive growth to strongly negative (Figure 7). There is a group of only six countries, i.e., Thailand, IR Iran, Cambodia, Malaysia, the ROK, and Singapore, for which capital productivity growth in the 2010s was less than half a percentage point away from zero growth.

FIGURE 7

CAPITAL PRODUCTIVITY GROWTH IN THE 2000S AND 2010S IN APO COUNTRIES.

(IN % PER YEAR)



Source: Author's estimates based on data from APO Productivity Database 2019.

Figure 8 shows a strong growth in capital in the 2010s in many APO countries. Rates of growth were above 6% a year in seven countries, led by India and Lao PDR with over 8%. The blue dots in the figure show the rate of capital productivity growth. So, dots below the origin mean that the capital growth was not matched by output growth.

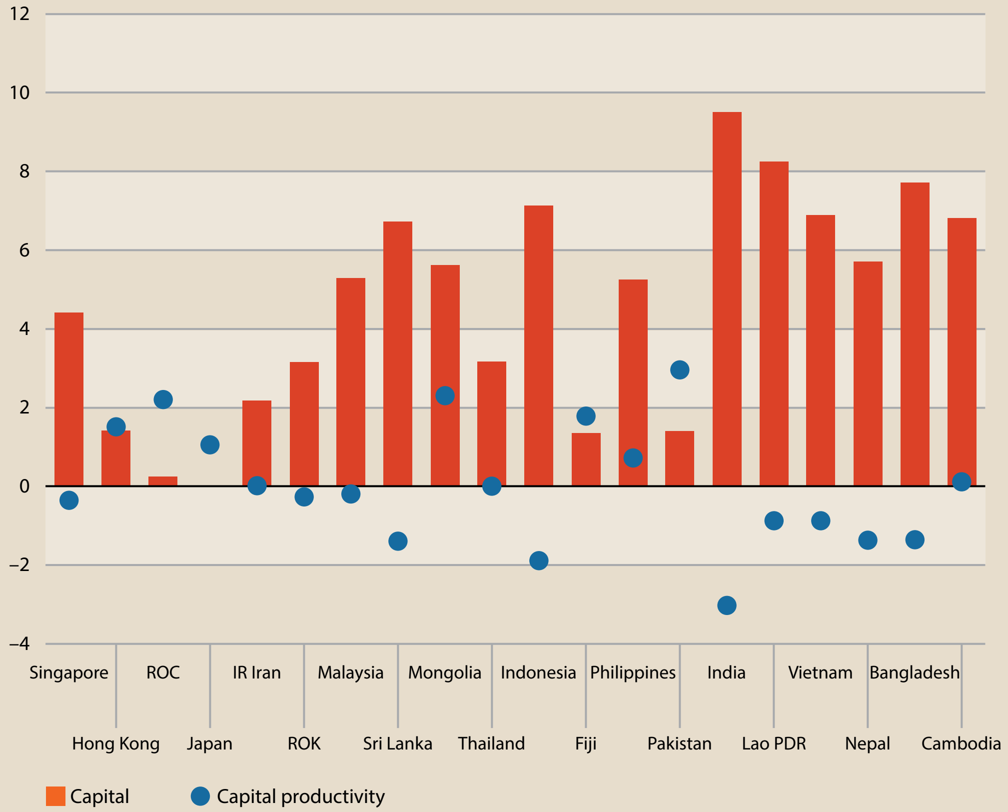
Key Point Summary

- While labor productivity growth slowed in the 2010s in other regions around the world, it increased in the APO region as a whole.
  - However, like other high-productivity countries, the high-productivity APO countries have also seen a productivity slowdown.

FIGURE 8

GROWTH IN CAPITAL AND CAPITAL PRODUCTIVITY IN APO COUNTRIES IN THE 2010s.

(IN % PER YEAR)



Source: Author's estimates based on data from APO Productivity Database 2019.

- ○ Because output growth has been consistently strong (at least in the middle-productivity economies), there was little acceleration in the 2010s. The acceleration in LP growth was more due to weaker growth in hours worked.
- ○ Slower output growth was the main contributor to weaker LP growth in the Asian Tiger economies.

- Greater capital deepening provided a boost to LP growth in the 2010s in the middle-productivity economies.
- Some of the lower-productivity economies also had sizeable contributions from changes in the mix of skills.
- APO countries have mostly relied on input accumulation, especially capital accumulation, to meet output growth.
    - ○ TFP growth has been more prominent, and more consistently so, in the higher-productivity APO countries.

    - Other countries maintained a reliance on capital accumulation but increased their TFP growth as a source of additional output growth in the 2010s.

- TFP performance has been mixed. Eight countries had higher TFP growth in the 2010s than in the 2000s.

- Capital productivity performance has been diverse, with 2010s growth falling within a range of highly positive to strongly negative. Only six countries had capital productivity growth within half a percentage point of zero. The countries with strongly negative capital productivity trends had very strong capital growth.

PRODUCTIVITY DETERMINANTS

A central task of this study was to settle on a framework of key factors that drive and enable productivity growth, called the productivity determinants. Indicators for each of the productivity determinants were then assembled (these are set out in the next chapter).

This chapter summarizes our review of the literature on productivity determinants. The detailed review is presented in Appendix B. This review distinguishes between factors that are within the control of businesses to influence productivity outcomes and factors that work indirectly by influencing the environment in which businesses operate. Examples of the latter include the availability of skills and the taxation regime. Importantly, governments have some policy control over the indirect determinants that condition the operating environment for business.

About the Review

The review aims to bring together the main productivity determinants that have been discussed and examined in economics literatures. It distills determinants that have been analyzed and discussed at three different levels, i.e., firms, industries, and the economy as a whole, in medium- to long-term timeframes. To be clear, there is no claim that the review is definitive. The literature does not identify a definitive list of determinants, and a clear assessment of how much each factor matters is not analytically possible.

Inevitably, the chapter discusses productivity determinants one at a time. However, this sidesteps the important perspective that productivity determinants are interrelated and cannot be rightly viewed in a piecemeal fashion. As a simple example, most of the innovations depend on a combination of research and development (R&D) activity and workforce skills to develop and implement new technologies.

One of the themes in this report is the importance of some prerequisite determinants, i.e., factors that need to be in place to provide a sound foundation for other determinants to support strong and sustained productivity performance in the long run. Strong institutions and economic and political stability are examples of these prerequisite determinants.

The review encompasses all forms of productivity measures, i.e., labor productivity, capital productivity, and total factor productivity (TFP). The context suggests which concept applies.

This chapter provides a brief elaboration on each of the identified productivity determinant. For more explanation, examples, and analytical information, see Appendix B.

Hierarchy of Determinants

Three types of productivity determinants can be distinguished, as shown in Figure 1.

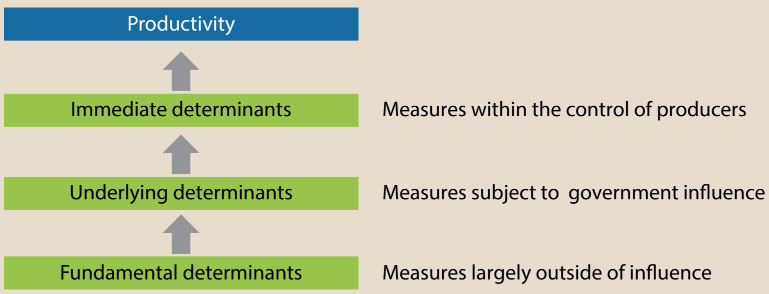
Producers make many decisions that directly affect productivity outcomes, e.g., ‘what capital investments to make’ and ‘how much labor to employ.’ The factors over which businesses have decision-making control are referred to in this report as ‘immediate determinants’ of productivity.

There are also many factors in firms' operating environments that affect their productivity performance but are outside of their direct control. Examples include the taxation system and the quality of the communications infrastructure. These are referred to as 'underlying determinants' and, while they cannot be directly influenced by most producers, they can be influenced by governments. They, therefore, have the greatest policy relevance.

Finally, there are 'fundamental determinants,' such as resource endowments and geographic location (which affects climatic zone and distance from markets). These also affect productivity, but are not subject to influences, at least in the short-to-medium term.

FIGURE 1

HIERARCHY OF PRODUCTIVITY DETERMINANTS.

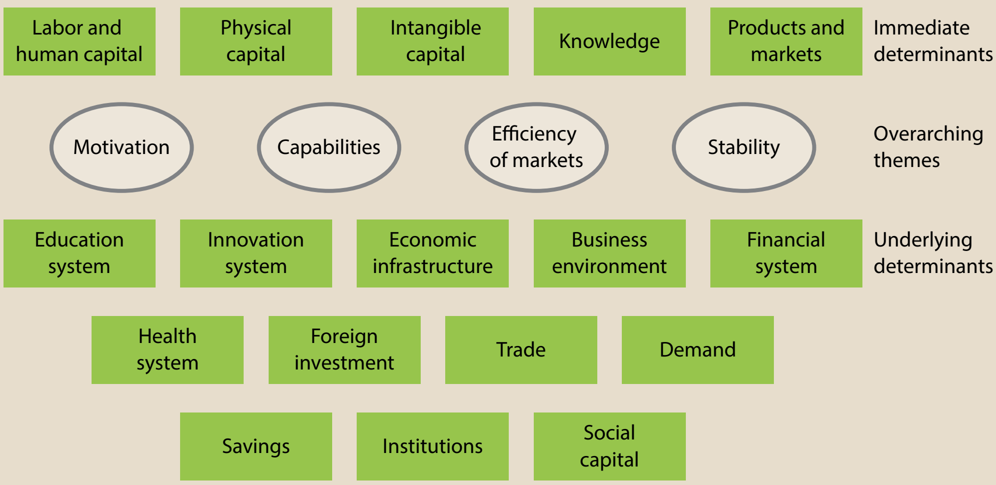


This review of productivity determinants focuses on immediate and underlying determinants. Since fundamental determinants are not subject to much influence, they are not discussed further.

The framework of immediate and underlying determinants that will be discussed is displayed in Figure 2. Note that linkages between the determinants are not shown, as doing so would make the diagram too complex to absorb easily.

FIGURE 2

FRAMEWORK OF INTERMEDIATE AND UNDERLYING DETERMINANTS.



Immediate Determinants

Productivity, at its simplest, is the ratio of outputs to inputs. Firms make decisions about what to produce, which production technology to use, and how much and what types of labor and capital inputs to use. These directly affect the ratio of outputs to inputs. And the investments firms make in developing and acquiring skills, innovation, and new capital affect their productivity performance over time.

Labor and Human Capital

As an input to the denominator of the productivity ratio, the quantity of labor has an obvious effect on the measurement of productivity. Labor productivity (LP) and TFP are improved when more output is produced per unit of labor.

The quality of labor input also matters. Growth in human capital or skills raises productivity in two ways. First, skilled workers are more productive, on average, than low-skilled workers. A skilled worker, for example a crane driver, can generate more output in an hour of work than a low-skilled manual worker can. Second, skilled workers are better able to raise the rate of innovation by developing or implementing new technologies and management practices (see Appendix B). Entrepreneurial and technical skills are especially important in promoting innovation. At a national level, more educated workers help developing countries (and countries that do not develop their own technologies) to absorb technologies developed in other countries. In this way, they assist the process of countries catching up to the world frontier (see Chapter 6 for more on catchup and convergence in the APO region).

As reviewed in Appendix B, empirical studies have found that education has a positive effect on long-term growth rates.

Physical Capital

Physical capital, in the form of assets such as buildings, plants, machinery, and equipment, affects productivity in several ways. First, it has a direct effect on TFP as one of the inputs on the denominator of the productivity ratio. Second, it affects labor productivity directly through capital deepening, i.e., the increase in the capital–labor ratio. Third, new capital can embody technological changes, which affect productivity by altering the production process. Fourth, certain types of capital can have an indirect effect on TFP by enabling other innovations.

Information and communications technologies (ICTs) provide an important example of capital that has enabling effects on TFP. ICT acts as a platform on which users can develop their own innovations in products and processes. As detailed in Appendix B, innovative use of ICT can improve capacity utilization, enable product customization, support organizational reengineering, and so on. APO countries' engagement with ICTs is discussed in Chapter 6.

Intangible Capital

Since the digital revolution got underway, there has been a growing recognition of the importance of investments in intangible assets. These are assets of value that companies call on to grow in a fast-changing and competitive world. They cover such things as R&D and associated intellectual property; designs, software, and databases; and marketing outcomes, brands, and organizational capital, including processes that allow firms to anticipate and adapt to change.

Appendix B presents the results of studies that show a positive linkage between various elements of intangible capital and productivity.

Knowledge

Knowledge covers technology. In the long haul, development, adaptation, and implementation of technological advances have formed the main vehicle for productivity growth. Some technological advances allow firms to produce new products that have lower input requirements, while other technological advances allow firms to generate existing products in less resource-intensive ways.

Knowledge also includes advances in 'soft' technology, i.e., the knowhow based on management techniques, workplace arrangements, and organizational structures. Through these advances, firms can get more from their inputs and so become more productive.

Products and Markets

By choosing products and markets, and by developing new ones, firms can influence their productivity performance. Because there are different productivity levels associated with different products, a switch from a low-productivity-level product to a higher-productivity-level product will raise the average productivity. Choosing to export can allow firms to benefit from economies of scale in production, thereby leading to productivity improvements. International trades may also increase the returns to innovation, and, in some circumstances, facilitate knowledge transfers between firms in different countries.

Firm dynamics also affects the average level of productivity. For example, there can be developments by which high-productivity firms capture more market share and new entrants become high-productivity firms, while low-productivity firms exit the industry.

The degree of competition in markets is a driver of productivity improvements. It provides incentives for firms to innovate and improve performance to maintain or increase market share.

Underlying Determinants

The above immediate determinants have direct effect on outputs produced and inputs used, and therefore, on producers' productivity. However, there are other factors, beyond the production choices of individual firms, that drive and enable producers to be more productive. These factors are the underlying determinants.

Education System

Human capital affects a nation's productivity, as noted above, by enhancing individuals' personal productivity and by enabling more rapid innovation and absorption of knowledge. The effectiveness of a country's education and training system is therefore of great underlying importance in supporting long-term productivity growth.

The education system covers early childhood learning, primary and secondary schooling, and tertiary education and training. An effective education system develops basic numeracy and literacy, skills for work and life, and a capacity for ongoing learning.

Innovation System

The innovation system is the interrelated network of the government, universities, and private research agencies and their researchers. The diffusion of ideas and research successes depend on the innovation system. Success requires collaborations and cross-fertilization of ideas, particularly for large projects and where areas of expertise and specialization have been developed and are needed. The innovation system provides the research infrastructure for firms to undertake research and adapt knowledge to match their circumstances.

Infrastructure

Economic infrastructure, including transport and communications systems, energy generation, and water distribution, provides a foundation for businesses that enhances productivity by reducing transaction costs, production and distribution costs, and spatial barriers to knowledge diffusion and trade.

Not all infrastructure spending, however, is good spending. Some spending can reflect political rather than economic priorities and some can get wasted and diverted needlessly. Effective selection and management of projects is needed.

Business Environment

The business environment is the set of rules and conditions under which businesses operate. It comprises such elements as the taxation regime, product regulation, and environmental regulation; industrial relations and work rules; and corporate governance requirements and compliance requirements for starting and running a business.

These rules and conditions affect productivity by conditioning the amount of inputs that are required to produce outputs. A country's tax system and regulatory settings can either facilitate or discourage investment. In a positive business environment, high-productivity firms can succeed and grow. While they are mostly formulated for good reason, some regulations are either unnecessary or implemented in ways that bring avoidable negative effects on productivity.

Financial System

Financial market development is positively associated with economic growth, investment, and productivity. Constraints on credit can prevent productive ventures from taking place. Often an investment in R&D is the last to be funded. Financial market imperfections can also distort the allocation of finance to where it can be most productively employed, e.g., inhibiting startups in an industry, financing technology adoption, or underwriting entrepreneurial ventures.

Health System

The quality of the health system helps determine the productivity of individuals by conditioning their ability to participate fully in work activities. With good healthcare, there is less time off work due to minor ailments; faster recovery from serious illnesses and accidents; and greater focus on prevention and early detection.

Foreign Investment

Foreign investment provides a source of funding that complements domestic savings. Foreign direct investment (FDI) can also bring in benefits in the form of knowledge spillovers. For example, foreign companies can bring technology and knowhow that transfers to businesses in the local economy, lifting domestic productivity.

Trade

Trade can enhance productivity through various mechanisms such as exports and imports. Exporting can lift productivity by raising production to a point where economies of scale are possible. Importing can provide access to embedded technologies, as happens in case of ICTs. Imports also put competitive pressure on domestic firms in the same industry, spurring them to improve their productivity. Trade also encourages a reallocation of resources in an economy to where they can be most productively employed.

Demand

Demand patterns can affect productivity by affecting the scale of production and allocation of resources to produce for different markets. They can entice product development and innovation and induce greater competition between producers.

Savings

Domestic savings provide a pool of funds for investment. Together with foreign investment, this helps determine the cost of the capital and the amount of capital accumulation that takes place.

Institutions

Institutions are laws, customs, or practices that define the formal and informal rules governing economic, political, and social relations. Effective institutions are associated with the definition, protection, and enforcement of property rights; protections against corruption and crime; and defense of the rule of law. The quality of institutions also depends on political stability and effective governance. Strengths and weaknesses in institutions can make big differences to the accumulation of physical and human capital over time, and thus to a country's long-term growth and development. Weak institutions raise the risks of obtaining inadequate rewards from investments.

Social Capital

Social capital, in this context, captures the levels of trust, cooperation, and cohesion in a society. It affects productivity by conditioning the extent to which citizens are prepared to commit to long-term work, invest in education and work hard, and cooperate with others to achieve productive outcomes.

Overarching Themes

Clearly, many factors have underlying or indirect effect on productivity, and there are complex interactions and interdependencies between various factors. Some factors also shape the way other factors interact (see Appendix B).

We put forward four overarching themes from the underlying determinants (these are developments of the Australian Productivity Commission's themes of incentives, capabilities and flexibility) [4]. They involve the following key requirements for strong and sustained productivity improvement:

- **Motivation:** Producers must be motivated, for example, by market pressures, to improve productivity.
- **Capabilities:** Producers must have access to the resources they need to improve productivity.
- **Efficiency of markets:** Resources need to be allocated and reallocated to where they can be productivity employed.
- **Stability:** Long-term productivity growth is underpinned by economic and political stability.

Motivation

The business environment shapes motivation to be more productive in important ways. Onerous regulation can get in the way of business startups and expansion. Regulations that stipulate certain processes must be followed can stifle innovation. Licensing and regulation can restrict competition, which could encourage firms to be more productive (see Appendix B). Taxation regimes shape the net rewards that firms gain from taking entrepreneurial risks and making investments toward productivity improvement.

Trade and foreign investment policies can also affect motivation by reducing or enhancing competitive pressures. Trade barriers reduce the competitiveness of imported goods and services, while restrictions on foreign investment can limit the competition that domestic producers face.

Capabilities

The capabilities to improve productivity, such as skills and efficient communication, are built through the education and health systems, the innovation system, development of infrastructure, and enhancement of social capital.

Efficiency of markets

The efficiency of markets requires resources to be allocated to where they can be used most productively and profitably. Market efficiency is influenced by changes in the business environment, especially in the regulation of product, labor and capital markets. The development and sophistication of the financial system also matters.

The quality of institutions is a more fundamental influence. As noted above, institutions affect businesses' attitudes toward risk and therefore help determine which production activities they pursue.

Stability

Institutions provide the foundation upon which economic and political stability are built. Social capital and financial system are also important.

The Need for a Comprehensive Approach

A set of determinants that embraces all four themes is needed for long-term productivity success. While producers may be motivated to improve productivity, they may be unable or reluctant if the needed capabilities are unavailable or if there is political instability that puts investment at risk. National productivity will not be promoted to the fullest if markets are distorted, i.e., resources are diverted to unproductive ends. Similarly, infrastructure and skills capabilities can be put in place, but they will not have maximum effect on productivity if producers are not keenly motivated to improve productivity.

A combination of drivers and enablers is needed. Motivation is a driver of productivity growth. The other overarching themes are enablers of productivity growth.

These four overarching themes are also touchstones for government policy. As noted at the outset of this chapter, governments need to take a multifaceted policy approach. They need to ensure that underlying determinants are appropriately addressed to give strength to all four overarching areas.

Key Point Summary

- Three tiers form a hierarchy of productivity determinants. These are:
    - immediate determinants that are within the control of businesses;

- underlying determinants that are not within the control of businesses but can be influenced by governments through policy actions; and
- fundamental determinants that are not subject to much influence (and are not discussed in this report).

- Immediate determinants are:
  - labor and human capital;
  - physical capital;
  - intangible capital;
  - knowledge; and
  - products and markets.
- Underlying determinants are:
  - the education system;
  - the innovation system;
  - infrastructure;
  - the business environment;
  - the financial system;
  - the health system;
  - foreign investment;
  - trade;
  - demand;
  - savings;
  - institutions; and
  - social capital.
- There are four overarching themes in the underlying productivity determinants that need to be in place to ensure long-term productivity success. These are,
  - motivation;

    - capabilities;
    - efficiency of markets; and
    - stability.

- Governments need to ensure that policy actions address underlying determinants in all the four overarching areas to foster strong and sustained productivity performance.

DIAGNOSTIC INDICATORS

This chapter establishes a set of diagnostic indicators for each of the productivity determinants that were put forward in the previous chapter. These indicators provide the basis for identifying the strengths and weaknesses of APO countries on the determinants of productivity growth.

APO countries' positions (scores) on these indicators are reviewed in this chapter. In the next chapter, the indicators are used to form indices of the overarching themes, i.e., motivation, capabilities, efficiency of markets, and stability; and these indices are used to measure countries' productivity orientation and readiness at a broad level. The indicators are also used as a key part of individual countries' reviews in the country studies reported in Part B.

The set of indicators shows the most-recent positions of countries on productivity determinants. This set can be carried forward to monitor countries' future progress in strengthening their productivity determinants. Some indicators, especially from the World Economic Forum (WEF)'s Global Competitiveness Report, have been excluded because they have recently been dropped in a restructuring of indices.

However, some historical indicator data is included in other areas of the report. A small number of supplementary indicators are added in undertaking the country studies to give a fuller picture of some productivity determinants. Historical data are also used in the next chapter as part of an exploration of relationships over time.

A total of 48 indicators are introduced in this chapter, of which 13 are for immediate determinants and 35 are for underlying determinants. Multiple indicators are put forward for some determinants as they provide different information.

Due to space constraints, a complete examination of all 48 indicators is not provided. Prominence is given to those indicators that show greater association with productivity as indicated by correlation coefficients between the indicator and the level of labor productivity across APO countries. It also turns out that there is quite a consistent pattern in which high-productivity countries score higher on indicators and, conversely, middle- and lower-productivity countries score lower. To display all indicators would be repetitive.

Values of all indicators for individual APO countries are presented in the country studies in Part B of the report, while values of all indicators for all countries are listed in Appendix H. The sources and descriptions for the indicators are listed in Appendix G.

Indicators of Immediate Productivity Determinants

The first step is to examine the immediate determinants and the correlations between diagnostic indicators and the levels of labor productivity in APO countries (Table 1). The closer the correlation coefficient is to 1, the stronger is the indicator's correlation with productivity and the greater the weight that can be given to the indicator as an explanator of productivity levels, all other things being equal. An 'NA' in the table indicates a correlation coefficient is 'not available' because it is a growth variable that cannot be related to productivity levels.

Since a cross-section of data points is used (a sample across high- and lower-productivity APO countries at a point of time), the correlations can be taken as reflecting long-term relationships. The differences between countries are ones that have emerged over long periods.

TABLE 1

CORRELATIONS BETWEEN LP LEVELS AND IMMEDIATE DIAGNOSTICS FOR APO COUNTRIES.

Indicator	Correlation coefficient
Capital intensity	
Capital/GDP ratio	0.75
Capital deepening	na
IT capital deepening	na
Human capital	
Labor quality's contribution to LP growth	na
WEF Current workforce	0.87
WEF Entrepreneurial Culture	0.51
Knowledge	
NRI technology	0.87
NRI people	0.84
Products and markets	
Share of agriculture	–0.84
Share of manufacturing	0.22
Share of medium- and high-tech manufacturing	0.75
Exports/GDP	0.62
Imports/GDP	0.52

Source: Author's calculations.

The immediate determinants are discussed in an order that gives prominence to indicators with higher correlation coefficients.

Human Capital

Human capital is represented by the following indicators:

1. Current Workforce Index from the WEF Global Competitiveness Report, which measures the education and skills of the current workforce;

2. Entrepreneurial Culture from the WEF Global Competitiveness Report, which captures the degree of entrepreneurial activity; and

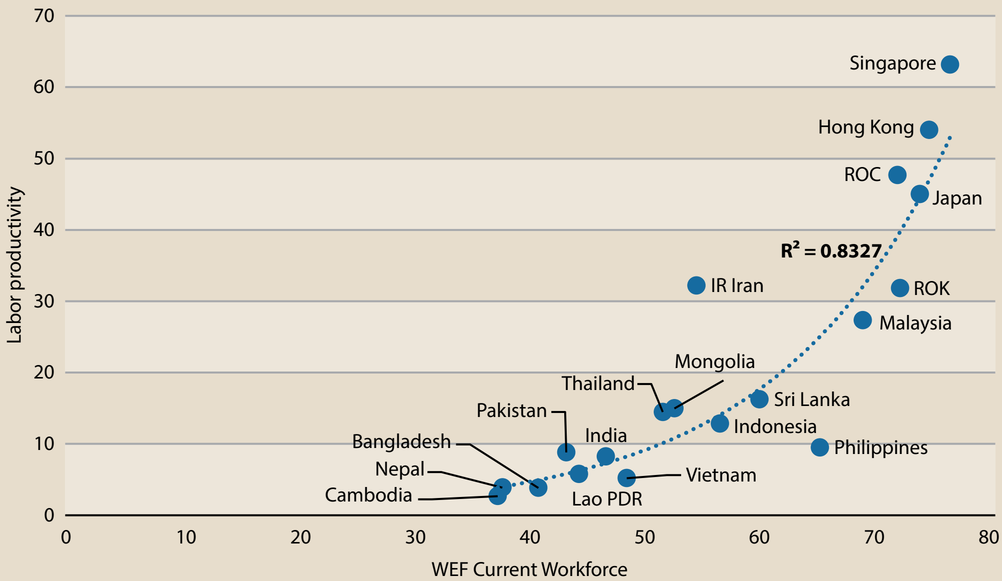
3. Growth in labor quality as revealed in the APO Productivity Database.

Table 1 suggests that, with the highest correlation coefficient of 0.87, the Current Workforce indicator is of prime importance. This indicator covers the average years of schooling of the workforce and the skills of the current workforce in various areas, e.g., extent of staff training, quality of vocational training, skillsets of graduates, digital skills among active population, and ease of finding skilled employees.

Countries' values for the Current Workforce indicator are displayed in Figure 1. The high-productivity countries like Japan and the Asian Tigers have high education and skill levels, whereas the lower-productivity countries have lower education and skill levels. Singapore is at a forefront globally, being ranked number 3 in the world.

FIGURE 1

THE RELATIONSHIP BETWEEN HUMAN CAPITAL AND PRODUCTIVITY IN APO COUNTRIES.



Note: Scores are 0–100 and LP is in USD at PPP.

Figure 1 also shows a positive relationship between workforce skills and productivity, whereby the countries with high skill levels have high productivity levels too. Indeed, the figure suggests that, based on the WEF Current Workforce indicator, the relationship between human capital and labor productivity is nonlinear across APO countries. This means there are proportionately greater productivity returns as the human capital in the workforce increases. This suggests that human capital is very important for productivity performance but that a certain level of development is required before more substantial payoffs from upskilling become available.

From the figure, the Philippines does not have as high a productivity level as the fitted curve would suggest for the level of its human capital indicator. This implies that some other factor must be dragging its productivity down. On the other hand, IR Iran has a higher LP level than expected, according to the curve.

The WEF Entrepreneurial Culture indicator and the labor quality contribution to LP growth are not displayed here. Values for these indicators are shown in Appendix H and, for individual countries, in the country studies in Part B.

Knowledge

The level of knowledge is represented by:

1. the technology pillar from the Network Readiness Index (NRI); and
2. the people pillar from the NRI.

(In the country studies, we supplement the knowledge indicators with a WEF indicator, called 'Availability of latest technologies.' This indicator is available for 2017 but cannot be carried forward for years beyond.

Knowledge is another important determinant in Table 1, with both the diagnostic indicators showing strong correlations with productivity. While these indicators are focused on ICTs and digital capabilities, it could be argued that variations in digital knowledge across countries are also reflective of variations in technical and nontechnical knowledge more generally.

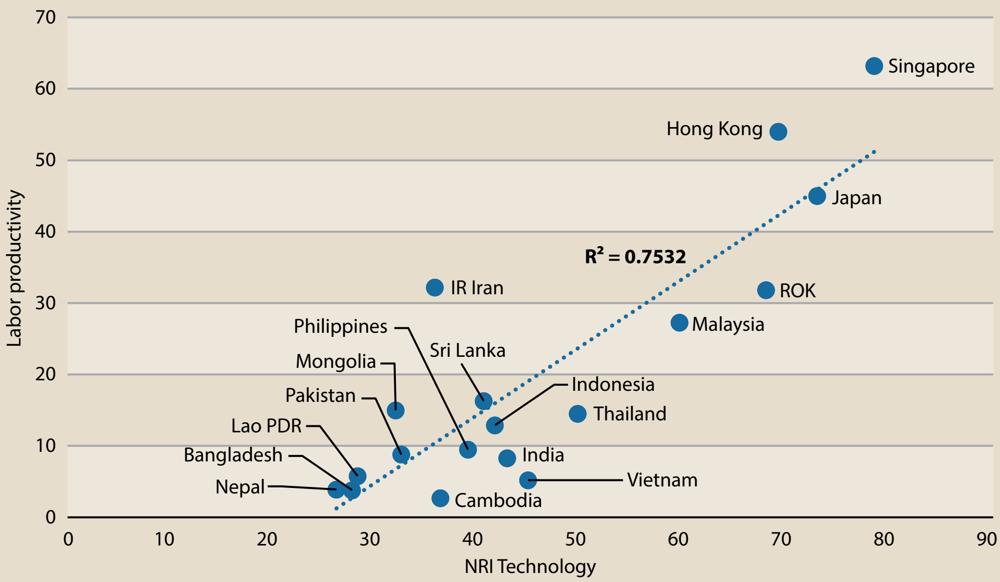
The technology pillar covers access to the internet, content development, and engagement in advanced technologies. The people pillar measures the sophistication of use of the internet and related technologies by individuals, businesses, and governments. These two indicators are components of an overall Network Readiness Index, published by the Portulans Institute.

There are some strong performers in the APO group. Singapore is ranked number 2 in the world on the overall NRI. Malaysia is ranked number 1 among upper-middle income countries, Vietnam is ranked number 1 among lower-middle income countries and Nepal is ranked number 3 among low-income countries.

Countries' values for the technology indicator, together with the relationship with labor productivity, are shown in Figure 2. There is a broadly similar pattern for the people indicator.

FIGURE 2

RELATIONSHIP BETWEEN THE NRI TECHNOLOGY INDICATOR AND LABOR PRODUCTIVITY.



There is a divide between high- and lower-productivity countries on these two indicators. The lower-productivity countries are much less engaged with digital technologies than the high-productivity countries. This is perhaps an area where the lower-productivity countries could lift their engagement, at least in becoming more sophisticated users of digital technologies.

Capital Intensity

Capital intensity is represented by

1. the ratio of the capital stock to GDP, as revealed in the APO Productivity Database;

2. the rate of capital deepening (i.e., the increase in capital–labor ratio), as revealed in the APO Productivity Database; and

3. the rate of IT capital deepening, as also revealed in the APO Productivity Database.

Values of the ratio of capital stock to GDP are presented in Table 2. On this measure, there are large differences in capital intensity between APO members. The ratio of capital stock to GDP was over 8 in 2017 in the ROC, Singapore, and Hong Kong, but was 2.5 or less in Sri Lanka, Mongolia, and Pakistan.

TABLE 2

CAPITAL/GDP RATIOS FOR APO COUNTRIES IN 2017.

Country	Capital/GDP	Country	Capital/GDP
ROC	8.6	Philippines	2.9
Singapore	8.3	Cambodia	2.7
Hong Kong	8.1	Bangladesh	2.7
ROK	7.0	Lao PDR	2.6
Japan	5.4	India	2.6
Thailand	4.4	IR Iran	2.6
Indonesia	3.6	Vietnam	2.6
Nepal	3.5	Sri Lanka	2.5
Malaysia	3.5	Mongolia	2.5
Fiji	3.1	Pakistan	1.8

Source: APO Productivity Database 2019.

Products and Markets

Products and markets are captured by:

1. the share of agriculture in GDP, derived from the APO Productivity Database;

2. the share of manufacturing in GDP, derived from the APO Productivity Database;

3. the share of medium- and high-tech production in manufacturing value added, taken from the UNIDO Competitive Industrial Performance report;

4. Share of exports in GDP, derived from the APO Productivity Database: and

5. Share of imports in GDP, derived from the APO Productivity Database.

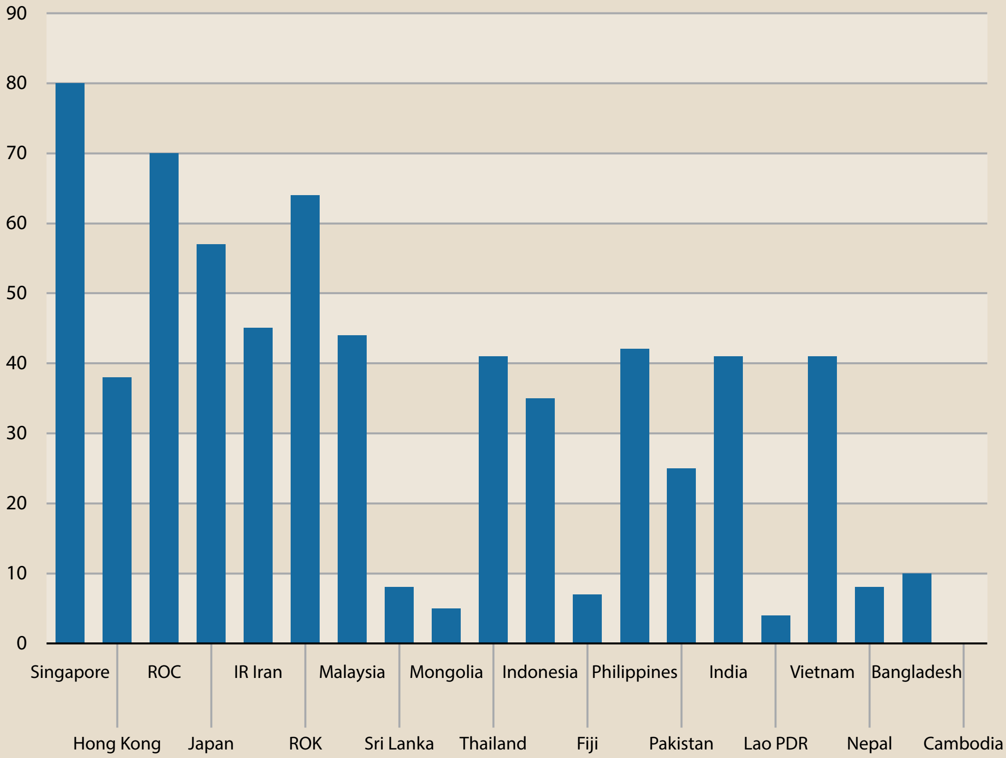
There are also large differences between APO countries on the products and markets indicators.

The size of the agricultural sector is highly and negatively correlated with productivity levels. The high-productivity countries have negligible or small agriculture sectors, whereas four countries (Nepal, Cambodia, Pakistan, and Lao PDR) have agriculture sectors accounting for over 20% of their economies. (The influence of industry mix on productivity is discussed in Chapter 6).

Interestingly, the manufacturing share indicator is not highly correlated with productivity. However, the degree to which manufacturing comprises medium- and high-technology production is highly correlated. The latter is displayed in Figure 3. There are stark differences between the high-productivity countries (at the left of the figure) and some of the middle- and lower-productivity countries. These highlight the large differences in technological capabilities of APO countries. These differences cannot be changed in the near term and need to be addressed through a range of underlying measures to raise skills and competencies.

FIGURE 3

VALUES OF THE MEDIUM- AND HIGH-TECH SHARES OF THE MANUFACTURING INDICATOR FOR APO COUNTRIES.



Intangible Capital

Indicators of intangible capital for the breadth of APO countries were not found.

Indicators of Underlying Productivity Determinants

In general, more attention should be given to the indicators of underlying determinants. It is the underlying determinants that drive the outcomes for the immediate determinants.

The correlations between the various diagnostic indicators and labor productivity levels are shown in Table 3. The underlying determinants are discussed in an order that gives prominence to indicators with higher correlation coefficients.

TABLE 3

CORRELATION COEFFICIENTS FOR INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Correlation coefficient	Indicator	Correlation coefficient
Education system		**Foreign investment**	
WEF Future Workforce	0.75	KOF Financial Globalisation	0.70
Innovation system		KOF Financial Globalisation, de jure	0.76
WEF Innovation Capability	0.85	FDI Stock/GDP (%)	0.60
KOF Informational Globalisation, de facto	0.77	THF Investment Freedom	0.58
Infrastructure:		**Trade**	
WEF Infrastructure	0.90	WEF Trade Openness	0.73
Business environment		THF Trade Freedom	0.58
THF Business Freedom	0.78	KOF Trade Globalisation	0.55
WEF Administrative Requirements	0.60	KOF Trade Globalisation, de jure	0.73
WEF Domestic Market Competition	0.78	**Demand**	
THF Tax Burden	0.02	WEF Macroeconomic Stability	0.56
WB WGI Regulatory Quality	0.86	HF Monetary Freedom	0.45
WEF Labor Market	0.70	**Savings**	
THF Labor Freedom	0.59	Gross savings (% of GDP)	0.28
NRI Governance	0.83	**Institutions**	
Financial system		WEF Institutions	0.86
WEF Financial System	0.72	IMF Financial Institutions	0.81
IMF Financial Markets	0.74	WB WGI Political Stability	0.54
THF Financial Freedom	0.58	WB WGI Rule of Law	0.74
Health system		WB WGI Control of Corruption	0.89
Life expectancy at birth (years)	0.86	WB WGI Government Effectiveness	0.89
		Social capital	
		WEF Social Capital	0.47
		WB WGI Voice & Accountability	0.51

Infrastructure

The indicator for infrastructure is the infrastructure pillar (correlation coefficient = 0.9) from the WEF's Global Competitiveness Report.

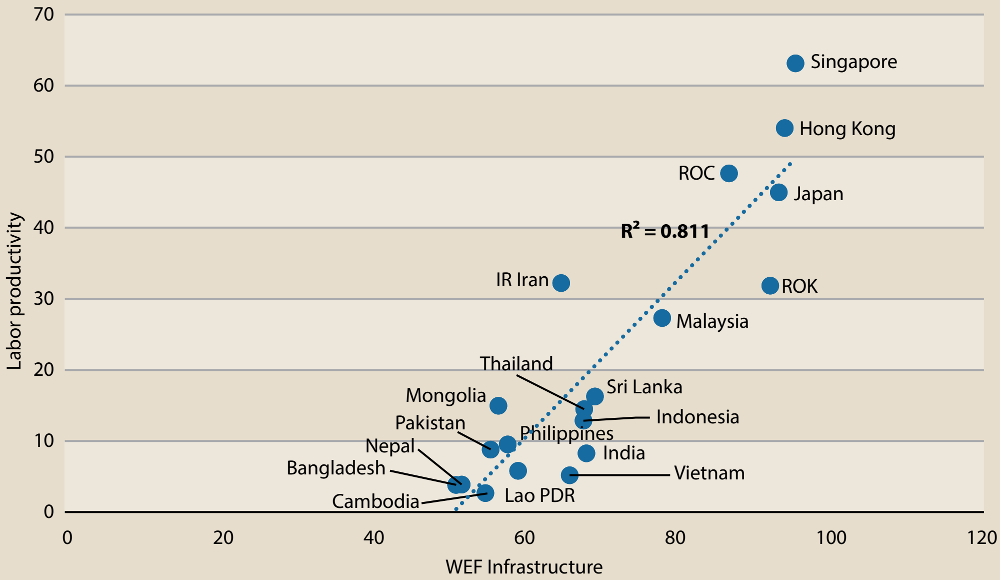
This indicator has the largest correlation coefficient among all underlying indicators, thereby implying that it should be given strong emphasis. The infrastructure indicator covers connectivity, efficiency, and quality in the areas of transport infrastructure (road, rail, air, and sea) and utility infrastructure (electricity and water).

The values shown in Figure 4 reveal a substantial difference between the high-productivity countries and most other countries, although Malaysia is not that far behind. Countries scoring below 60 on this indicator are Lao PDR, the Philippines, Mongolia, Pakistan, Cambodia, Nepal, and Bangladesh. The score for Fiji is not known.

The figure reveals a strong positive relationship between infrastructure and labor productivity.

FIGURE 4

RELATIONSHIP BETWEEN INFRASTRUCTURE AND PRODUCTIVITY IN APO COUNTRIES.



Note: Scores are 0–100 and LP is in USD at PPP.

Institutions

Several indicators are used to measure different aspects of institutions. These are

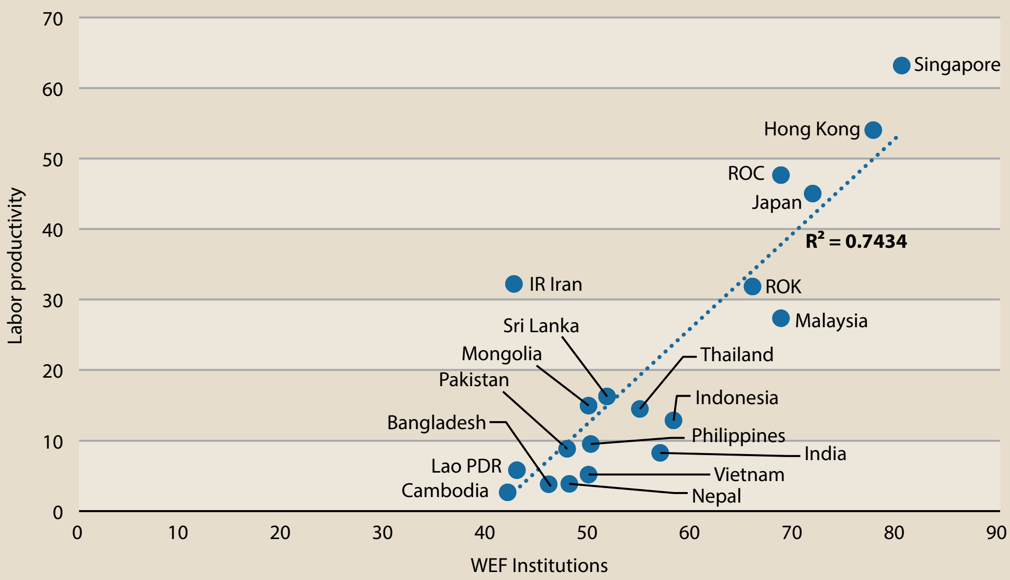
- 'Institutions' from the WEF Global Competitiveness Report (correlation coefficient = 0.86);
- 'Financial Institutions' from the IMF Financial Markets Development Index, which measures depth, access, and efficiency of financial institutions (correlation coefficient = 0.81);
- 'Political Stability' from the World Bank Worldwide Governance Indicators (correlation coefficient = 0.54);
- 'Rule of Law' from the World Bank Worldwide Governance Indicators (correlation coefficient = 0.74);
- 'Control of Corruption' from the World Bank Worldwide Governance Indicators (correlation coefficient = 0.89); and
- 'Government Effectiveness' from the World Bank Worldwide Governance Indicators (correlation coefficient = 0.89).

All but one of these indicators have high correlations with productivity. The WEF's Institutions indicator is presented here as a representative indicator of institutions.

A strong relationship between the 'Institutions' indicator and labor productivity is shown in Figure 5. The same pattern of high indicator values for the high-productivity countries and low indicator values for the lower-productivity countries is evident. Singapore is an exemplar on institutions, being ranked second in the world on the WEF Institutions indicator.

FIGURE 5

RELATIONSHIP BETWEEN INSTITUTIONS AND PRODUCTIVITY.



Note: Scores are 0–100 and LP is in USD at PPP.

The WEF's Institutions pillar covers security, social capital, checks and balances, public-sector performance, transparency, property rights, corporate governance, and future orientation of government (government adaptability and commitment to sustainability).

Since control of corruption emerges as an important issue in the country studies, the indicator is also presented here. The World Bank's Worldwide Governance Indicator of Control of Corruption captures perceptions of the extent to which public power is exercised for private gains, including both petty and grand forms of corruption, as well as the 'capture' of the state by elites and private interests.

Values of the indicator are displayed in Figure 6. Again, Singapore is an exemplar, sitting at the 99th percentile rank for all countries measured. The lower-productivity countries, in contrast, have quite a bit of work to do to improve their control of corruption.

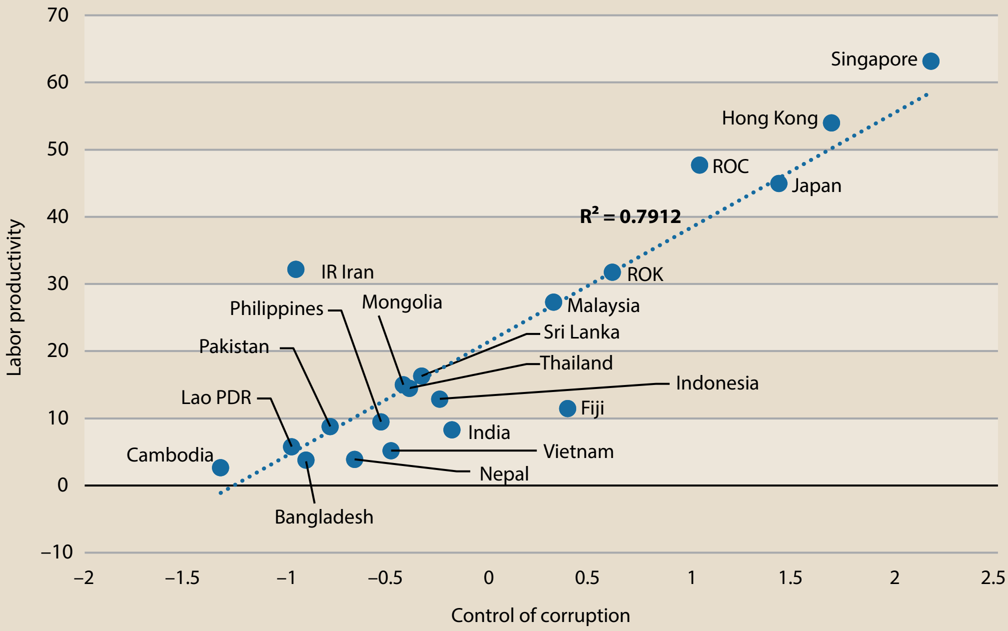
Business Environment

The Business environment is represented by

- The Heritage Foundation (THF)'s Business Freedom Index, which combines administrative elements drawn from the World Bank's Doing Business ranking (correlation coefficient = 0.78);

FIGURE 6

RELATIONSHIP BETWEEN CONTROL OF CORRUPTION INDICATOR AND LABOR PRODUCTIVITY.



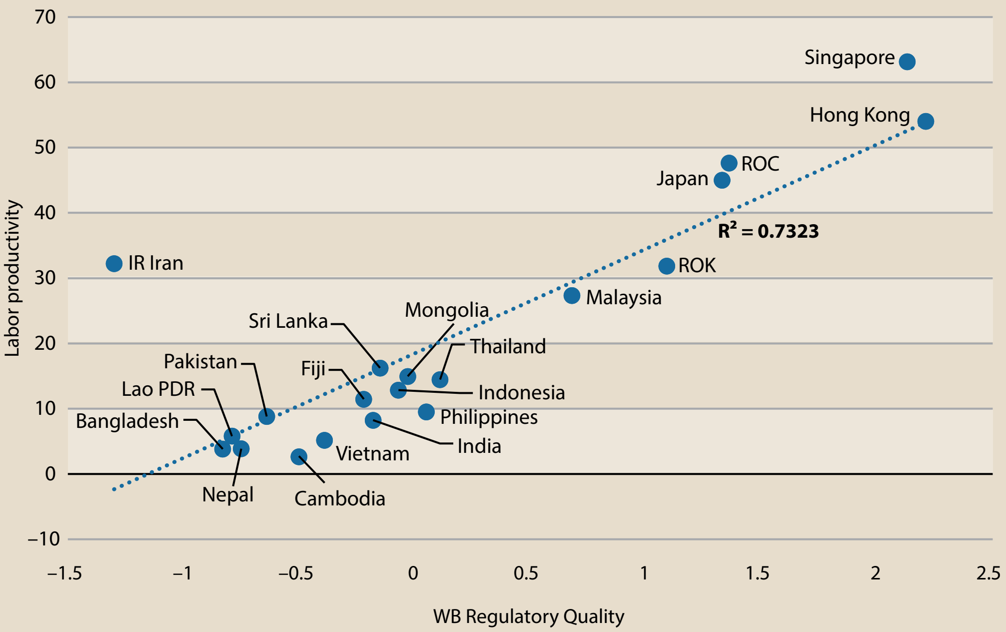
- the Administrative Requirements Index from the WEF Global Competitiveness Report, which combines administrative elements drawn from the World Bank's Doing Business ranking (correlation coefficient = 0.60);
- the Domestic Competition Index from the WEF Global Competitiveness Report (correlation coefficient = 0.78);
- the Tax Burden Index from THF's Index of Economic Freedom (correlation coefficient = 0.02);
- the Regulatory Quality Index from the World Bank's Worldwide Governance Indicators (correlation coefficient = 0.86);
- the Labor Market indicator from the WEF Global Competitiveness Report, which covers flexibility and meritocracy and incentivization (correlation coefficient = 0.70);
- the Labor Freedom Index from THF's Index of Economic Freedom (correlation coefficient = 0.59); and
- the Governance pillar from the Network Readiness Index (correlation coefficient = 0.83).

Several indicators show high correlations with labor productivity. The highest is for the World Bank's Regulatory Quality indicator. Then follow NRI Governance, THF Business Freedom, WEF Domestic Competition, and WEF Labor Market, all with correlation coefficients above 0.70. These high correlations reinforce the desirability of sound regulatory environments and of competition as a motivator of productivity growth, along with the need for a flexible operating environment to make productivity-enhancing changes.

The World Bank's Regulatory Quality indicator is shown as a prime example of a business environment indicator. It captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Countries' values are shown in Figure 7. Once again, the low values for the low-productivity countries suggest an area for them to work on.

FIGURE 7

RELATIONSHIP BETWEEN REGULATORY QUALITY INDICATOR AND PRODUCTIVITY IN APO COUNTRIES.



Note: Scores are 0–100 and LP is in USD at PPP.

The descriptions of other business environment indicators are provided in Appendix G.

Innovation System

The extent and quality of the innovation system is represented by

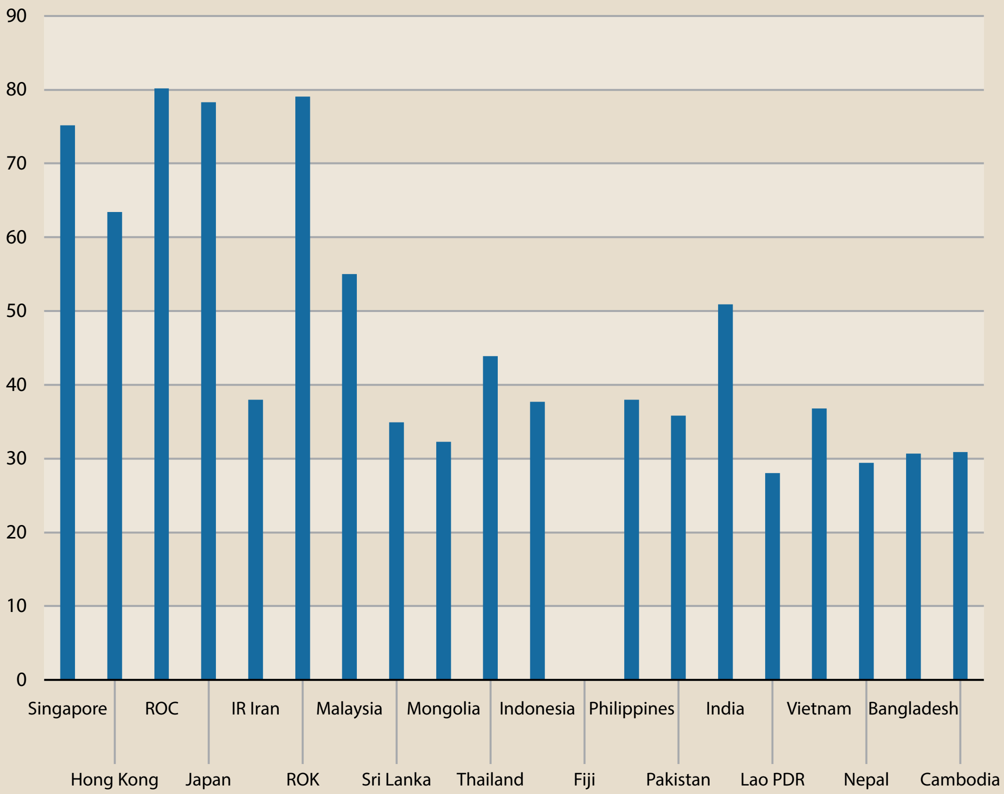
- the Innovation Capability indicator from the WEF Global Competitiveness Report (correlation coefficient = 0.66); and
- the Informational Globalisation de facto index from the KOF Swiss Economic Institute (correlation coefficient = 0.77).

The KOF indicator, with the higher correlation coefficient measures used internet bandwidth, international patents, and high-technology exports.

Although it has a lower correlation coefficient, it is worth showing the WEF Innovation Capability indicator as it suggests a strong divide between the high-productivity and other countries (see Figure 8). This indicator measures diversity and collaboration, R&D, and commercialization.

FIGURE 8

VALUES OF THE WEF INNOVATION CAPABILITY PILLAR FOR APO COUNTRIES.



The correlation is weaker because the divide between the high-productivity and other countries is so stark.

Foreign Investment

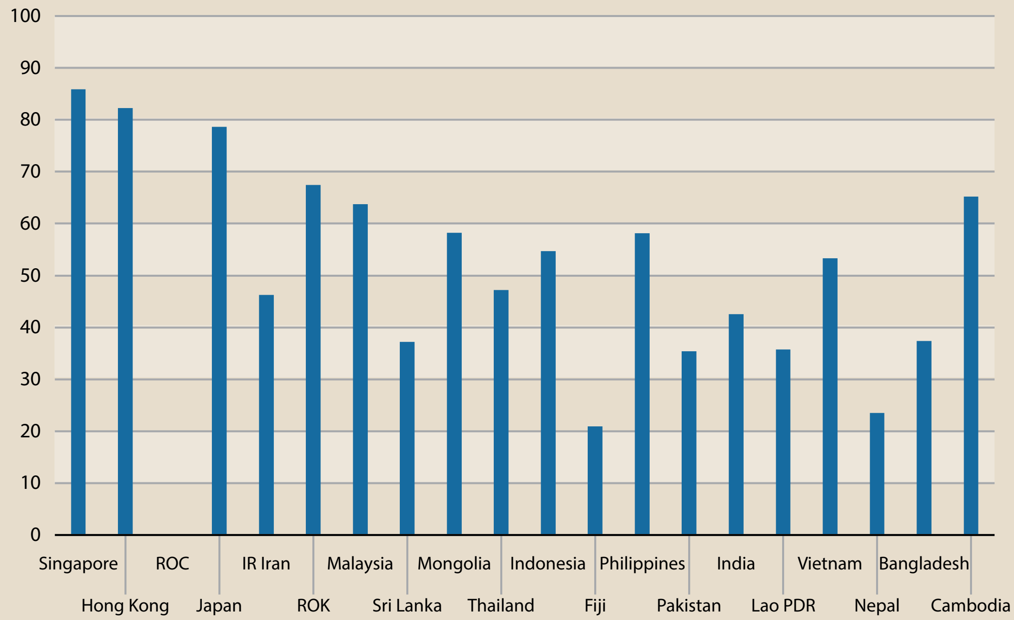
The extent of foreign investment and barriers to it are indicated by

- the Financial Globalisation index from the KOF Swiss Economic Institute (correlation coefficient = 0.70)
- the Financial Globalisation de jure index from the KOF Swiss Economic Institute (correlation coefficient 0.76);
- the foreign direct investment stock in proportion to GDP (correlation coefficient = 0.60); and
- the Investment Freedom Index from THF Index of Economic Freedom.

The highest correlation in the foreign investment area is for the KOF Financial Globalisation de jure indicator, which measures investment restrictions, capital account openness, and international investment agreements. Values are displayed in Figure 9, which suggests that, while some countries are more closed, others like Cambodia, Vietnam, and the Philippines are more open than their productivity positions would suggest.

FIGURE 9

VALUES OF THE KOF FINANCIAL GLOBALISATION DE JURE INDICATOR FOR APO COUNTRIES.



Education System

The quality of the education system is indicated by the Future Workforce indicator, sourced from the WEF Global Competitiveness Report (correlation coefficient = 0.75). This indicator is supplemented in the country studies by WEF indicators on the Quality of the Education System and Quality of Primary Education and by data on education expenditure in proportion to GDP. It is not possible or easy to extend these indicators beyond 2017.

The WEF Future Workforce indicator is used to represent the status of the education system. It covers education of the future workforce (school life expectancy) and skills of the future workforce (critical thinking in teaching and pupil-to-teacher ratio in primary teaching).

Values are displayed in Figure 10. As is common, the high-productivity countries have high values while the lower-productivity countries have much lower values. Pakistan, in particular, has a low value on this indicator.

Again, some nonlinearity suggests there are greater payoffs from improving the quality of education once some level of development has been reached.

Financial System

The characteristics of the financial system are represented by

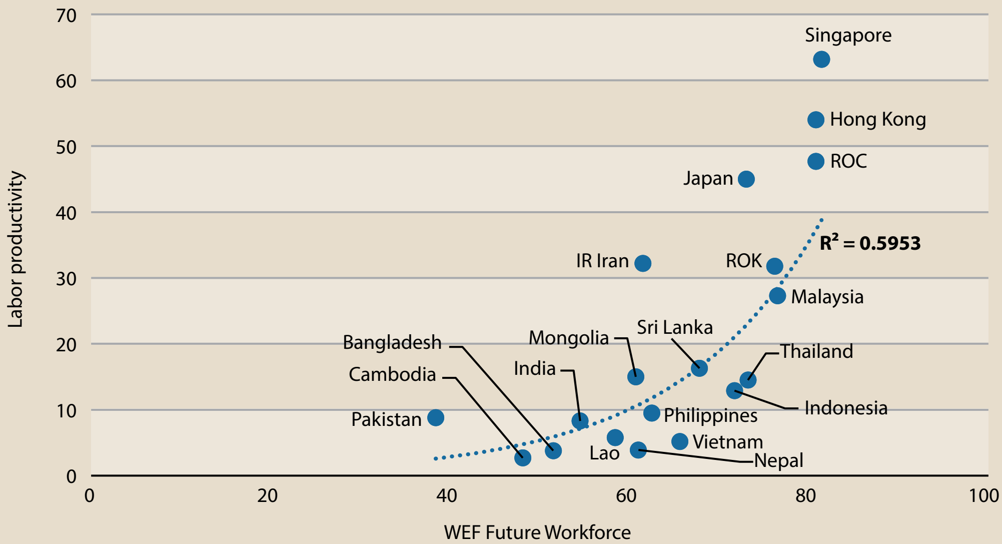
- the Financial System pillar of the WEF Global Competitiveness Report, which covers depth and stability of the financial system (correlation coefficient = 0.72);
- the Financial Markets Index of the IMF Financial Markets Development Index, which measures depth, access, and efficiency of financial markets (correlation coefficient = (0.74); and

- the Financial Freedom Index from THF Index of Economic Freedom (correlation coefficient = 0.58).

The correlations for the WEF Financial System pillar and the IMF Financial Markets indicator are close. The distribution of values across countries is similar to the familiar pattern of high values for high-productivity countries and lower values for middle- and lower-productivity countries.

FIGURE 10

RELATIONSHIP BETWEEN THE WEF FUTURE WORKFORCE INDICATOR AND LABOR PRODUCTIVITY.



Trade

The indicators of trade are

- the Trade Openness Index from the WEF Global Competitiveness Report (correlation coefficient = 0.73);

- the Trade Freedom indicator from THF Index of Economic Freedom (correlation coefficient = 0.58);

- the Trade Globalisation Index from the KOF Swiss Economic Institute (correlation coefficient = 0.55); and

- the Trade Globalisation de jure index from the KOF Swiss Economic Institute (correlation coefficient = 0.73).

It may be noted that a supplementary indicator, the Services Trade Restrictions Index, is used in the country studies. This indicator is available for 14 of the APO countries.

Two indicators of the trade determinant have quite high correlations. The WEF's Trade Openness indicator measures tariff and non-tariff barriers to trade, complexity of tariffs, and border clearance efficiency. The KOF Trade Globalisation de jure indicator measures trade regulations, trade taxes, tariffs, and trade agreements.

Health System

The quality of the health system is indicated by life expectancy at birth from United Nations Development Program data (correlation coefficient = 0.86). A supplementary indicator on infant mortality is also used in the country studies.

Life expectancy at birth has a very high correlation coefficient. However, there is a question about the direction of causality. While maintaining good health matters for productivity, more productivity means more income, which can be devoted to improving health.

Demand

The indicators of demand are

- Macroeconomic Stability pillar from the WEF Global Competitiveness Report (correlation coefficient = 0.56); and
- Monetary Freedom Index from THF Index of Economic Freedom (correlation coefficient = 0.45).

The two indicators have moderate correlations with productivity. The values for most countries are reasonably high, meaning there is less variation across countries compared with other indicators.

Social Capital

The two indicators are used to capture social capital are

- the Social Capital Index from the WEF Global Competitiveness Report (correlation coefficient = 0.47); and
- the Voice and Accountability indicator from the World Bank Worldwide Governance Indicators (correlation coefficient = 0.51).

There is comparatively little variation across countries in the values of the WEF's Social Capital variable. While there is more variation in the World Bank's Voice and Accountability indicator, it is not highly correlated with levels of labor productivity.

Savings

The savings indicator is given by gross savings as a percentage of GDP, from a World Bank source (correlation coefficient = 0.28).

There is relatively low correlation between productivity and the savings ratios in APO countries.

Key Point Summary

- This chapter established a set of currently available indicators to diagnose countries' strengths and weaknesses on productivity determinants. This set of diagnostic indicators can be used in future to monitor progress.
- Some 48 indicators have been suggested. Of these, 13 are for immediate determinants and 35 are for underlying productivity determinants.

- Quite strong correlations between many of the indicators and levels of labor productivity in APO countries have been found.

- The strong tendency is for high-productivity countries to have high scores on the indicators, while lower-productivity countries have lower scores.

- The indicators of immediate productivity determinants suggest that human capital, knowledge, capital intensity, and more technology-intensive production are important areas in which lower-productivity countries are relatively weak. They also tend to have relatively large agriculture sectors.

- It is by working on the underlying determinants that scores on the indicators of immediate determinants will improve.

- The indicators suggest that important underlying determinants for APO countries are infrastructure, institutions, and the quality of regulation. Some countries have taken steps to open their economies to trade and investment, but they need to tackle regulation (including administrative requirements for businesses), corruption, and government effectiveness if they are to make substantial and long-standing improvements in productivity.

- Other indicators in the business environment point at the desirability of competition as a motivator of productivity growth and the need for a flexible operating environment in order to adapt to a changing operating environment.

- The quality of the education system, openness to trade and foreign investment, and well-functioning financial markets are also strongly associated with higher productivity.

PRODUCTIVITY READINESS MODELING

Chapter 3 introduced four overarching themes that arise from the underlying determinants. These themes, which are also touchstones for policymakers, are motivation, capabilities, efficiency of markets, and stability. All four of these themes must be in play to bring about a strong and sustained productivity growth.

These themes are not directly observed. Rather, they can be thought of as unobserved determinants of productivity. What can be observed are measures of the underlying determinants such as trade, innovation, and quality of institutions, as demonstrated in the previous chapter.

Our approach, given this structure, is to form indices for the unobserved themes from the diagnostic indicators of the underlying determinants. Factor analysis, which takes a group of variables and seeks to identify unobservable factors from those variables, is well-suited for this purpose.

Once we create index measures for motivation, capabilities, efficiency of markets, and stability, we use principal component analysis to identify an overall index of a country's settings with respect to these four touchstones. We call this the 'Productivity Readiness Index.' We then use fixed-effects regression models to demonstrate the significant relationship between this overall index of productivity readiness and total factor productivity (TFP) growth and labor productivity (LP) levels.

We also undertake a cointegration analysis of the long-run determinants of productivity. This analysis requires a longer time series of data that are not available for many APO countries. This analysis, using 66 countries overall, including seven APO countries, and 35 years of data, is described in Appendix I.

Next, we discuss the data we assembled and used, our modelling approach, and our results in greater detail.

Data

The first step in our analysis was assembling a very large dataset of underlying productivity determinants from a wide range of sources. In order to assess productivity relationships in the most general way, we sought to assemble data for a wide range of countries including APO countries, OECD countries, and other countries. This dataset comprises 127 variables from the APO; the Conference Board; the Global Entrepreneurship & Development Institute; the Harvard Atlas of Economic Complexity; The Heritage Foundation; the IMD World Competitiveness Centre; the Institute for Taxation and Accounting (Ludwig-Maximilians-Universität München); the International Centre for Tax and Development; the International Labour Organization; the International Monetary Fund (IMF); KOF Swiss Economic Institute; the Organisation for Economic Cooperation and Development (OECD); the Penn World Tables; the United Nations (UN); the World Bank, the World Economic Forum (WEF); the World Health Organization (WHO); and the World Values Survey.

The data range from 1950 through 2019, depending on the source and the variables. Country coverage ranges from a handful of countries to as many as 216 countries. Country coverage, unsurprisingly, is much better for recent years than for past years.

Many of the variables purport to measure the same thing, e.g., there are many different ways to estimate education, ranging from government expenditure on education to test scores to education quality indices proposed by a variety of organizations.

Two key decisions thus need to be made: (1) what years of data should we use; and (2) which variables should we use? In making the first decision, the first key tradeoff is that the longer time series have smaller country coverage. The second key tradeoff is that many data series that undertake high-quality analysis of the underlying determinants only began fairly recently. In making the second decision, the key question is: for those sets of variables that measure the same thing, which ones do we keep and which ones do we discard?

Our initial aim was to get a time series of the variables presented in Chapter 4. For some of these variables, only current values were available with no time series. Those were thus unsuitable for our statistical analysis. For other variables, there were gaps in the time series that made them unsuitable. Our final variable list for the preliminary regression analysis reflects an attempt to use as many of the variables from Chapter 4 as possible and, in the absence of those, to use suitable alternative variables. In our final estimates, we expand the variables beyond those covered in Chapter 4 to a wider set of variables of potential interest for which we can obtain sufficiently long time series and sufficiently broad country coverage.

In terms of years, we settled on the range of 2007–17 as providing the widest possible coverage of countries (119) and variables (36 for the preliminary estimates and 43 for the final estimates), which we expand beyond the variables considered in Chapter 4. In addition to attempting to match the variables as closely as possible to Chapter 4, we used the degree of uniqueness that each variable contributed to the estimation of the unobserved factors. We dropped variables where the additional information contributed by the variable was small and where the main informational content of the variable was covered by one of the other variables. Variables that were statistically insignificant in all models were also dropped. We estimated a wide variety of models with wide-ranging sets of variables in order to settle upon the data that we used in the final model. As we show below, the main conclusions of our analysis are unchanged when we use a wider set of variables.

Table 1 provides a list of variables that are used in the preliminary analysis. Table 6 provides the additional variables used in the final analysis. For each variable, we assign it to one or more of the intermediate categories of motivation, capabilities, efficiency of markets, and stability. Assignment is based on a theoretical assessment of the content of the variables. These are documented in Table 1 and Table 6.

Even among the final list of variables, there are some that would appear to measure the same thing. However, in our estimates, they do appear to capture different information and we therefore keep all of them. For example, we keep two KOF measures of trade and financial globalization (a de jure measure and an overall measure that incorporates the de facto and de jure components) because they seem to pick up different information. We note that others have found that these two measures of globalization affect economic growth differently [5].

A final factor in our decision about coverage of variables and years was the degree to which we could maximize the sample of APO countries for our analysis. Our choice of years and variables led to having complete coverage for 17 APO member countries, including Turkey. We do not calculate the indices for Fiji, Lao PDR, Nepal, and the ROC due to lack of data on one or more of the 36 variables below. In all cases, there are a large number of variables missing for those four countries.

TABLE 1

VARIABLES USED IN THE STATISTICAL ANALYSIS.

Indicator	Range	Contributes to			
		Motivation	Capabilities	Efficiency of markets	Stability
Education system					
Innovation system					
WEF Innovation	1–7		X		
KOF Informational Globalisation, de facto	0–100	X	X	X	
WEF Buyer Sophistication	1–7	X	X	X	
Infrastructure					
WEF Infrastructure	1–7		X		
Business environment					
THF Business Freedom	0–100	X		X	
WEF Competition Intensity	1–7	X		X	
WEF Market Dominance	1–7	X		X	
THF Tax Burden	0–100			X	
WB WGI Regulatory Quality	−2.5 to 2.5	X		X	X
WEF Labour Market Efficiency	1–7		X	X	
THF Labour Freedom	0–100			X	
Financial system					
WEF Financial Market Development	1–7	X		X	
IMF Financial Markets	0–1		X	X	
THF Financial Freedom	0–100			X	
IMF Financial Development	0–1	X	X	X	
Health system					
Life expectancy at birth	Open		X		
Foreign investment					
KOF Financial Globalisation	0–100		X	X	
KOF Financial Globalisation, de jure	0–100		X	X	
FDI Stock/GDP — inward	% of GDP			X	
FDI Stock/GDP — outward	% of GDP			X	
THF Investment Freedom	0–100	X	X	X	

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(Continued from previous page)

Indicator	Range	Contributes to			
		Motivation	Capabilities	Efficiency of markets	Stability
Trade					
THF Trade Freedom	0–100	X	X	X	
KOF Trade Globalisation	0–100	X	X	X	
KOF Trade Globalisation, de jure	0–100	X	X	X	
WEF Non-Tariff Trade Barriers	1–7			X	
WEF Burden of Customs Procedures	1–7		X	X	
Demand					
WEF Macroeconomic Stability	1–7		X	X	X
THF Monetary Freedom	0–100		X	X	
Savings					
Gross savings/GDP	% of GDP		X		
Institutions					
WEF Institutions	1–7		X		
IMF Financial Institutions	0–1		X		
WB WGI Political Stability	–2.5 to 2.5				X
WB WGI Rule of Law	–2.5 to 2.5	X			X
WB WGI Control of Corruption	–2.5 to 2.5	X		X	X
WB WGI Government Effectiveness	–2.5 to 2.5	X	X	X	X
Social capital					
WB WGI Voice and Accountability	–2.5 to 2.5				X

Modeling Approach

Having classified each of the variables in Table 1 and Table 6 into one or more of the four overarching themes (motivation, capabilities, efficiency of markets, and stability), we proceed to estimate an overall index for each of them using the indicated variables. We do this by using factor analysis. Factor analysis allows us to collapse a large number of variables into one or more factors that explain the majority of the movement in the larger set of variables.

For each set of variables, the first factor explains the vast majority of variation among the set of underlying variables. In each case, we create an index ranging from 1–100 for all countries and years for which data are available.

In order to create an overall index of the productivity settings for each country, we use principal component analysis to find the linear combination of these four indices that explain the largest amount of common variation. The combination of factor analysis and principal components analysis that we use is similar to that employed by Kim and Loayza [6].

The weightings for the four factors that emerge from the principal component analysis are found to be roughly equal as given below:

- Motivation: 0.5401 (0.504)
- Capabilities: 0.4994 (0.4993)
- Efficiency of markets: 0.5017 (0.5021)
- Stability: 0.4948 (0.4946)

The first set of numbers above are for the final analysis with the expanded set of 43 variables of Table 6. The numbers in parentheses are for the preliminary analysis using the 36 variables in Table 1.

We use these weights in combination with the four indices to create a Productivity Readiness Index (PRI) for each country. The PRI is rescaled to lie in the range 1–100 for all countries and time periods.

We use a fixed-effects model and the years 2007–17 and estimate the effect of changes to the index on the change in the log of TFP. We control for country and time fixed effects and include lagged TFP level (to capture convergence) in the model.

$$\Delta\, ln\, ln\left(TFP_{i,t+1}\right) = \alpha_0 + \beta PRI_{it} + TFP_{it} + \lambda_t + \alpha_i + \epsilon_{it} \tag{1}$$

We also estimate models of labor productivity as a function of the PRI. We control for capital productivity and include country and time-fixed effects.

$$LP_{i,t+1} = \alpha_0 + \beta PRI_{it} + KP_{it} + \lambda_t + \alpha_i + \epsilon_{it} \tag{2}$$

The purpose of estimating equations (1) and (2) is to identify the impact that the PRI has on changes in TFP growth and the level of labor productivity.

All results in tables below are estimated using the full 11 years of data and the full sample of 119 countries, even where we only present model estimates for subsets of APO countries.

Results: Preliminary Estimates

Table 2 shows the average values of the four overarching indices and the PRI for APO member countries (including Turkey); OECD countries, and those that are in the estimation sample but are neither members of the OECD nor the APO. These are based on the 36 variables from Table 1.

TABLE 2

AVERAGE VALUES OF PRODUCTIVITY INDICES BY COUNTRY GROUPS.

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index	Sample size
OECD countries	78	75	76	77	78	37
APO countries	53	52	53	50	53	17
Other countries	43	39	44	41	42	66

APO countries lag the OECD countries, on average, in all four indices as well as in productivity readiness. They do perform better than non-OECD, non-APO countries, which are primarily in Eastern Europe, Africa, and Latin America. To be specific, there are 29 African countries; 16 Caribbean/Central/South American countries; 10 Eastern European countries; eight Middle Eastern countries; five Central Asian countries; two Mediterranean countries; and PR China.

Table 3 shows values of the index and the various subcomponents for the 17 APO countries for which complete data are available in 2017.

It is no surprise that the high-productivity countries are at the top of the table with high scores in each of the overarching indices and the PRI. The scores drop away fairly rapidly after the fifth position, occupied by Malaysia. Scores for the Stability Index are the lowest for many countries. However, this does not necessarily mean that this factor has the largest (negative) effect on productivity. These scores do not take into account the responsiveness of productivity to each of the indices.

TABLE 3

VALUES OF OVERARCHING THEME INDICES FOR APO COUNTRIES.

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index	Ranking
Top quartile (PRI)						
Singapore	99	98	100	97	100	1
Hong Kong	97	93	99	92	97	2
Japan	88	85	83	85	87	3
ROK	76	76	73	72	75	4
3rd quartile (PRI)						
Malaysia	69	73	70	58	69	5
Thailand	56	59	56	47	55	6
2nd quartile (PRI)						
Turkey	51	49	51	42	49	7
Indonesia	47	45	46	42	46	8
India	46	42	43	45	45	9
Philippines	44	41	45	40	43	10
Vietnam	43	41	41	43	42	11
Mongolia	39	41	44	42	42	12
Sri Lanka	42	32	38	44	40	13
Bottom quartile (PRI)						
Cambodia	32	34	39	25	33	14
Pakistan	31	24	30	28	28	15
IR Iran	26	28	24	28	26	16
Bangladesh	25	19	26	28	25	17

Source: Author's estimates.

Effect on Productivity

Turning to the regression estimates, the key coefficient estimate from the model is β, which captures the effect of productivity readiness on productivity.

In equation (1), when we use a sample of all countries, we find a coefficient of 0.0080. It is significant at the 10% level. If we use only OECD and APO countries, we find a stronger and still statistically significant effect of the index on TFP change, at 0.011. The interpretation of this result is that if PRI increases by 1, TFP growth increases by 1%. Another way of interpreting these results is that a country that goes from the midpoint of one quartile to the midpoint of a higher quartile in PRI can expect to experience an increase of 25% in TFP growth.

As PRI is a composite index constructed from 36 different variables, it is difficult to relate these estimates to the underlying, measurable influences on productivity. We turn to this problem below when we discuss our final estimates based on all available variables.

Estimating equation (2), we find a strong and statistically significant impact of productivity readiness on labor productivity. We measure labor productivity in two different ways: productivity per hour, and productivity per worker. Regarding both measures, we find a strong and significant effect of productivity readiness on labor productivity.

Theme Changes over Time

Finally, we examined how countries have performed in improving the determinants of productivity over the past 10 years. Table 4 looks at the change in the key indices between 2007–09 and 2015–17. To eliminate volatility, we take an average over the first three years of data and the last three years of data. The countries are sorted by the improvement in overall PRI over the 10-year period.

In Table 5, we compare the change in data over time for APO countries on an average with OECD countries and the other, non-APO and non-OECD countries. It is evident that APO countries have outperformed other countries in improving the determinants of productivity and overall productivity readiness over the past decade. Since OECD countries are starting at a higher level of productivity readiness, it might seem natural that APO countries have shown more improvement. This is an evidence of productivity convergence between APO and OECD countries.

However, APO countries also seem to have outperformed the ‘other countries’ that started at a lower level of productivity readiness. This would suggest a growing gap in productivity readiness between APO and other non-OECD countries. While this is a positive sign for APO countries in terms of their productivity performance, it suggests a lack of convergence for non-OECD, non-APO countries on an average.

Results: Final Estimates

In this section, we expand our estimation to include other variables that could potentially have a strong impact on productivity. Recall that we began by limiting ourselves to those variables considered in Chapter 4. Now, Table 6 in this chapter lists seven additional variables, not used in Chapter 4, that we add to the analysis of the previous section and classify them into one of the four intermediate categories: motivation, capability, efficiency of markets, and stability. We considered some additional variables, which were not included, based on the fact that they were insignificant and unimportant when added to the statistical analysis.

TABLE 4

CHANGE IN VALUES OF OVERARCHING THEME INDICES FOR APO COUNTRIES.

(AVERAGE IN 2015–17 MINUS AVERAGE IN 2007–09)

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index (PRI)
Japan	4.989 (6.0%)	7.386 (9.5%)	6.292 (8.2%)	5.271 (6.6%)	6.092 (7.6%)
Bangladesh	6.347 (33.8%)	9.4 (111%)	5.235 (26.7%)	2.677 (10.7%)	6.008 (33.1%)
Mongolia	4.04 (11.7%)	8.339 (26.8%)	6.26 (16.8%)	3.284 (8.6%)	5.592 (15.7%)
Cambodia	4.516 (17.3%)	7.508 (28.9%)	3.831 (10.9%)	2.453 (10.5%)	4.639 (16.5%)
Vietnam	5.268 (14.3%)	4.559 (12.8%)	1.717 (4.4%)	6.855 (19.5%)	4.603 (12.4%)
Malaysia	5.016 (7.7%)	5.141 (7.5%)	4.958 (7.5%)	1.826 (3.1%)	4.339 (6.7%)
Philippines	2.177 (5.2%)	4.917 (13.5)	2.492 (5.8%)	4.054 (11.2%)	3.435 (8.6%)
Indonesia	2.145 (5.0%)	4.171 (10.4%)	−0.644 (−1.4%)	6.761 (20.0%)	3.047 (7.4%)
Thailand	2.117 (4.0%)	4.321 (8.2%)	1.366 (2.5%)	1.554 (3.5%)	2.353 (4.5%)
ROK	3.231 (4.5%)	0.547 (0.7%)	2.178 (3.1%)	1.461 (2.1%)	1.906 (2.6%)
Hong Kong	3.049 (3.3%)	−0.296 (−0.3%)	1.74 (1.8%)	2.437 (2.7%)	1.772 (1.9%)
Singapore	1.888 (1.9%)	−0.977 (−1.0%)	1.169 (1.2%)	3.256 (3.5%)	1.354 (1.4%)
Sri Lanka	1.544 (3.7%)	−0.188 (−0.6%)	−1.393 (−3.4%)	3.825 (9.2%)	0.899 (2.2%)
India	−0.7639 (−1.7%)	3.4 (9.4%)	−1.957 (−4.5%)	0.34 (0.8%)	0.191 (0.5%)
Turkey	−1.848 (−3.4%)	4.283 (9.6%)	0.397 (0.8%)	−6.555 (−13.1%)	−0.909 (−1.8)
Pakistan	0.234 (0.8%)	−3.75 (−14.8%)	−3.683 (−11.5%)	1.837 (7.4%)	−1.422 (−5.0%)

Source: Author's estimates.

TABLE 5

CHANGE IN VALUES OF OVERARCHING THEME INDICES FOR COUNTRY GROUPS.

(AVERAGE IN 2015–17 MINUS AVERAGE IN 2007–09, WITH PERCENTAGE CHANGES GIVEN IN PARENTHESES)

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index (PRI)
APO countries	2.75 (7.1%)	3.67 (14.5%)	1.87 (4.3%)	2.58 (6.6%)	2.74 (7.1%)
Other countries	1.26 (4.1%)	2.29 (11.3%)	0.27 (0.4%)	−0.07 (−0.5%)	0.94 (2.6%)
OECD countries	−0.08 (−0.7%)	0.68 (1.6%)	−0.95 (−0.9%)	−0.46 (−0.7%)	−0.41 (−0.2%)

Source: Author's estimates

TABLE 6

ADDITIONAL VARIABLES USED IN EXTENDED STATISTICAL ANALYSIS.

Variable	Range	Contributes to			
		Motivation	Capabilities	Efficiency of markets	Stability
WEF Company spending on R&D	1–7	X	X		
WEF Customer Orientation	1–7	X		X	
WEF Quality of Education System	1–7		X		
WEF Quality of Primary Education	1–7		X		
WEF FDI and Technology Transfer	1–7		X	X	
WEF Foreign Ownership Prevalence	1–7		X	X	
WEF University–Industry Collaboration in R&D	1–7		X		

Table 7 shows the average values of the four indices and the productivity readiness measure for APO countries, OECD countries, and 'others' (those that are in the estimation sample but are neither members of the OECD nor the APO). These are based upon the 43 combined variables from Table 1 and Table 6.

The index numbers that we create in this section are not directly comparable with those from the previous section because the indices are re-estimated across all countries using the wider set of variables and then recalculated for the entire sample. So, there is no meaningful comparison that can be made of the individual numbers in Table 2 and Table 7, for example.

TABLE 7

AVERAGE VALUES OF PRODUCTIVITY INDICES BY COUNTRY GROUPS IN THE EXTENDED ANALYSIS.

(2017 VALUES).

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity readiness Index	Sample size
OECD countries	79	72	75	77	77	37
APO countries	54	51	53	50	53	17
Other countries	43	37	43	43	42	66

Nonetheless, the overwhelming conclusion is that using the wider set of variables does not change the overall impression of the results that emerge from the data. OECD countries have higher productivity readiness, followed by APO countries, while non-APO and non-OECD countries in Latin America, Africa, and Eastern Europe are lagging behind both OECD and APO countries.

Given that the wider set of variables includes more information, we consider these to be our preferred results. These are the ones that we report in the individual country studies.

Table 8 presents the 17 APO countries for which we have sufficient data to calculate the individual and overall indices for 2017. The ranking is roughly similar to that from Table 3. Again, the numbers are not directly comparable across the two tables.

TABLE 8

VALUES OF OVERARCHING THEME INDICES FOR APO COUNTRIES IN THE EXTENDED ANALYSIS.
(2017 VALUES)

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index	Ranking
Top quartile (PRI)						
Singapore	99	97	99	97	100	1
Hong Kong	97	88	98	92	95	2
Japan	90	83	84	85	87	3
ROK	76	71	71	72	74	4
Malaysia	71	75	71	58	70	5
Third quartile (PRI)						
Thailand	58	55	57	47	55	6
Second quartile (PRI)						
Turkey	52	44	51	42	48	7
Indonesia	48	48	48	42	47	8
India	46	46	44	45	46	9
Philippines	45	41	46	40	44	10
Vietnam	41	40	40	43	41	11
Sri Lanka	42	34	39	44	40	12
Mongolia	38	36	42	42	40	13
Bottom quartile (PRI)						
Cambodia	32	34	40	25	34	14
Pakistan	30	27	30	28	29	15
IR Iran	25	28	23	28	26	16
Bangladesh	25	20	26	28	25	17

Source: Author's estimates.

Effect on Productivity

Regression results are similar to those above. The effect of the overall index on the change in TFP produces a coefficient of 0.0061 (0.0046), which is statistically positive at the 10% level in a regression using all countries. Using only OECD and APO countries, the statistical significance increases. The coefficient becomes 0.01 (0.0056). In regressions using all countries, the effect of the index on output per hour, 150 (48), or output per worker, 4,081 (1,066), are both positive and strongly statistically significant. Notably, the numbers in parentheses are the standard errors.

While the regression modelling provides evidence that the four indices and the productivity readiness measure correlate positively with productivity levels and improvements, it is hard to get a sense of what the impact is on productivity readiness of improvements to the underlying variables. In order to assess it, we look at the impact of changing an underlying variable on the four indices and the overall productivity readiness measure. We use our estimated model parameters to estimate the change in the indices that occurs if we increase (improve) the underlying variable by one standard deviation. So, for example, if a country can improve its rating in the WEF Global Competitiveness Report on the variable Burden of Customs Procedures, how does this improvement translate into an improvement in motivation, capabilities, efficiency, stability, and overall productivity readiness? We then look at how this translates into an improvement in labor productivity and in the change in multifactor productivity.

Table 9 presents the impact of a one standard deviation increase in each variable (holding all the other variables constant) on the motivation, capabilities, efficiency, and stability indices. The zeros indicate that the variable in question does not enter into that particular index. The main purpose of this analysis is to look at the relative impact on the four indices and on productivity readiness of the variables included in the analysis. Since many of the variables are themselves indices that range from 1–7 or 0–100, it is difficult to interpret the impact in a standard way such as percentage change in some easily measured quantity.

Table 10 presents the impact of a one standard deviation increase in each variable (holding all the other variables constant) on the productivity readiness measure and on our three measures of productivity: TFP change, output per hour, and output per worker.

In both Table 9 and Table 10, the variables are listed in the order of their impact on the overall productivity outcomes, i.e., from largest impact to smallest impact. The changes that we document in Table 9 and Table 10 may not have an easy interpretation in terms of the quantities that governments can vary. But they give a good idea of which policy areas governments should target.

We explored two other methods for estimating the impact of each individual variable. The first was to divide the impact of each variable by the number of indices in which it appears. The second was to conduct a principal component analysis directly from all 34 individual variables with which to predict the overall measures of productivity. The rankings that emerged from these two exercises in terms of the importance of each variable in contributing to productivity were similar to what is presented in Table 9 and Table 10.

TABLE 9

IMPACT OF ONE STANDARD DEVIATION INCREASE ON KEY INDICES.

Variable	Standard deviation, increase in index			
	Capability	Efficiency	Motivation	Stability
Regulatory Quality	0	0.3287	0.3197	0.2096
Government Effectiveness	0.0897	0.0827	0.2008	0.1873
Rule of Law	0	0	0.1220	0.4161
FDI Stock Outward	0	0.4072	0	0
Trade Globalisation, de jure	0.0664	0.0505	0.1356	0
Control of Corruption	0	0.0280	0.0347	0.1849
KOF Financial Globalisation, de facto	0.1116	0.1261	0	0
FDI Stock Inward	0	0.1846	0	0

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Variable	Standard deviation, increase in index			
	Capability	Efficiency	Motivation	Stability
Innovation Index	0.1440	0	0	0
IMF Financial Development	0	0.0881	0.0465	0
Buyer Sophistication	0.0319	0.0514	0.0500	0
Customer Orientation	0	0.0561	0.0732	0
Burden of Customs Procedures	0.0538	0.0706	0	0
Informational Globalisation	0.0510	0.0100	0.0615	0
Financial Institutions Index	0.1111	0	0	0
Trade Globalisation, de facto	0.0520	0.0355	0.0228	0
Financial Globalisation, de jure	0.0629	0.0417	0	0
Competition Intensity	0	0.0457	0.0484	0
Market Dominance	0	0.0330	0.0584	0
Trade Freedom	0.0339	0.0112	0.0426	0
Financial Markets Index	0.0687	0.0190	0	0
Foreign Ownership Prevalence	0.0285	0.0549	0	0
Monetary Freedom	0.0375	0.0418	0	0
Institutions Index	0.0631	0	0	0
Education Quality	0.0630	0	0	0
FDI Technology Transfer	0.0354	0.0240	0	0
Political Stability	0	0	0	0.0559
Investment Freedom	0.0192	0.0161	0.0060	0
Macroeconomic Stability	0.0295	0.0082	0	0.0006
Univ–Industry R&D Collaboration	0.0357	0	0	0
Infrastructure Index	0.0348	0	0	0
Labour Market Efficiency Index	0.0133	0.0208	0	0
Company Spending on R&D	0.0308	0	0	0
Life Expectancy	0.0284	0	0	0
Education Quality (primary)	0.0267	0	0	0
Business Freedom	0	0.0064	0.0191	0
Voice and Accountability	0	0	0	0.0248
Tax Burden	0	0.0157	0	0
Non-tariff trade barriers	0	0.0142	0	0
Labour Freedom	0	0.0141	0	0
Financial Freedom	0	0.0124	0	0
Savings (gross) to GDP	0.0114	0	0	0
Financial Market Development Index	0	0.0016	0.0023	0

Note: Numbers indicate the increase in terms of standard deviations of the respective indices.

TABLE 10

IMPACT OF ONE STANDARD DEVIATION INCREASE ON PRODUCTIVITY READINESS, TFP CHANGE, AND LABOR PRODUCTIVITY.

Variable	Standard deviation, increase in PRI, TFP or output			
	Productivity Readiness	Change in TFP	Output per hour	Output per worker
Regulatory Quality	0.2196	0.0501	0.0693	0.0388
Government Effectiveness	0.1434	0.0327	0.0452	0.0253
Rule of Law	0.1369	0.0312	0.0432	0.0242
FDI Stock Outward	0.1036	0.0236	0.0327	0.0183
Trade Globalisation, de jure	0.0650	0.0148	0.0205	0.0115
Control of Corruption	0.0629	0.0144	0.0198	0.0111
KOF Financial Globalisation, de facto	0.0605	0.0138	0.0191	0.0107
FDI Stock Inward	0.0469	0.0107	0.0148	0.0083
Innovation Index	0.0367	0.0084	0.0116	0.0065
IMF Financial Development	0.0345	0.0079	0.0109	0.0061
Buyer Sophistication	0.0342	0.0078	0.0108	0.0060
Customer Orientation	0.0333	0.0076	0.0105	0.0059
Burden of Customs Procedures	0.0317	0.0072	0.0100	0.0056
Informational Globalisation	0.0315	0.0072	0.0099	0.0056
Financial Institutions Index	0.0283	0.0065	0.0089	0.0050
Trade Globalisation, de facto	0.0282	0.0064	0.0089	0.0050
Financial Globalisation, de jure	0.0266	0.0061	0.0084	0.0047
Competition Intensity	0.0242	0.0055	0.0076	0.0043
Market Dominance	0.0235	0.0054	0.0074	0.0042
Trade Freedom	0.0225	0.0051	0.0071	0.0040
Financial Markets Index	0.0223	0.0051	0.0070	0.0039
Foreign Ownership Prevalence	0.0212	0.0048	0.0067	0.0037
Monetary Freedom	0.0202	0.0046	0.0064	0.0036
Institutions Index	0.0161	0.0037	0.0051	0.0028
Education Quality	0.0160	0.0037	0.0051	0.0028
FDI Technology Transfer	0.0151	0.0034	0.0048	0.0027
Political Stability	0.0141	0.0032	0.0045	0.0025
Investment Freedom	0.0105	0.0024	0.0033	0.0019
Macroeconomic Stability	0.0098	0.0022	0.0031	0.0017
Univ.-Industry R&D Collaboration	0.0091	0.0021	0.0029	0.0016
Infrastructure Index	0.0089	0.0020	0.0028	0.0016
Labour Market Efficiency Index	0.0087	0.0020	0.0027	0.0015

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Variable	Standard deviation, increase in PRI, TFP or output			
	Productivity Readiness	Change in TFP	Output per hour	Output per worker
Company Spending on R&D	0.0078	0.0018	0.0025	0.0014
Life Expectancy	0.0072	0.0016	0.0023	0.0013
Education Quality (primary)	0.0068	0.0015	0.0021	0.0012
Business Freedom	0.0066	0.0015	0.0021	0.0012
Voice and Accountability	0.0063	0.0014	0.0020	0.0011
Tax Burden	0.0040	0.0009	0.0013	0.0007
Non-tariff trade barriers	0.0036	0.0008	0.0011	0.0006
Labour Freedom	0.0036	0.0008	0.0011	0.0006
Financial Freedom	0.0031	0.0007	0.0010	0.0006
Savings (gross) to GDP	0.0029	0.0007	0.0009	0.0005
Financial Market Development Index	0.0010	0.0002	0.0003	0.0002

Note: The increases are in terms of standard deviations of the respective index.

There are some small variations in the ordering of variables across the two tables. It is important to remember that these are driven by small differences in the estimates rather than important shifts in the key determinants of productivity. Since these are estimates based on data, it is normal that there is some variability when we shift variables. Nonetheless, we note that this variability is quite minor.

We found very consistently that regulatory quality, government effectiveness, and she rule of law were quite important in determining overall productivity. This suggests that countries should be investing in improving the quality of their institutions alongside other policies to improve productivity. Although infrastructure appears less important in this analysis than it did in Chapter 4, the correlation between infrastructure and regulatory quality is very high, at 0.82. The correlation between infrastructure and government effectiveness is even larger, at 0.90. So, the large impact of those two variables in Table 10 should also be interpreted as a very large impact of high-quality infrastructure improvements on productivity.

Policies related to financial flows and trade openness were also quite important in contributing to productivity.

It is important to remember that even those variables that are not at the top of the list still contribute to productivity, and investments in those items will pay productivity dividends. Of course, some changes will be more costly than others, so productivity benefits need to be weighed against implementation costs.

It is also important to recognize that the variables are not mutually exclusive. So, investments in trade openness, for example, will affect many of the variables, e.g., KOF Trade Globalisation; Trade Freedom; Non-Tariff Trade Barriers, etc. The numbers in the table representing the impacts on productivity are therefore likely to be lower bounds for the impacts that can be expected from actual interventions on productivity improvements.

Theme Changes Over Time

Table 11 examines the change in the values of the subindices and the index of overall productivity readiness using the expanded variable set. Again, the results are quite comparable to those presented in Table 4. Recall that the numbers are not directly comparable since the indices are re-calculated using all available variables, countries, and years for the expanded set of data.

One key takeaway from the two sets of analysis is that the overall results are quite insensitive to the variable choice.

TABLE 11

CHANGE IN VALUES OF OVERARCHING THEME INDICES FOR APO COUNTRIES.

(AVERAGE IN 2015–17 MINUS AVERAGE IN 2007–09)

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index
Japan	4.803 (5.6%)	5.743 (7.4%)	6.484 (8.4%)	5.271 (6.6%)	5.724 (7.0%)
Mongolia	5.023 (15.5%)	7.401 (25.6%)	4.955 (13.3%)	3.284 (8.6%)	5.294 (15.3%)
Bangladesh	5.722 (29.5%)	7.957 (75.7%)	2.747 (12.1%)	2.677 (10.7%)	4.851 (25.0%)
Malaysia	5.348 (8.1%)	5.689 (8.2%)	4.518 (6.7%)	1.826 (3.1%)	4.467 (6.7%)
Cambodia	4.454 (16.6%)	6.72 (25.4%)	2.954 (7.9%)	2.453 (10.5%)	4.224 (14.6%)
Vietnam	4.275 (11.6%)	3.482 (9.8%)	0.293 (0.7%)	6.855 (19.5%)	3.692 (9.9%)
Philippines	2.192 (5.1%)	5.509 (14.9%)	1.967 (4.4%)	4.054 (11.2%)	3.469 (8.5%)
Indonesia	1.506 (3.4%)	3.213 (7.2%)	-3.264 (-6.6%)	6.761 (20.0%)	1.926 (4.4%)
Thailand	2.356 (4.3%)	2.441 (4.8%)	1.147 (2.1%)	1.555 (3.5%)	1.9 (3.6%)
Hong Kong	2.765 (2.9%)	-0.081 (-0.1%)	0.387 (0.4%)	2.437 (2.7%)	1.368 (1.5%)
Singapore	1.962 (2.0%)	-1.564 (-1.6%)	0.356 (0.4%)	3.256 (3.5%)	0.982 (1.0%)
Sri Lanka	1.15 (2.6%)	-1.68 (-4.4%)	-3.079 (-7.0%)	3.825 (9.2%)	-0.062 (-0.1%)
ROK	2.067 (2.8%)	-4.5 (-6.0%)	-0.614 (-0.9%)	1.461 (2.1%)	-0.439 (-0.6%)
India	-2.41 (-5.3%)	2.731 (6.8%)	-4.463 (-9.6%)	0.34 (0.8%)	-1.062 (-2.4%)
Pakistan	-0.056 (-0.2%)	-1.792 (-6.8%)	-5.404 (-16.0%)	1.837 (7.4%)	-1.517 (-5.3%)
Turkey	0-0.922 (-1.7%)	2.119 (5.0%)	-0.876 (-1.7%)	-6.555 (-13.1%)	-1.526 (-3.0%)

Source: Author's estimates.

Again, when we compare the average changes over the past decade across the three groups of countries, we see similar patterns. APO countries have performed better than OECD countries, which is a sign of convergence in productivity readiness and in the key determinants of productivity.

However, the APO countries have outperformed the non-OECD countries, which is a sign of divergence in productivity from these countries. These results are shown in Table 12.

TABLE 12

CHANGES IN VALUES OF OVERARCHING THEME INDICES FOR COUNTRY GROUPS.

(AVERAGE IN 2015–17 MINUS AVERAGE IN 2007–09, WITH PERCENTAGE CHANGES GIVEN IN PARENTHESES)

	Motivation	Capabilities	Efficiency of markets	Stability	Productivity Readiness Index (PRI)
APO countries	2.51 (6.4%)	2.71 (10.7%)	0.51 (0.9%)	2.58 (6.6%)	2.08 (5.4%)
Other countries	1.32 (4.2%)	1.64 (6.4%)	−0.86 (−2.6%)	−0.07 (−0.5%)	0.49 (1.2%)
OECD countries	−0.72 (−0.9%)	0.30 (0.9%)	−1.63 (−2.3%)	−0.46 (−0.7%)	−0.66 (−0.7%)

Source: Author's estimates.

Key Point Summary

- We estimate indices for capabilities, efficiency of markets, motivation, and stability using a wide range of data on the underlying determinants of productivity.
- We estimate an overall Productivity Readiness Index (PRI) based on the four intermediate indices.
- Capabilities, efficiency of markets, motivation, and stability are all important contributors to overall productivity readiness. A data-driven approach suggests that the four touchstones are all of roughly equal importance in determining productivity readiness.
- While all of the underlying determinants contribute to productivity, the determinants of Regulatory Quality, Government Effectiveness, Rule of Law, Foreign Direct Investment, and Infrastructure appear to be particularly important for productivity readiness.
- Across APO countries, some have very high levels of productivity readiness (Singapore, Japan, the ROK, and Hong Kong) whereas others have quite low levels (Pakistan, IR Iran, and Bangladesh)
- Almost all APO countries have improved their productivity readiness over the past decade. Notable exceptions are India and Pakistan, which have experienced decreased productivity readiness.
- The results are not particularly sensitive to the set of variables that are used to measure the underlying determinants of productivity.
- The cointegration analysis of the long-run determinants of productivity, presented in detail in Appendix I, reinforces the importance of trade openness, technological progress, and taxation and government spending.

FOCUS ISSUES

This chapter highlights issues of importance to productivity growth in APO countries that have not come to the forefront in dealing with diagnostic indicators in the previous chapters. The issues are

- the ease with which low-productivity APO countries might catch up to high-productivity countries;
- the extent to which productivity growth is affected by industry mix and structural changes;
- the influence on productivity of participation in global value chains;
- the engagement with digitization in the region and its effect on productivity; and
- developments in trade in services, an area of growing importance to productivity growth.

Catchup and Convergence

The pattern of growth and development across countries has often been viewed in a catch-up and convergence framework. While the framework attracts some controversy, it posits that less-developed or low-income countries achieve relatively rapid growth in per capita income and thereby catch up over time to the average income levels of more-advanced or high-income countries. As a corollary, it is said, countries tend to converge toward a similar level of average income.

It is reasoned that catchups can occur because capital growth in developing countries is not subject to the same diminishing returns as in the case of advanced economies and because emerging countries can achieve relatively rapid productivity growth by emulating and accessing developed countries' technologies and production knowhow.

One part of the controversy concerns the issue of whether catchup occurs simply as a matter of course or whether it is subject to some prior conditions being in place before developing countries can catch up with any vigor. These prior conditions would fall in the category of underlying determinants and would include a certain degree of institutional, infrastructural, and perhaps innovation capability development. An unconditional catchup would require only light policy attention, whereas a conditional catchup would require significant policy attention to put the precursors in place.

The analysis in the previous chapters lends weight to the conditional catch-up hypothesis as it highlighted the importance of institutions, regulatory environments, infrastructure, and other underlying determinants in fostering productivity growth. Since productivity growth overwhelmingly determines average income growth in the long run, it is productivity catchup that largely determines average income catch-up (see Appendix C).

Nevertheless, the experience of APO countries is reviewed to assess whether there are signs of the operation of conditional or unconditional catchup.

The Extent of Catchup in APO Countries

The APO countries are considered here in three income groups as defined by the World Bank. Individual countries are examined in Appendix C. A longer time horizon is considered than in the review of productivity trends in Chapter 2.

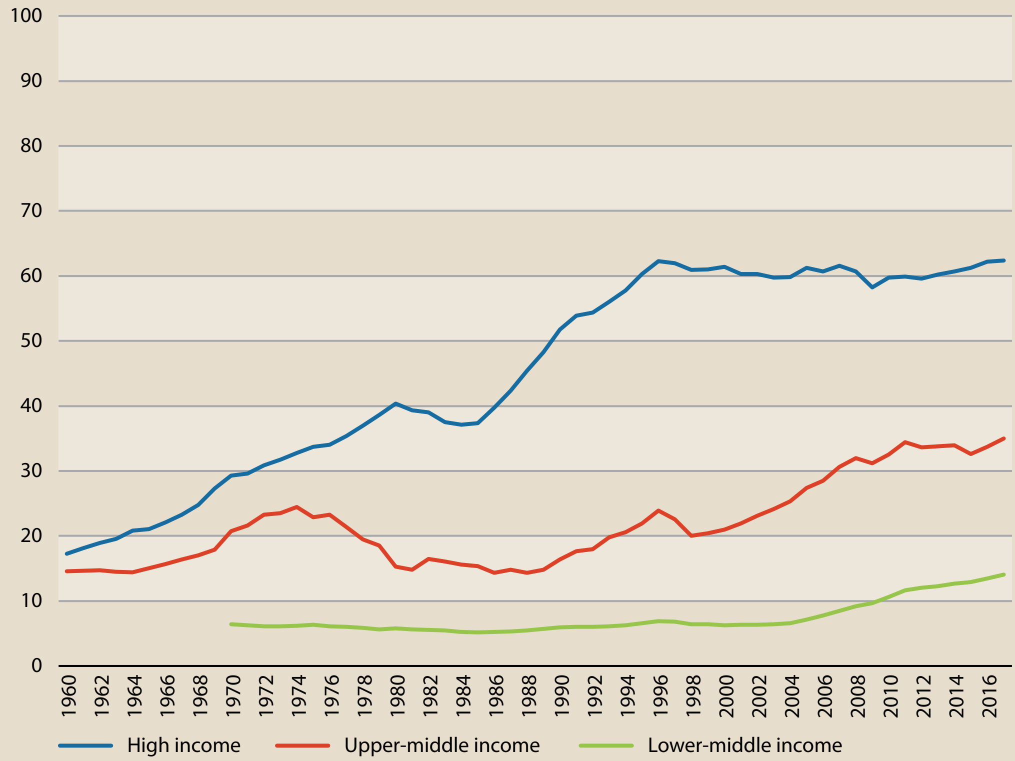
The three groups, namely, high-income, upper-middle-income, and lower-middle-income, have caught up to the USA's level of productivity by vastly different degrees (see Figure 1). The discussion jumps to look at productivity catchup because it largely determines income catchup (see Appendix C).

The high-income group, comprising Japan and the Asian Tigers caught up over 40 percentage points toward the USA's average productivity levels between 1960 and the mid-1990s. From that point, catchup stalled, at least in part because the USA's productivity growth gathered speed. The upper-middle-income group caught up, albeit to a much lesser extent (15 percentage points), by the 2010s through the agency of Malaysia, Thailand, IR Iran, and Sri Lanka. There was even milder catchup in the lower-middle-income group, with Indonesia and Mongolia achieving the maximum catch up in this group.

FIGURE 1

CATCHUP TO USA'S PRODUCTIVITY LEVELS BY GROUPS OF APO COUNTRIES.

(% OF USA'S LEVEL)



Source: Author's calculations based on data from 'The Conference Board Total Economy Database.'

Do Preconditions Matter?

The evidence for individual countries in Appendix C and the evidence in the country studies in Part B suggest that catchup and convergence do not happen automatically. If they happened automatically, the large disparities between countries in their catchup behavior would not have persisted to such an extent over such a long period.

Preconditions do matter. Japan and the Tiger economies instituted transformational changes that allowed them to emulate the frontier economies and to catch up to them. In effect, they formed a 'convergence club,' which other countries were not able to join. As demonstrated in Appendix C, there is no evidence of systematic or unconditional catchup and convergence in the APO region before 2000. While there is weak evidence of catchup after 2000, this may be due to a temporary slowdown in productivity growth in the high-income countries after the Global Financial Crisis (GFC). There was, however, more rapid growth in the low-productivity nations following the introduction of some reforms (see part B of this report for reviews of individual countries).

A recent review of the convergence literature confirmed the importance of countries instituting prior conditions before growth accelerated. Johnson and Papageorgiou [7] concluded that removing inefficiencies, especially in governance and political institutions, explained most of the economic achievements in developing economies.

Optimizing Catchup

Catchup to other countries does not happen as a matter of course but requires sound policy and institutional settings to be in place to form a strong base for long-term productivity growth. These requirements involve a lot of effort to develop the underlying determinants, including the rule of law, a sound property rights framework, absence of corruption, a transparent and accountable policy-making process, and a set of structural policies (openness to trade and investment, regulation, and taxation) that foster productive investments and endeavor. Once in place, faster catchup can ensue.

Industry Mix and Structural Change

Changes in industry structure are a way in which economies catch up. This form of catchup does not require changes in production methods. That is, it does not require adoption of the more advanced technologies of leader economies.

Productivity levels and opportunities for productivity growth differ across sectors of economies. As a prime example, agriculture has a generally lower level and slower rate of growth of productivity than manufacturing. Consequently, economies with proportionately larger agriculture sectors tend to have a lower overall level of productivity and lower productivity growth than economies with a more prominent manufacturing sector.

A shift in resources from low- to high-productivity sectors raises the overall level of productivity, thereby generating a degree of catchup to leader countries, all other things being equal. Further, if the expanding sector has stronger productivity growth opportunities, the rate of catchup will speed up compared with what would otherwise have been the case.

This section looks at the industry structures of APO countries and how structural changes have influenced their productivity performances. A detailed examination is provided in Appendix D.

Industry Mix

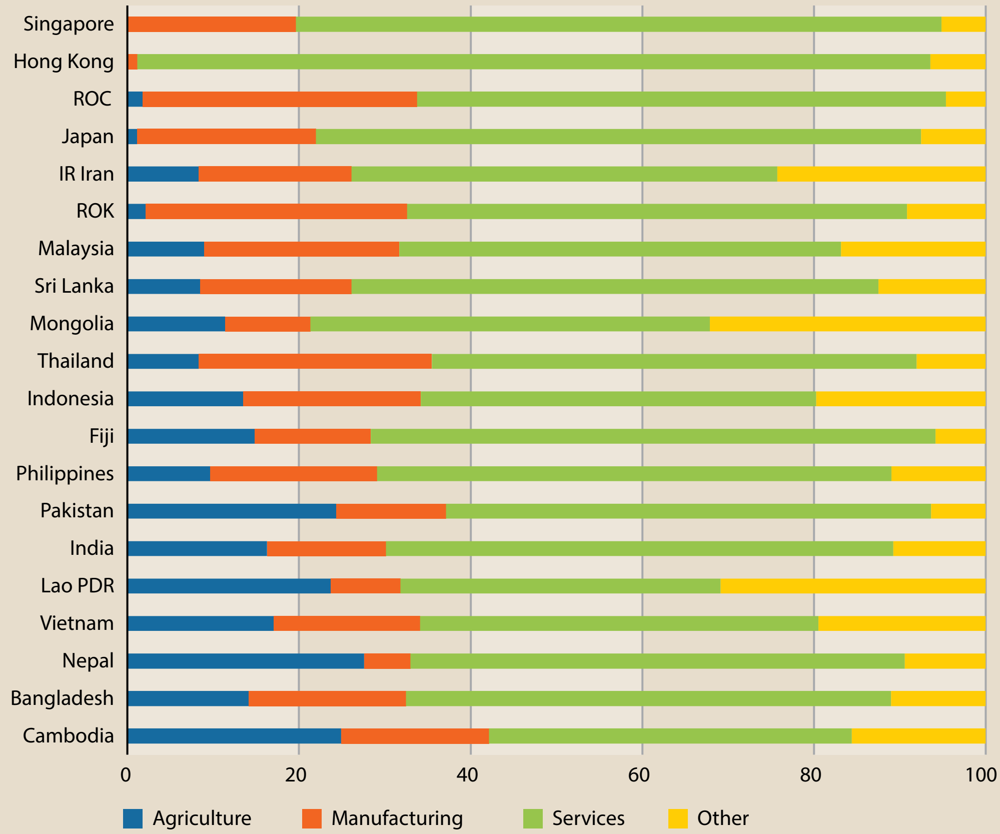
The industry structures of APO countries vary widely, as seen in Figure 2 in which countries are ordered from highest to lowest labor productivity level. We have followed the sector definitions used in the APO Productivity Databook 2019. Industries classified as services include wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants; transport, storage and communications; financial intermediation, real estate, renting, and business activities; and community, social, and personal services. The 'other' sector covers mining and quarrying; electricity, gas, and water supply; and construction.

In 2017, Agriculture was over 20% of the economies of Nepal, Cambodia, Pakistan, and Lao PDR but was scarcely present in the high-productivity metropolises of Singapore and Hong Kong. Manufacturing was a relatively large sector (over 20%) in the economies of the ROK, Thailand, Malaysia, Japan, and Indonesia but was less than 10% in Hong Kong, Nepal, Mongolia, and Lao PDR. Hong Kong is overwhelmingly a services economy, with services accounting for 93% of its economic activity. Likewise, over 70% of the Japanese and Singaporean economies are devoted to services.

FIGURE 2

INDUSTRY STRUCTURE OF APO ECONOMIES IN 2017.

(PERCENTAGE POINTS)



Source: Derived from the APO Productivity Database 2019.

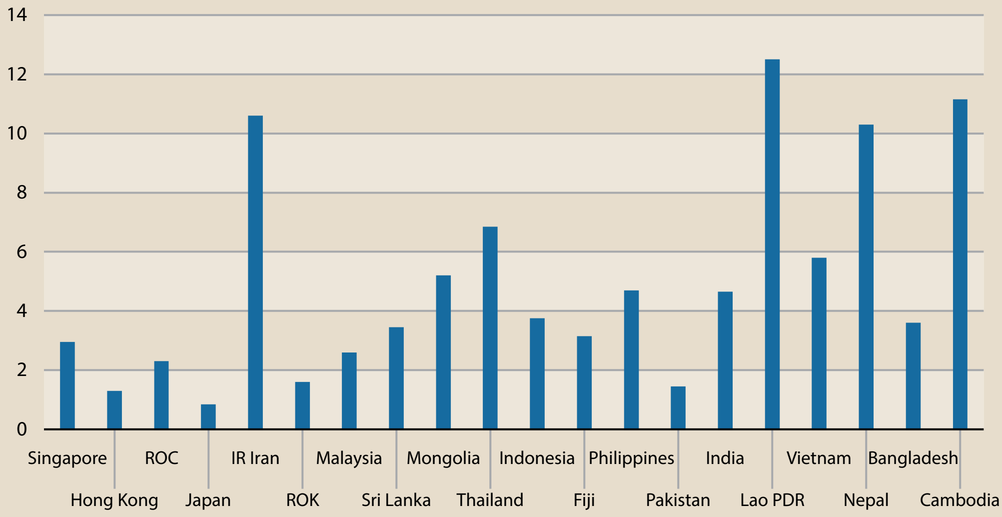
Clearly, there is a progression. The lower-income and lower-productivity countries are relatively intensive in agriculture, and as they develop, they switch the activity from agriculture to manufacturing. Further development is associated with switching of activity to services.

Structural Change

There has been considerable structural change in APO economies over the decades. Figure 3 shows the Structural Change Index for APO countries for the 2010s (2000 to 2017). The structural change index is calculated as half the sum of the absolute differences in sector shares between 2010 and 2017. The biggest structural changes have been in the economies of Lao PDR, Cambodia, and Nepal. As just seen, these economies have large agricultural sectors. The large structural changes were mostly associated with declines in the importance of agriculture. The large structural change in the Iranian economy was the shift from the 'other' sector to manufacturing.

FIGURE 3

STRUCTURAL CHANGE INDEX FOR APO COUNTRIES IN THE 2010s.



Source: Author's calculations based on data from the APO Productivity Database 2019.

Other countries too have had shifts out of agriculture in earlier periods. Although not illustrated here, Mongolia had a large structural change in the 2000s, when its mining sector was greatly expanded.

Effects on Productivity

As noted above, the level of productivity is greater in manufacturing than in agriculture. This is borne out in Figure 4, which shows higher productivity in manufacturing than in agriculture for all APO countries. It also shows that the manufacturing productivity level is much higher in the advanced economies of Singapore, the ROK, the ROC, and Japan. This suggests that there are opportunities for more productivity growth to the extent that economies can advance their manufacturing sectors into higher-technology activities.

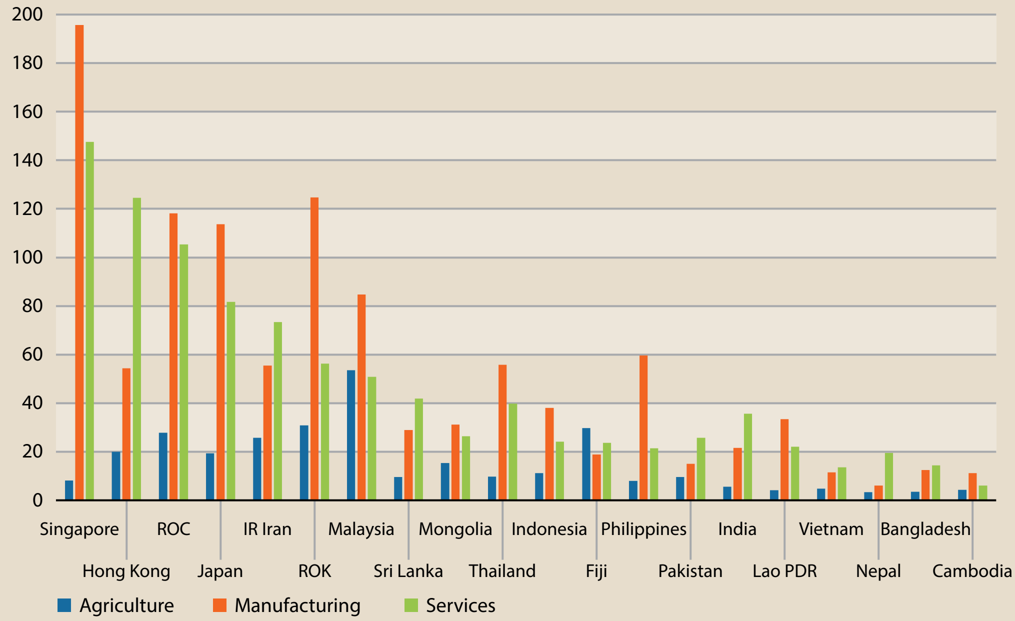
Figure 4 also shows that productivity is relatively high in services, especially in the advanced economies where high-productivity financial services feature prominently. While the same shifts into financial services may not be available, structural shifts into services generally could also raise overall productivity.

The relative importance of structural changes and productivity growth within sectors can be assessed using shift–share analysis. While the details are provided in Appendix D, the results are presented in Figure 5.

FIGURE 4

OUTPUT PER PERSON IN INDUSTRY SECTORS IN APO COUNTRIES.

(USD AT 2011 PPPs, REFERENCE YEAR 2017)



Source: Author's calculations based on data from APO Productivity Database 2019.

Figure 5 shows labor productivity growth in terms of GDP per worker for APO countries during 2010–17, with a breakdown via shift–share analysis into within-sector and between-sector effects. The within-sector effect represents contributions of labor productivity growth within sectors to total labor productivity growth. The between-sector effect represents contributions of movement of labor from sectors with low productivity levels or growth to those with to high productivity levels or growth. Catch-up effects are immediately apparent, as labor productivity growth is broadly higher for lower income countries. Overall, within-sector contributions have contributed significantly more to aggregate growth than between-sector structural changes, especially in higher income countries, suggesting that for these countries, significant structural changes and resulting productivity improvements may have already occurred.

Firm-level Dynamics

Structural change also occurs at the firm level. The productivity levels of firms vary markedly, even within the same industry. Average productivity of an industry is influenced by firm dynamics, e.g., the entry of new firms that are (or soon become) more productive; the exit of firms that are least productive; and the increase in market share of firms with above-average productivity.

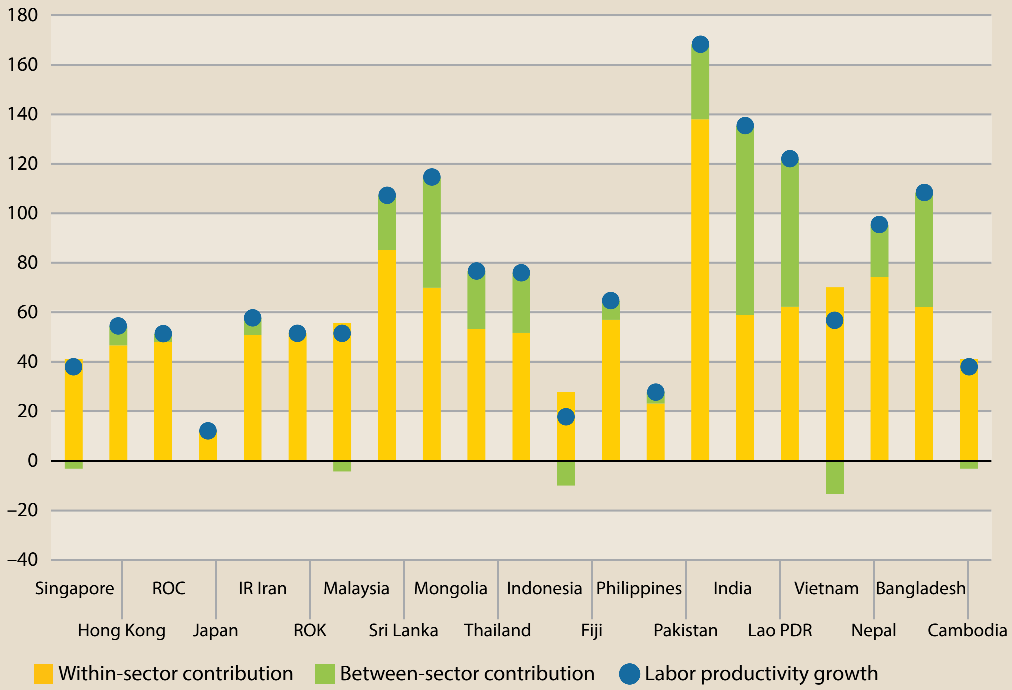
Entrepreneurship and competitive pressures are major forces driving these firm dynamics. Entrepreneurship drives new entries and provides opportunities for existing firms to expand. Competition drives poorly performing firms to exit and provides motivation for firms to improve their productivity performance.

Some APO countries found a weakening of this dynamic process, with productivity growth held down by 'zombie' or poorly performing firms that could continue to survive for longer than would normally be the case. Zombie firms were propped up in Japan by easy bank lending after the early

FIGURE 5

CONTRIBUTIONS OF WITHIN-SECTOR AND BETWEEN-SECTOR EFFECTS TO LP GROWTH.

(PERCENTAGE POINTS)



Source: Appendix D.

1990s asset price crash (see Japan country study in Part B). Mounting debt also kept Thai firms in existence (see Thailand country study).

The issue of zombie firms arises in the context of Covid-19. While the pandemic has caused an unwelcome decline in production and employment, there is also a side 'cleansing' effect of putting the most pressure on the least-productive and least-competitive firms. The most productive and competitive firms are most likely to survive and then prosper when stronger demand returns. However, the provisioning of subsidies and credits to tide firms over in the pandemic, while reducing overall disruption, would inhibit the cleansing side effect.

Optimizing Structural Change

Industry mix and structural change affect expectations of a country's productivity growth. However, structural change is something that evolves. It is not something to be directly forced or inhibited. While forcing change could bring productivity benefits in the short term, there can also be long-term costs if resources are misallocated to activities that do not generate strong net income flows into the future. Inhibiting structural change means that opportunities for productivity growth are lost.

Industry structure is fundamentally influenced by a comparative advantage, which in turn is influenced by geography, climate, access to large markets, resource endowments, competitiveness, and so on.

The best way to optimize structural change, both at the industry and firm level, is to ensure that the underlying determinants, as outlined in Chapter 3, are in place to foster growth in output at whichever firms and industries it may come. Structural change will then take its course and in a way that responds to economic developments and shocks as they occur. The same set of factors will drive both structural change and productivity growth.

Global Value Chains

Global value chains (GVCs) refer to arrangements in which production processes are split into discrete activities with different elements produced in different countries. GVCs are established to bring productivity gains and cost advantages.

GVCs have become a major feature of production in APO countries, as part of 'Factory Asia' for other parts of the world and as networks within the region have developed. Quite complex production and trade networks involving components, finished goods, and services have evolved.

GVCs provide opportunities for countries to industrialize by producing and specializing in 'fragments' of production. For example, a country can participate in motor-vehicle manufacturing by specializing in the production of certain components for vehicles without getting into the complexity and difficulty of designing and manufacturing complete units.

A summary discussion of the implications of GVCs for APO countries is provided here, while the details are given in Appendix E.

The Growth of GVCs

A handful of countries in Asia, Europe, and North America have been mostly responsible for the significant expansion in GVCs over the past four decades. Between 1990 and 2015, GVC participation worldwide grew by about seven percentage points, reflecting the increased ability of firms to fragment their production processes. GVC intensification was driven in large part by high-tech manufacturing industries. In addition, upstream mining and other primary industries accounted for most of the scale effect, consistent with their high share of GVC integration and growing share of world trade [8]. The development path for GVCs has been unique for different countries and regions. The advent of GVCs in Asia is outlined in the Box.

While early GVCs were based on accessing cheap labor for more labor-intensive parts of a production process, GVCs have since become more complex and sophisticated. Product innovation has led to more fragmentation of production of goods, while innovations in information and communications technology (ICT) have facilitated service linkages for coordinating timely and cost-efficient production and transport of components. 'Fragmentation trade' or 'trade in tasks' has increased more rapidly than conventional commodity-based trade.

Asia has become a hub for GVCs. Since the 1950s, several Asian countries have managed to upgrade their GVC activities, e.g., Japan in the 1950s and the 1960s; the ROK, the ROC, Hong Kong, and Singapore in the 1970s and the 1980s; and PR China in the 1990s. These countries moved away from being predominant in the assembly of products to more domestically integrated and higher value-added forms of exporting.

Asian trade shares demonstrate the importance of GVC-related trade. For example, 43.2% of exports and 38.3% of imports comprised intermediate GVC products [10]. Table 1 shows leading

THE ADVENT OF GVCS IN ASIA

There were several factors that shaped the experience and arrival of GVCs in Asia. These ranged from political interventions to changes in economic fundamentals.

In 1978, Chinese Vice Premier Deng Xiaoping, asked Panasonic's founder Konosuke Matsushita to help modernize Chinese industries. During the 1980s, Panasonic transferred technology, trained personnel and modernized the Chinese industry through 150 separate projects. In return, Panasonic gained unprecedented access to the Chinese market.

A second big factor emerged in 1985, when Western leaders pushed Japan to allow the yen to rise in value through the 'Plaza Accord.' This made its companies less competitive, which in turn encouraged Japanese companies to relocate their labor-intensive processes to elsewhere in Asia.

Further, seeing the success of export-oriented countries like Japan, Hong Kong, Singapore, and the ROC, Southeast Asian countries and PR China opened up to foreign investment and trade. Governments set up export processing zones, reduced tariffs, offered tax concessions, and actively encouraged foreign investments.

This political and economic environment allowed for the proliferation of GVCs. Reductions in transportation and communication costs, and exponential growth in the ICT sector, further cemented the growth of GVCs. Today, there is a rich, dense, and diverse network of GVCs in Asia, where each country produces according to its comparative advantage.

Asian economies according to their GVC participation rates. Participation rates refer to the proportion of value added in total gross exports.

As a result of trade expansion and increased GVC activity, Asian countries have become major exporters in several industries including electronics, automotive products, garments, agribusiness, and ICT.

TABLE 1

ASIAN COUNTRIES' GVC PARTICIPATION RATES IN 2017.

Country	Rate	Country	Rate
Singapore	76	Thailand	52
Hong Kong	73	Vietnam	51
Malaysia	64	Indonesia	50
PR China	62	Japan	48
Philippines	58	India	42
ROK	58	Macao	39
ROC	54	Bangladesh	31

Source: Moore [11].

While several countries produce a variety of products, some countries specialize. For instance, PR China has a strong presence in exports of electronics; Turkey and Thailand specialize in automotive and agricultural products; and Malaysia focuses on electronics and automotive products. PR China is one of the largest exporters of electronic goods. The Association of Southeast Asian Nations (ASEAN) countries have also raised their production of electronic goods since 1990. Within ASEAN, Malaysia and Singapore are the largest exporters (one-third each of the ASEAN total); followed by the Philippines (14%); Indonesia (10%); and Thailand (9%). PR China has also undergone major upgrades in the apparel industry, allowing it to become the largest exporter of textile and apparel products in the world. Bangladesh, Vietnam, and Cambodia also export sizeable shares of the apparel and footwear industry.

Trade in GVCs is not just limited to products, as services are also a vital part [8]. The fragmentation of production processes has been accompanied by outsourcing both manufacturing tasks and service tasks. While Asia's successes in GVCs till date have been mainly in the manufacturing sector, there are also important services cases. Singapore and Hong Kong have become distribution and logistics centers for GVCs within Asia, while India and the Philippines have become major offshore service providers in ICT and business processing outsourcing. The Philippines has also had some success in gaining a share in low value-added services such as call centers.

Between 2000 and 2017, intraregional GVC trade continued to increase within Asia, in part due to upgrades within GVCs. As a result, domestic content in Chinese exports increased from 65% in 2000 to 70% in 2017. Similarly, GVCs in Indian software companies have been involved in advanced innovation capabilities, including high-level development of products and services. Since 2000, the share of complex intraregional GVCs has grown from around 37% to around 46% of all GVC activities.

In recent decades, foreign direct investment (FDI) has become an important strategy for multinationals involved in GVCs. Increases in FDI have paralleled increases in exports for Asian countries. The Asian share of FDI doubled between 1985 and 1995, with PR China becoming the most attractive destination for FDI.

Productivity Effects of GVCs

Generally, trade is linked to productivity growth. Knowledge spillovers and competition from foreign firms boost productivity growth for domestic firms. Trade related to GVCs has been linked to higher welfare gains compared with traditional trade. These welfare gains come from economic growth, productivity growth, cost savings, better quality inputs, and sophistication and diversification of exports.

GVC participation can lead to technology transfer, inducing productivity gains [12, 13]. A 10% increase in GVC participation has been linked to a 1.6% increase in productivity [14]. Participation in GVCs is a way for countries, especially those that are at some distance from the technological frontier, to start and continue to catch up. Those furthest from the frontier benefit the most from GVC participation [15].

There is evidence that GVCs' impact on manufacturing productivity in East and Southeast Asian economies is significantly higher than in other regions. This is possibly linked to countries in this region interacting differently with global GVCs [15].

There are numerous potential channels through which GVCs can enhance productivity. Splitting up production processes creates opportunities for countries to specialize in certain types of production and to benefit from economies of scale. Participation in GVCs provides access to higher-quality and higher-technology inputs. Participation can lead to technology transfer and, over time, develop technological competencies, as has happened in Japan and the Tiger economies. With attendant structural changes in an economy, GVC participation can improve the allocation of resources to where they can be used more productively. Through GVC participation, a higher degree of technology flow is also generated.

There is also evidence that participation in GVCs provides greater incentives and scope for innovation. GVCs can also increase competitive pressures in an economy, which in turn stimulate the search for productivity improvements.

Drivers and Enablers

The following three key developments have been behind the growth in GVCs:

1. rapid advances in production technology have enabled industries to slice the value chain into finer 'portable' elements;

2. innovations in ICT and transportation have shrunk the distances that once separated nations and improved the ability of firms to coordinate production activities across dispersed locations; and

3. liberalizing policy reforms both at home and abroad have greatly reduced barriers to trade and investment.

Other factors of importance have been

- service linkage costs, which have declined due to reductions in transport and communications costs;

- factor endowments, especially the availability of low-skilled and low-cost labor;

- availability of skills and technological capabilities, which matter for more-complex GVCs;

- ease of access to transport;

- market size;

- geography; and

- strong institutions that protect intellectual property and provide law and order, stable governance, and economic stability.

Degain [16] has noted that Asian countries developed within GVCs by improving infrastructure, investing in human capital, reducing costs of doing business, lowering trade tariffs, simplifying trade procedures, and facilitating trade. Manufacturing trade in Asia is mostly dominated by semi-processed products, which have the lowest applied tariffs in the region. Asian economies continue to decrease the applied tariffs to liberalize trade and have also used regional trade agreements to support GVCs and help integration.

GVC-related trade has also been augmented by export processing zones (EPZs) in which production for export is insulated from domestic regulations, taxes, and charges. A key argument is that EPZs attract FDIs. The number of countries with EPZs increased from 25 in 1975 to 130 in 2006 [17]. EPZs accounted for around 20% of total exports from developing countries [16].

There are downsides to these EPZs though. They can reduce government revenue, distort signals for the allocation of resources between domestic and export production, and undermine social and environmental protections.

Optimizing the Gains from GVCs

While countries need to have an initial advantage to enter a GVC, they also need to maintain and develop their advantages. Investment capital tied up in GVCs tends to be mobile. As the supply chain is restructured and relative costs between countries change, production can shift from one country to another.

Reductions in tariff and non-tariff barriers and relaxing restrictions on foreign investments can facilitate participation in GVCs. Importantly, this includes barriers to trade in services (discussed in a section below). Inefficiencies in port and customs procedures can act as an informal barrier. Coordination between standards and certification processes across countries can help ensure that there is no need for duplicate production.

Conditions in the local market also matter. Participation will be facilitated if it is not impeded by unnecessary regulation. Fostering competition in local services markets will also provide cost advantages to local participation in GVCs.

The underlying productivity determinants are important. Sound infrastructural services are vital, especially in the areas of transport and communications. The ability of institutions to protect intellectual property and to provide law and order, stable governance, and economic stability is of fundamental importance. Strong institutions are also needed to ensure proper social and environmental protections.

In the longer term, developing skills and technological capabilities matter. This will help countries to avoid the ‘middle-income trap,’ which refers to the concept in which countries are unable to develop further and enter the high-income grouping. With the dynamic nature of GVC production and trade, countries can stagnate if they do not invest in innovations, institutions, and skills upgrades. For example, scarcity of R&D scientists and technical engineers, as well as lagging innovation and R&D activities, have meant that upgrading within GVCs has been difficult in some cases.

It is to a country’s advantage to be hard to imitate. This requires investments in R&D and design, along with complementary investments in ICTs, skills, and intangible capital.

In more recent times, Covid-19 has shown both the strengths and weaknesses of GVCs. According to the OECD, resilient global production sharing can be achieved through better management strategies, risk management, stockpiling strategies, and agility [18].

Digital Technologies

ICTs and digitization of goods and services present abundant opportunities for productivity growth. They present countries with opportunities to participate in international production and exchange of goods, services, information, ideas, and innovations. They are a feature of GVC production.

While the digital revolution reached Asia a long time ago, the digital landscape does vary across APO countries. On one hand, some countries are among the world leaders in the sophistication of their development and application of digital technologies. Some countries are even intricately involved in the production of digital goods and services through GVCs. Other countries remain basic users of digital goods and services.

Digital goods and services provide crucial opportunities for productivity growth in the APO region. They can affect productivity in at least four ways.

First, there are productivity gains in production. With advances in technology, such as processing capability and speed, digital goods and services become more powerful. These are quality improvements that are correctly considered to be part of the output growth. TFP gains come through these quality improvements as they can be produced without many more input requirements. The country location of these productivity gains in the APO context depends on which 'fragments' are produced where in the cross-country value chains.

Second, there are 'substitution gains' from the use of digital goods and services. While the same outputs are produced, the digital goods and services substitute for labor and other inputs in performing production tasks, such as storage and retrieval of information and undertaking routine computations. Investment in digital devices enhances labor productivity through capital deepening. It can also enhance the utilization of other capital, leading to lower overall investment requirements.

Third, there are innovation and transformation gains that are based on digital platforms. ICTs are often considered a 'general purpose technology' or platform technology, whereby owners of the ICTs can use them to develop or apply their own innovations in products or processes. Examples include new internet products, such as online sales, and better coordination of ordering, production, and distribution, which reduces the need for storage of inventories and improves the certainty of delivery.

Fourth, digital networks facilitate the sale and purchase of goods and services on much broader horizons. Businesses can source the needed products both locally and internationally and market their products near and far. This increases competitive pressures, which can drive productivity improvements (see Chapter 4).

All channels are affected by the development of digital technologies through improvements to existing technologies and development of new technologies, such as the internet of things and artificial intelligence. New and improved technologies enable production gains, more substitution possibilities, and further possibilities for innovations.

Overall Digital Engagement

The Network Readiness Index (NRI), which was introduced in Chapter 4, is an indicator of countries' engagement in the digital sphere. It is a composite index that combines indicators on technology sophistication, development of uses, governance, and economic and social impacts. Now published by the Portulans Institute, the NRI is an updated version of the index previously published by the World Economic Forum.

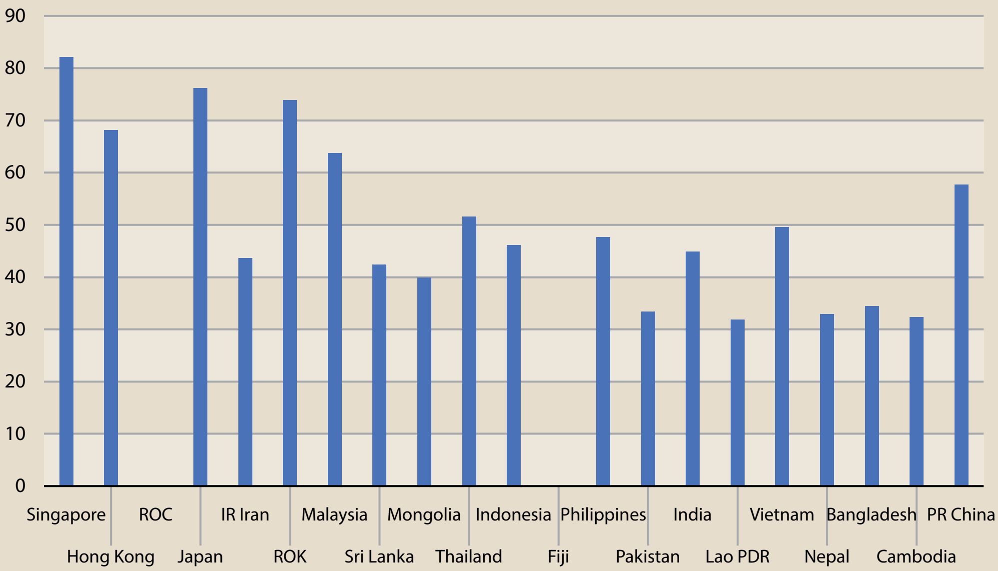
The high-income countries score very highly on the NRI (see Figure 6). In fact, Singapore is ranked second in the world on the 2019 index behind Sweden; Japan is ranked 12th; the ROK 17th; and Hong Kong 24th. Malaysia also scores highly and comes in 32nd on the international ranking.

Figure 6 shows a second tier of APO countries that score between 40 and 55 on the index and then a third tier that score below 40.

FIGURE 6

NETWORK READINESS INDEX SCORES FOR APO COUNTRIES AND PR CHINA.

(SCORE: 0–100)



Source: Portulans Institute [19].

Production of Digital Goods and Services

Japan, the ROK, Malaysia, the Philippines, Singapore, the ROC, and Thailand are important producers of ICT hardware. Japan and the ROK have been prominent in the development of new technologies [20]. Other countries, especially India and the Philippines, play a role in digital services by undertaking back-office functions, developing software, and providing call-center services.

Although data to determine the TFP payoffs from the production of digital goods and services are not readily available, some idea of the importance of digital production in APO countries can be gained from trade data. (Data at a sufficiently fine level of industry disaggregation are not available for APO countries from international databases. Also, the ability to measure TFP gains from production rests on the nature of price indices constructed for ICTs and whether price indices take account of the substantial quality improvements that become embedded in digital goods and services over time. International practice varies greatly.)

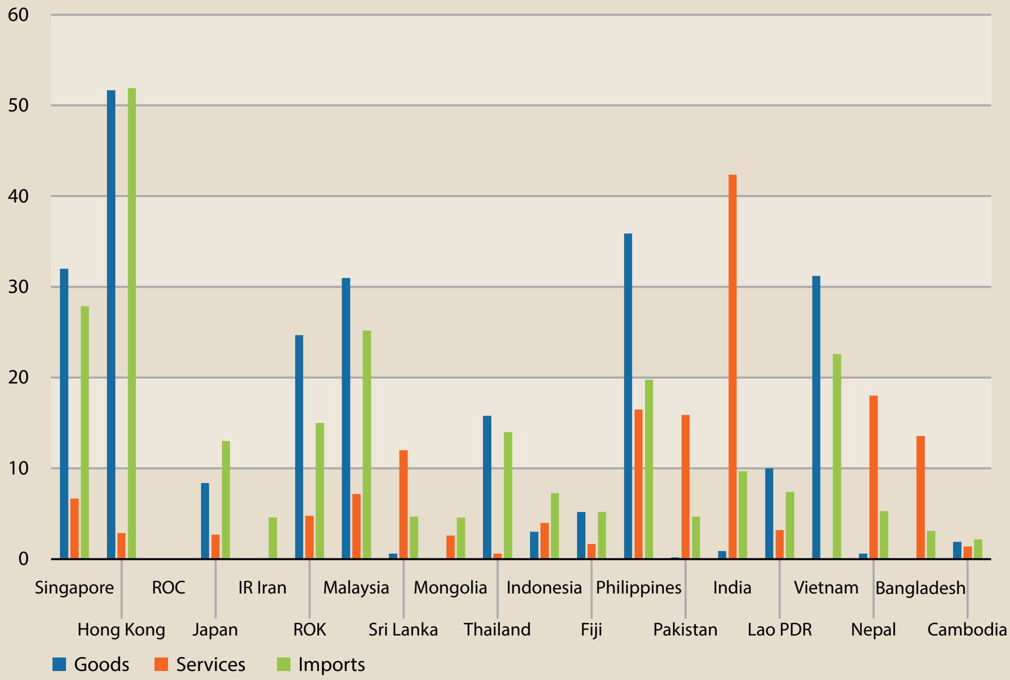
Several countries are both high importers and exporters of ICTs as they participate in the GVCs by importing components for adding value and then exporting downstream products to other countries in the value chain or for final consumption and investment. Figure 7 shows this to be true of Hong Kong, the Philippines, Singapore, Malaysia, Vietnam, the ROK, and Thailand. It is also true, to a lesser extent, of Lao PDR and Japan. The importance of export of services from India stands out.

Trade in digital services and data is a strong growth area [21]. Restrictions on the trade in digital services are discussed in the next section.

FIGURE 7

EXPORTS OF ICT GOODS AND SERVICES AND IMPORTS OF ICTS.

(% OF TOTAL EXPORTS AND % OF TOTAL IMPORTS)



The NRI presented in Figure 6 also gives a good indication of how APO countries score on the technology component of the index. Notably, countries' scores on the technology index are generally close to their overall NRI scores. The technology component covers access and affordability, the type of content that is available, and readiness to embrace developing technologies such as artificial intelligence.

Use of Digital Technologies

The contribution of ICT capital deepening to labor productivity (LP) growth gives an indication of the importance of ICT capital in an economy and the extent to which it has assisted labor productivity growth. ICT capital deepening is the growth in the ratio of ICT capital to hours worked (multiplied by the share of ICT capital in total production costs). It indicates the extent to which ICT capital has grown more rapidly than (or has substituted for) labor.

The APO Productivity Database 2019 refers to IT, rather than ICT. That said, while IT capital deepening was in play in the high-income countries in the 1970s, it only became established in other countries in the 1990s and 2000s (see Figure 8). Contributions of 0.4 of a percentage point (pp) or more arose in the 1980s and 1990s in the high-income countries. Malaysia and Thailand had IT capital-deepening contributions of more than 0.5pp in the 2000s. Several countries have had a much larger increase in IT capital deepening in the 2010s, with Thailand making a contribution of 0.6pp to LP growth.

These contributions to productivity growth do not include all the benefits that firms can derive from reducing costs of transactions, coordination, search, and communication; and from innovating.

Other subindices of the NRI also provide indications of the sophistication of ICT use and the economic and social impact of ICTs in APO countries. The 'people' pillar conveys a sense of the sophistication of use. It covers

- how individuals use technology and how they leverage their skills to participate in the network economy;
- how businesses use ICT and participate in the network economy; and
- how governments use and invest in ICT for the benefit of the general population.

The index, which is included in the indicators in Chapter 4, is highest for the countries that are also technologically advanced. Values for individual countries are reported in the country studies and are listed in Appendix H.

Governance

A breakdown of the NRI also provides information on the quality of governance arrangements for digital networks. The 'governance' index covers elements of:

- trust, i.e., the safety and security of individuals and firms in the network economy;
- regulation, i.e., the extent to which the government promotes efficient and effective participation in the network economy through regulation; and
- inclusion, i.e., the extent to which governments address digital divides.

Governance is an area of relative strength for nearly all countries (see Figure 9). For example, the Governance Index score for India is well above its NRI score.

Optimizing Digital Engagement

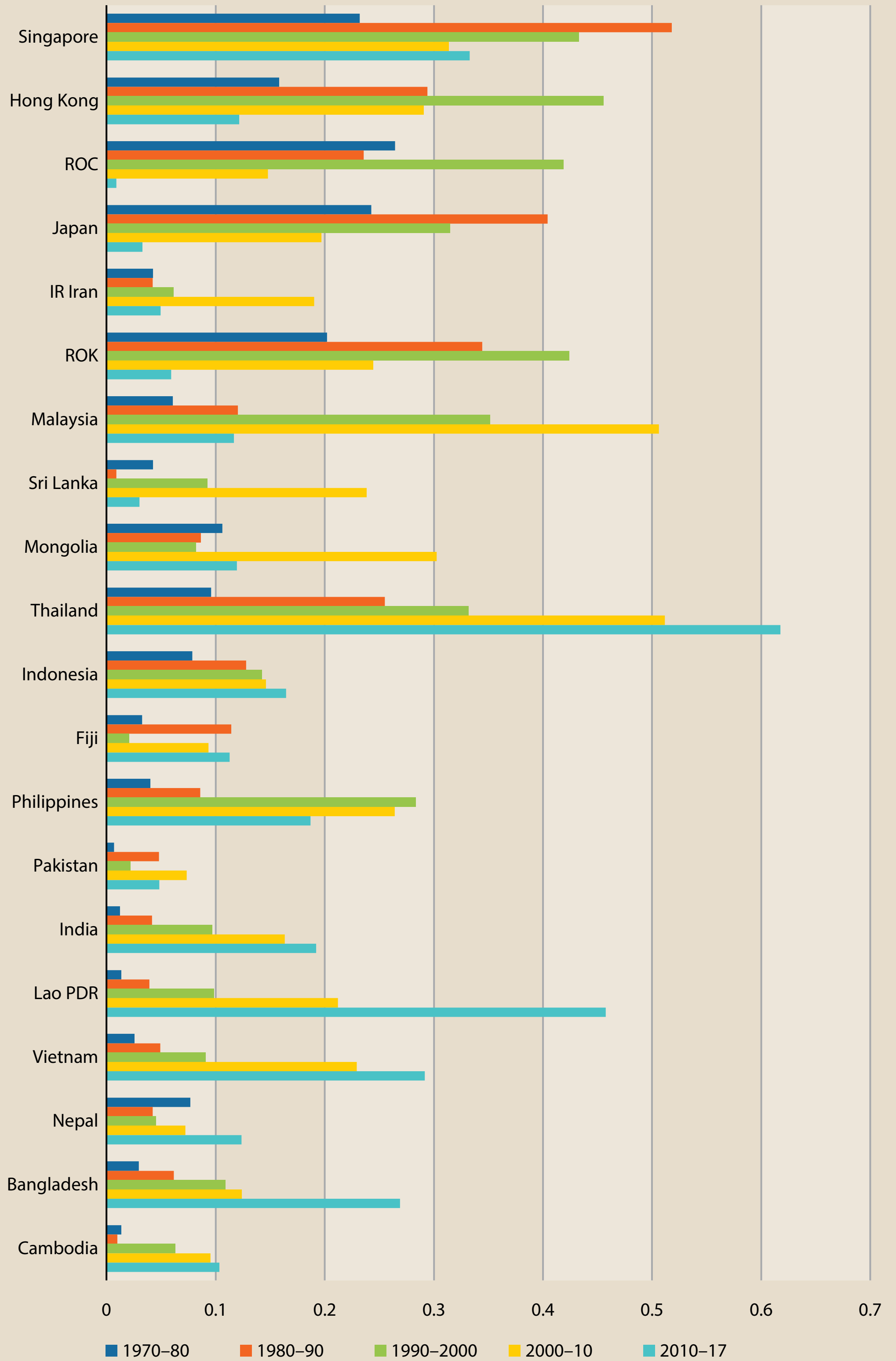
Each country will have its own optimum digital engagement. For many, large-scale production of digital goods and services, at least in innovation and design, will not be realistic, given the lead already reached by high-income and some other APO countries. However, there appears to be scope for countries to participate at some level of production in GVCs and for some countries to lift the amount and sophistication of their use of digital technologies.

Importantly, a mere investment in digital goods and services is not sufficient to realize the potential economic impact. Businesses need to be flexible and responsive, be able to tap into innovative thinking, and develop market opportunities. Realizing the potential of the digital revolution also requires suitable

FIGURE 8

CONTRIBUTIONS OF IT TO LP GROWTH IN APO COUNTRIES.

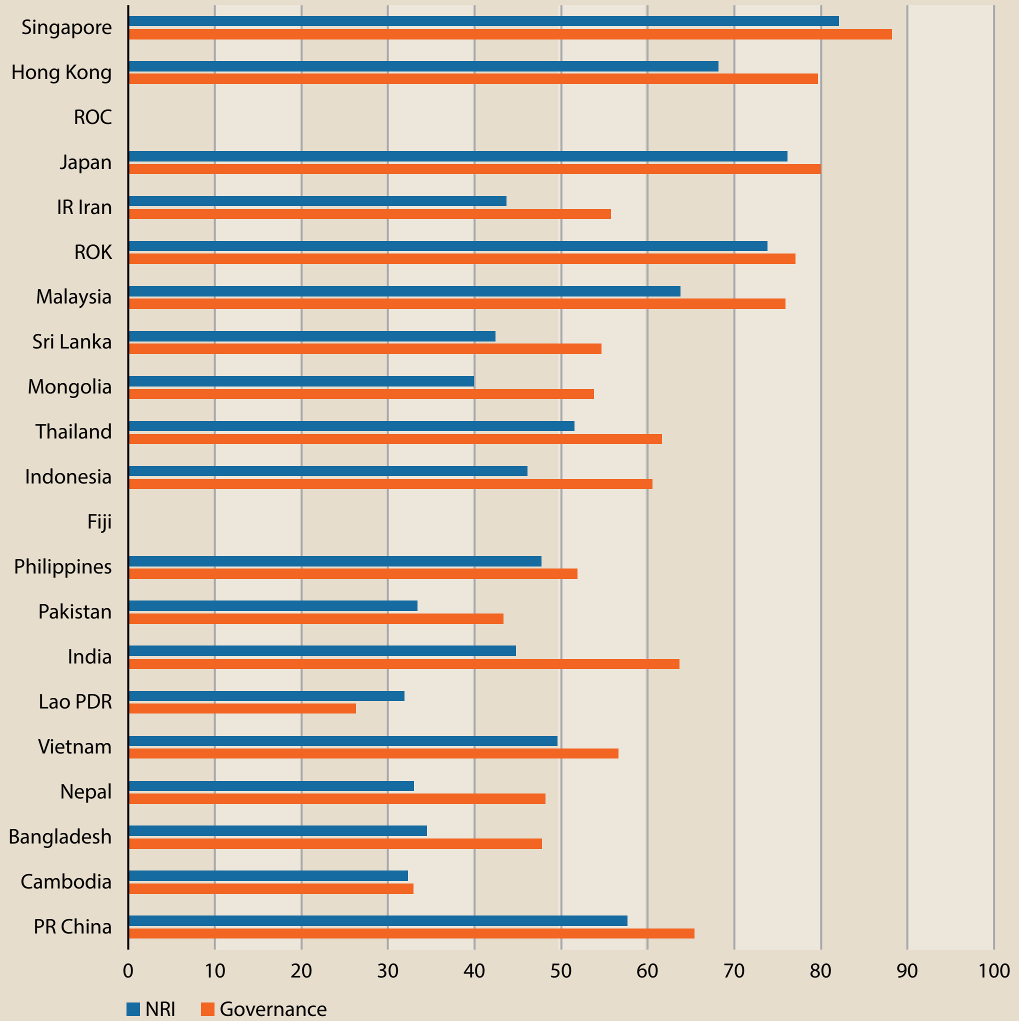
(PERCENTAGE POINTS)



Source: APO Productivity Database 2019.

FIGURE 9

NRI AND GOVERNANCE INDEX SCORES FOR APO COUNTRIES AND PR CHINA.
(SCORE: 0–100)



Source: Portulans Institute [19].

communications infrastructure and the availability of suitable skills. There needs to be the flexibility in the business environment to introduce new business models. And there needs to be good governance structures to provide user access and security and to promote producer efficiency.

Trade in Services

Producing low-cost manufactured goods for export has been a key element of the success of many APO economies. Yet, even in countries still heavily reliant on manufacturing, services are important. Services account for a significant share of costs in goods-producing industries. The cost and quality of services available in a country also affects its ability to participate in competitive GVCs.

Restrictions on services trade can raise production costs and impede trade and productivity growth. This section looks at the importance of services to the APO economies and the potential for economies to achieve higher productivity by removing unnecessary barriers to services trade. A detailed examination is provided in Appendix F.

Growth and Importance of Services Trade

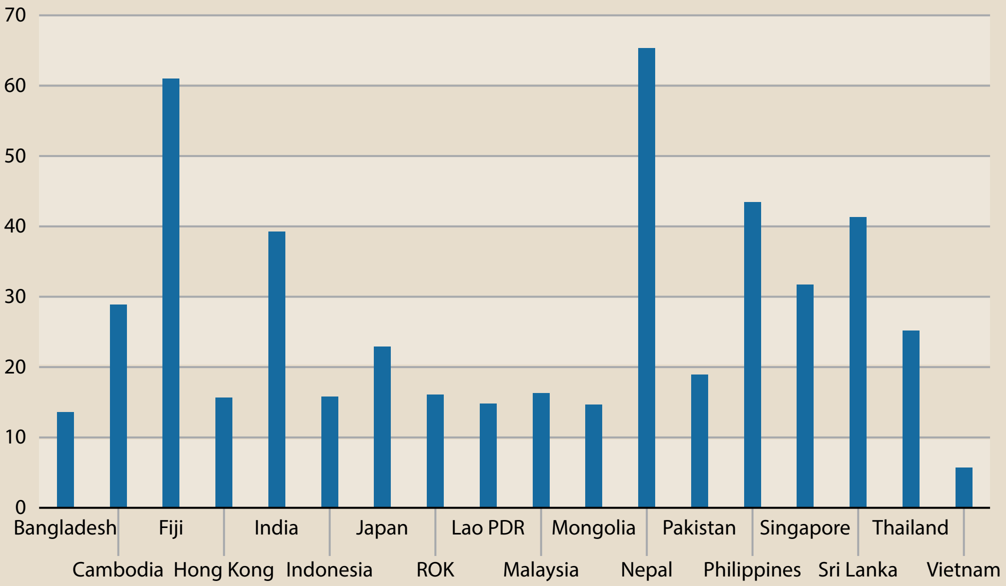
As seen earlier in this chapter, services have grown substantially in APO economies. Even in countries dependent on jobs, investments, and income generated from trade in manufactured goods, services still represent a large share of employment and activity. In 2017, services accounted for an average 59% of GDP in APO economies and roughly 40% of employment [2]. Services are defined to include all industries except agriculture, mining, manufacturing, utilities, and construction.

In many APO economies, services account for a significant share of total exports (see Figure 10). In Nepal and Fiji, where tourism is an important driver of growth in real GDP, services represent over 60% of exports. Services also make up a large share of exports in many high-income countries. In 2019, services comprised a third of the total exports of Singapore, a financial-services hub. In Japan, services represented 23% of exports in 2019, up 10 percentage points from the 2009 level, with travel services accounting for a fifth of services exports. Multiple APO economies have witnessed double digit annual growth in their exports of financial services, tourism, or ICT services in the past decade.

FIGURE 10

SERVICES' EXPORTS SHARE.

(% OF ALL EXPORTS)



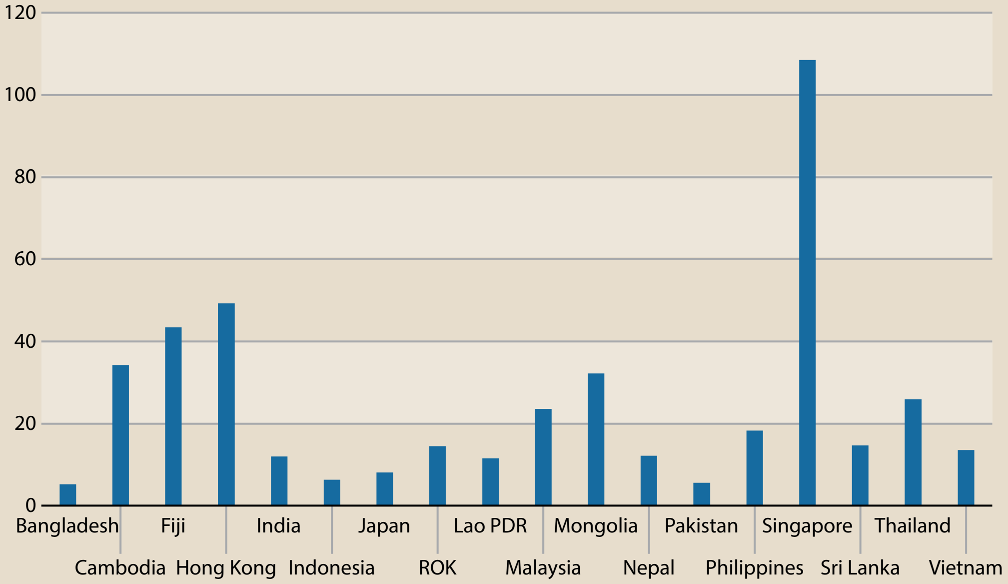
Source: World Bank World Development Indicators.
Note: 2019 data are shown for all economies except Lao PDR, Malaysia, Nepal, Sri Lanka, and Vietnam, where the most recent data available are for 2018.

In other APO economies, services have declined as a proportion of total exports in the past ten years. However, this has tended to reflect large expansions in exports of goods as opposed to shrinking services output. Across APO economies, the value of total trade in services, i.e., the sum of services exports and imports, ranges from 5% of GDP in Bangladesh to 109% in Singapore (see Figure 11). While services represent a larger share of activity in some countries than others, the value of trade in services has increased faster than GDP in most APO economies in the past 20 years.

FIGURE 11

TRADE IN SERVICES IN PROPORTION TO GDP.

(IN %)



Source: World Bank World Development Indicators.
Note: 2019 data are shown for all economies except Lao PDR, Malaysia, Nepal, Sri Lanka, and Vietnam, where the most recent data available are for 2018.

Official Data Obscure the Role of Services Trade

Official trade data report total flows of goods and services each time they cross a border between two countries. These data include services sold directly between firms in different countries. But they do not include services used as intermediate inputs to the production of other goods and services that are ultimately traded. For example, the sale of a bicycle made in the ROC to a wholesaler in the EU is recorded as an export of the manufacturing industry, although part of the value of the bike (or, equivalently, part of its total production cost) is due to services used to produce it. Inputs such as transport, communications or legal services, while crucial to the production of manufactured goods (and other directly traded services) are not included in official balance of payments data.

Estimates of value-added trade, in contrast, capture the value generated at all stages of the production of goods and services ultimately traded between countries. The share of services in total value-added trade is large, with recent estimates showing the share to be more than 40% of world value-added exports (see Appendix F). Input–output analysis is, however, unable to isolate services produced inhouse by goods-producing industries; for example, lawyers working in mining companies. Services 'embodied' in manufactured exports have increased as a proportion of total production value in recent years, making up a significant share of goods-producing industries' total costs.

Services are crucial to the running and coordination of GVCs, with transport, logistics, legal, and accounting services enabling the fragmentation of production across multiple countries. A proportion of such services are directly traded. The rest are intermediate inputs, attached to the production of a single fragment of the value chain, which can shift between countries.

Barriers to Trade in Services Remain Significant

Several APO economies have taken steps to liberalize trade in goods and services since the 1980s (see the country studies in Part B of this report). However, services industries remain highly protected in a number of APO countries. In some sectors, in particular, barriers to trade in services are significant, compared with sectors that are unrestricted (or completely open to trade) and in terms of the potential consequences for trade volumes and the performance of local firms. Restricting trade in services potentially adds unnecessary costs and erodes the competitiveness of a country's services sectors and goods-producing industries. Services sectors are often regulated for good reasons, e.g., to safeguard strategic assets, protect consumers' interests, or improve the way markets function. However, laws and regulations can have the effect of shutting foreign businesses out of local industries. Moreover, regulations introduced for legitimate policy aims can have the effect of increasing businesses' costs or making it harder to start and run a firm, if they do not align with rules in other countries.

Recent work by the World Trade Organization, in collaboration with the World Bank, suggests that India and Indonesia have the tightest restrictions on services trade among 14 APO economies for which data are reported (see Figure 12). The Services Trade Restrictions Index (STRI) tracks limits on cross-border trade as well as restrictions on the presence of foreign firms and individuals in different countries and industries. The STRI scores of India and Indonesia (65 and 64, respectively) are well above the APO average of 46, which is itself higher than the average of 42 for all 68 countries in the database. Notably, the averages cited in this section are not weighted by the value of total trade in different economies.

Six APO economies have scores below the 68-country average, indicating lighter-than-average restrictions on services trade. Japan has the lowest STRI of this group, which includes five high-income economies and Pakistan, a lower-middle-income economy. Hong Kong and Singapore are the biggest services producers in the APO, and both have relatively low STRIs. In contrast, in the ROK and Pakistan, the services share of GDP is below the APO average but services industries in both these countries are relatively open compared with other APO economies.

Among the APO economies in the database, Hong Kong has the least restrictive barriers to trade in telecommunications and transport services while Japan has the lowest STRI for distribution services and financial services. In contrast, India and Indonesia maintain significant barriers to trade in distribution and professional services, whereas transport services are highly protected in Malaysia.

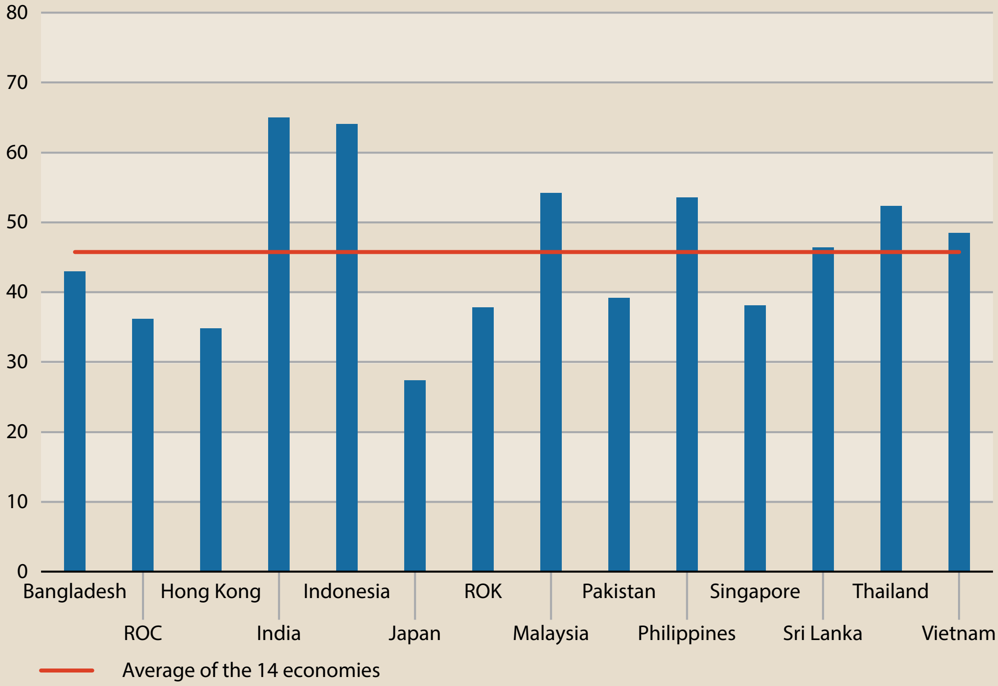
Average STRIs for APO economies in the database are lowest in distribution services (37.7), implying that this is a relatively open sector. In contrast, STRIs are highest, on average, in professional services (60.2) and financial services (51.2), suggesting that these industries are more protected.

A separate database, maintained by the European Centre for International Political Economy (ECIPE), tracks restrictions on digital trade, which can be important for innovation and R&D. The Digital Trade Restrictiveness Index (DTRI) covers limits on the use of data, investment in the ICT industry and barriers to digital trade imposed through laws and regulations, such as those on

FIGURE 12

WORLD BANK SERVICES TRADE RESTRICTIONS INDEX, 2016.

(SCORE: 0–100)



Source: 2016 World Bank Services Trade Restrictions Index; Borchert, et al [22].
Note: The Services Trade Restrictions Index (STRI) ranges from 0 to 100. A score of 0 indicates that none of the restrictions underlying the index is applied. A score of 100 means that the subsector is completely closed to trade.

competition and intellectual property. Of the 12 APO economies in the database, India and Indonesia have the greatest restrictions on trade in digital goods and services, with restrictive policies on public procurement and standards in India and restrictions on foreign ownership in online retailing in Indonesia. ECIPE notes, however, that India's data policies are relatively open, facilitating growth of ICT services exports [23]. Hong Kong and Singapore have the lightest restrictions overall (see Figure 13).

Barriers to Services Trade Increase Costs and Reduce Trade

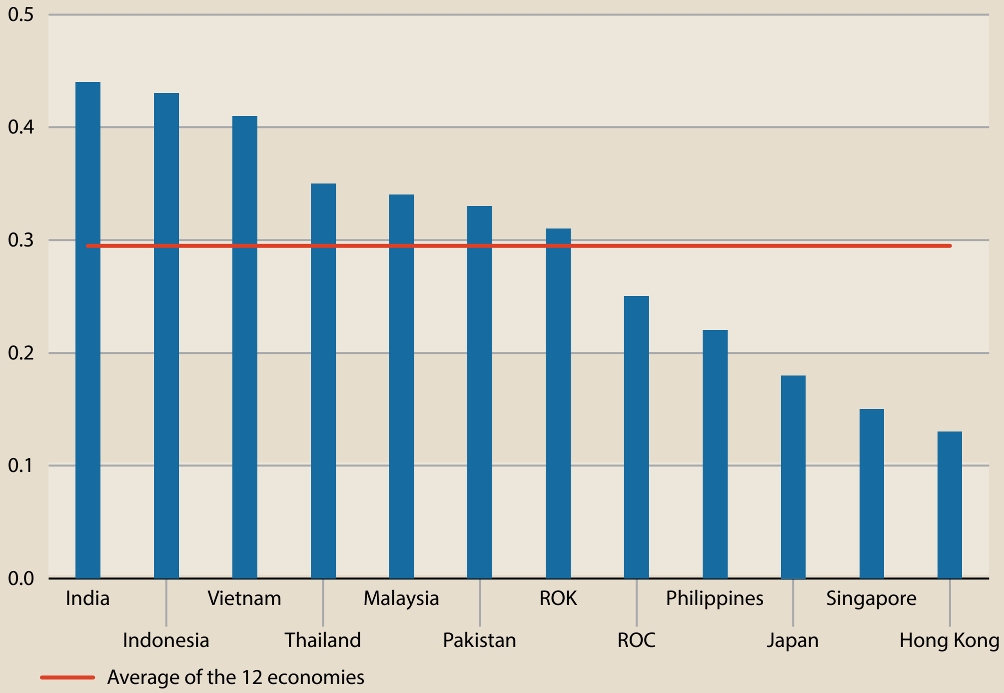
Restrictions on services trade reduce the range of services available to individuals and businesses while increasing input costs for local businesses and limiting competition. Services trade barriers also impede knowledge transfers that are enabled by FDIs and cross-border trades.

Moreover, high-performing services sectors are crucial to GVCs, which have driven strong exports growth in a number of APO economies, as discussed above. Coordinating production across borders requires good infrastructure but also needs effective transport, communication, finance, and logistical services. APO economies need efficient services to capitalize on their natural advantages, whether in producing goods or in facilitating cross-border production processes. Having access to high-quality imported services is an advantage for exporting manufacturing firms and their local suppliers, who may produce solely for the domestic market. Trade barriers raise the cost of these imported services. Relaxing unnecessary services trade restrictions can help make APO economies' exporting and domestic-focused industries more competitive in GVCs.

FIGURE 13

DIGITAL TRADE RESTRICTIVENESS INDEX.

(SCORE: 0–1)



Source: European Centre for International Political Economy
Note: DTRI scores range from 0 to 1; 0 being completely open, 1 being 'virtually restricted.'

A growing number of empirical studies find that liberalizing services trade contributes to improved economic performance in both services and goods-producing industries [24]. Liberalization of services trade is associated with higher export volumes and higher productivity in manufacturing firms, including high-productivity firms in ICT-using sectors. Effective institutions are needed for countries to capture the full productivity gains possible from reforming regulation of trade in services [25], which come, in a large part, through greater FDIs [25–27].

Optimizing Services Trade

Some regulation of services industries is essential to avoid market failures and to protect national interests. However, excessive regulation impedes competition, trade, and productivity. This matters not only for a country's services sectors but also for its goods-producing industries, which increasingly rely on inputs of services in production.

An evaluation of current services trade barriers should identify laws and regulations that obstruct competition, raise businesses' costs, and restrict FDIs and imports including restrictions on digital goods and services vital for innovation. Efforts should be made to identify regulations and regulatory processes that discourage trade in services because they are not consistent with rules, or the ways they are enforced, in other countries. This is particularly important for countries seeking to participate in GVCs. Cross-border policy frictions impose additional costs on international businesses, which can face multiple regulatory regimes across different jurisdictions that, even if similar in their objectives, are defined and enforced in distinct ways.

Cooperation between international firms, governments, and policy analysts could help identify and resolve such policy impediments to services trade, and the efficient operation of GVCs, with the aim of reducing costs without undermining policy objectives [28]. By lowering barriers that both undermine the long-run productivity agenda and are unnecessary for achieving other valid policy ambitions, APO economies can remove important obstacles to growth.

Key Point Summary

- The high-income APO countries (Japan, ROC, Hong Kong, ROK, and Singapore) showed impressive catchup toward the international frontier in earlier decades, while undergoing major structural transformations.

- The upper-middle income group (Malaysia, Thailand, IR Iran, and Sri Lanka) have also participated in catchup, although it came later and to a much lesser degree.

- The other economies of the APO region have started to catch up, to some degree, in the last decade or so.

- Catchup does not occur as a matter of course. It requires important preconditions to be in place. These conditions include policy and institutional reforms to lay a foundation for strong and sustained productivity growth in the long term.

- The industry mix and speed of structural change will also affect catchup and productivity performance, especially for the lower-productivity APO nations.

- However, structural change should not be forced (or inhibited), as this could lead to a misallocation of resources with adverse long-term consequences for productivity. Appropriate structural changes come out of a set of sensible policies and institutions.

- Asia has become a hub for global value chains (GVCs) and some APO economies are highly integrated with GVCs. GVCs provide opportunities for countries to participate in specific elements of manufacturing operations.

- GVCs can lead to productivity gains through specialization, access to higher-quality inputs, knowledge transfer and development of competencies. They can also encourage more innovation.

- Participation in GVCs can be fostered through lower trade barriers, coordination of standards and certification processes, reducing unnecessary regulation, and enhancing competition in local service markets. Developing infrastructure, institutions, skills, and technological capabilities are also important.

- Digital engagement varies widely among APO countries. While the high-income countries are highly engaged, it appears at first glance that the less-advanced economies could work to lift the extent and sophistication of their use of digital technologies. The extent of productivity effects will depend on the extent to which they can use digital technologies as a platform for innovation.

- Trade in services has become a more important feature of production in Asia. It has become more crucial in GVCs as production becomes more fragmented.

- Some APO countries have relatively high barriers to trade in services and could improve their competitiveness and productivity if they lowered at least some of these barriers. Removing unnecessary barriers to services trade should be part of a broader agenda aimed at reducing businesses' costs, enhancing competition, and lifting the productivity of services and goods-producing industries.

CONCLUSIONS

Rates of productivity growth have varied across APO countries since the turn of the millennium. Productivity growth has slowed in the high-income, high-productivity countries (Japan and the Asian Tigers). However, it has been strong in countries in the middle and lower productivity brackets. These countries have performed better than most others around the world.

In part, the difference is due to a common malaise affecting high-income countries, especially since the global financial crisis. However, it is also in part due to the timing of development trajectories. The high-income APO countries underwent transitions from low-productivity agriculture to higher-productivity manufacturing and services industries some time ago. So, their opportunities for rapid productivity growth have diminished. By varying degrees, the other APO countries are still going through these development transitions and are therefore still in the process of catching up.

A clear message from this report is that countries need to undertake policy and institutional reforms to provide the motivation, capabilities, efficiency of markets, and stability to promote strong and sustained productivity growth. While the high-productivity APO countries have established strong policy and institutional settings, other APO countries have further to go.

Nevertheless, all APO countries need strong productivity growth to promote growth in their living standards. The high-income countries must rely on productivity growth as they face such challenges as ageing populations and growing demands for social services. Other APO countries need to lock in strong productivity growth if they are to sustain the momentum in growth in their living standards.

Concerted and ongoing policy attention is needed in all countries. There is no finish line. While the high-income countries have implemented many policy and institutional reforms, there is still more to do. Catchup does not come as a matter of course for the other APO countries. While they have gone some distance in implementing policy reforms to open their economies to trade and to attract foreign capital, deeper institutional reforms are needed.

Much of the development of APO countries has taken place through the accumulation of inputs, especially capital. Strong labor productivity growth has been based on strong capital deepening. TFP growth has varied over time and countries but there needs to be more of a consistent focus for future labor productivity growth, as the contribution from capital deepening inevitably diminishes. This requires attention to skills, innovations, and improving the way the capital and the labor work together to generate output and income.

Broad Strengths and Weaknesses

This report has developed a framework of 17 productivity determinants and around 50 indicators that establish APO countries' strengths and weaknesses on those determinants.

High correlations between indicator scores and productivity levels have been found across APO countries. We are confident that the indictors are useful in giving timely suggestions on where policy action should be focused and for monitoring countries' progress over time in becoming more productivity ready.

The strengths and weaknesses of countries in the region are best indicated by values for the overarching indices developed for the four key themes of motivation, capabilities, efficiency of markets, and stability. These overarching themes reflect the fact that (1) firms need to be motivated to improve productivity; (2) they need the resources and competencies to be more productive; (3) resources need to be allocated responsively to where they can be used most productively; and (4) there needs to be political and economic stability to lay the path for long-term investment decisions.

All the four overarching elements are needed in combination to bring strong and sustained productivity growth. Policy and institutional settings need to ensure that underlying determinants that foster all four elements are promoted. There is no single measure or no 'silver bullet' for productivity success.

An overall Productivity Readiness Index (PRI) was developed from the indicators. This captures the notion that productivity growth does not always come immediately and automatically. Countries as well as firms need to be productivity-ready to take advantage of opportunities for productivity improvement as they emerge.

The analysis in this report has shown that, while APO countries are not as productivity ready as OECD countries, they are more productivity ready than non-APO, non-OECD countries. Despite this, APO countries can be expected to outstrip OECD countries in productivity growth because of the nature of their economies and their level of development.

As Figure 1 clearly illustrates, there is a very strong and positive relationship between productivity readiness and realization of productivity levels in the long term. This was confirmed by the statistical analysis undertaken for the report.

However, it should be recognized that large improvements in productivity readiness cannot happen overnight. Reform requires time and concerted effort.

APO countries' scores on the four overarching themes of motivation, capabilities, efficiency of markets, and stability are displayed in Figure 2.

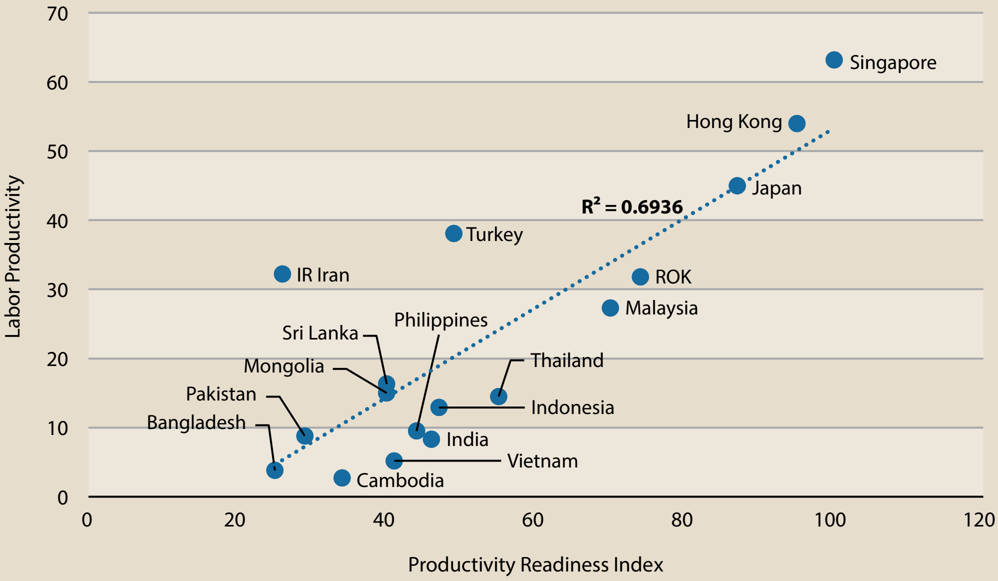
Singapore is a stand-out performer (globally as well), with high scores and top ranking on the overarching indices, as well as a PRI score of 100. Hong Kong comes next among APO countries with a PRI of 95, scoring higher on efficiency of markets, but lower on capabilities. Japan scores in the high 80s and is strongest on motivation of firms. The ROK and Malaysia are in the 70s, with Malaysia being weaker on stability.

Scores fall away sharply after that. Only Thailand has a PRI above 50. These lower scores suggest that there is considerable scope to improve productivity readiness. Many countries are weakest on stability.

Index scores could not be compiled for the ROC, Fiji, Lao PDR, and Nepal, because of insufficient indicator data. We can speculate that the ROC, with effective institutions and a favorable business environment, may be in the group of countries with scores over 70, while the other countries would be below 50.

FIGURE 1

THE RELATIONSHIP BETWEEN PRI SCORE AND LABOR PRODUCTIVITY.



Source: Author's estimates.

Some Specific Areas

The quantitative analysis found consistently that regulatory quality, government effectiveness, and rule of law are important in determining productivity readiness and growth. These conclusions were supported by simple correlations between indicators and labor productivity levels in APO countries and the studies of individual countries. Other areas identified as having important implications for productivity included infrastructure, openness to trade and investment, and the negative effects of corruption and political instability.

Table 1 summarizes the key strengths and weaknesses that were identified in the study for APO countries. These are not the only areas that require attention for each country, but they provide a sense of where policymakers could pay special attention.

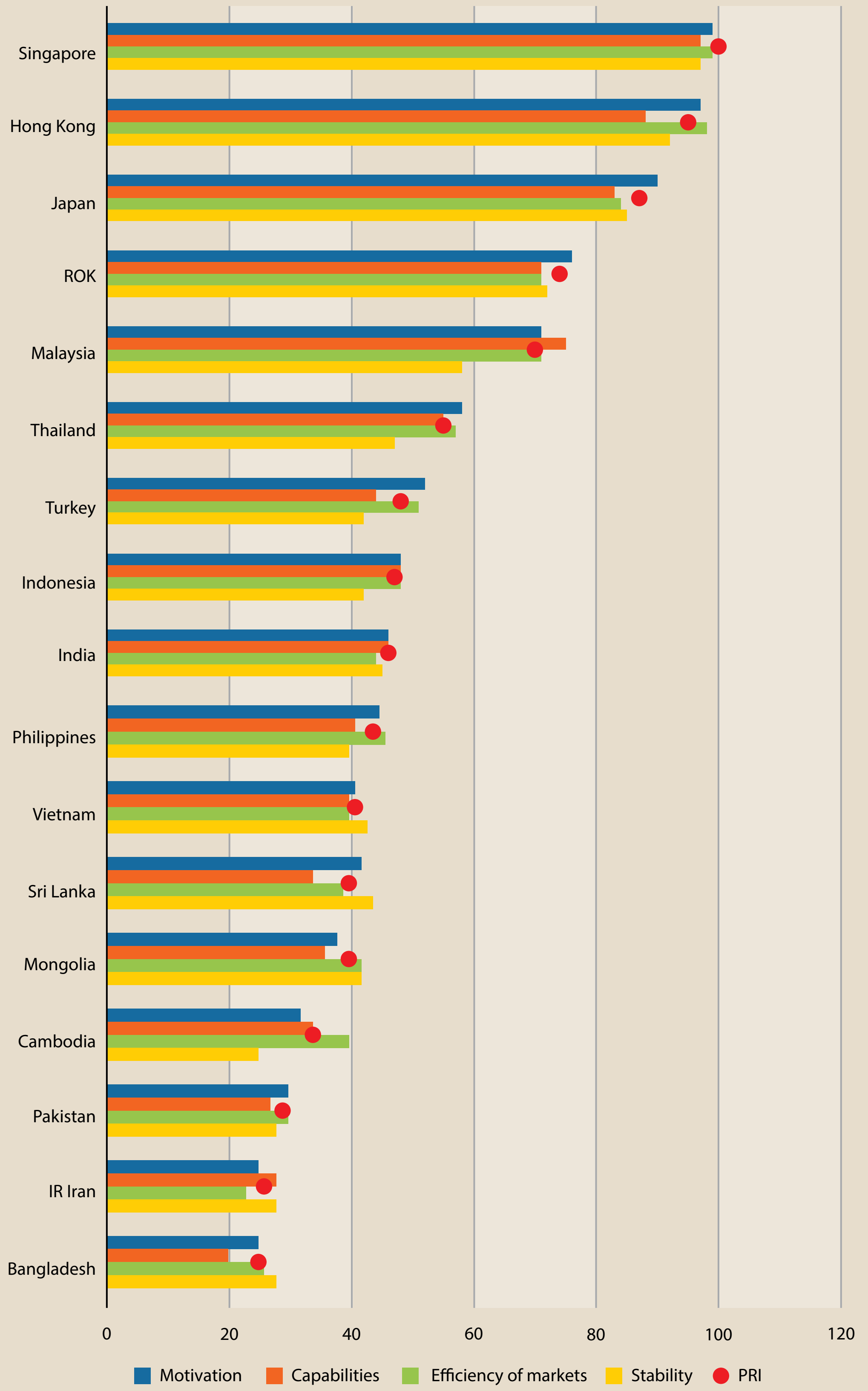
While the high-income, high-productivity countries score highly on nearly all indicators, there are areas in which they could take further action to improve productivity readiness. The individual country studies in Part B identify such areas. They include, for example: relaxing barriers to services trade in Singapore; reducing labor market rigidities and relieving the high tax burden in Japan; reducing administrative requirements on businesses and being more open to FDI in the ROC; and relaxing trade restrictions, reducing labor market rigidities, and lowering taxes in the ROK.

High regulatory burdens appear frequently as a weakness, and need attention in many APO countries including Cambodia, Fiji, India, Lao PDR, Mongolia, Pakistan, the Philippines, and Vietnam. Countries such as Bangladesh, India, and Pakistan need to improve their education systems and work to ensure access to education for all, especially those in rural areas.

Labor market inflexibility is a weakness, evident in the table, in one way or the other for nearly every APO country. In some cases, high minimum wages in the formal sector create perverse

FIGURE 2

COUNTRY SCORES ON OVERARCHING INDICES.



effects that can lead to corruption and an inefficient allocation of labor. These rigidities can also prevent labor mobility from aiding in productivity growth. On the other hand, a large informal sector and cheap labor militate against capital investments and resource reallocations that can bring long-term productivity gains.

Infrastructural improvements can lead to productivity growth for all countries by reducing the cost of production and trade. Cambodia, Mongolia, the Philippines, and Vietnam have work to do in some aspects of their transport and utility infrastructure.

TABLE 1

THE KEY PRODUCTIVITY STRENGTHS AND WEAKNESSES OF APO COUNTRIES.

Country	Strengths	Weaknesses
Bangladesh	• Government adoption of technology and responsiveness to change • Railroad and airport connectivity	• Poor quality of education system • Institutional weaknesses, corruption control, and low government effectiveness • Lack of dynamism in business environment
Cambodia	• Openness to foreign investment • Labor market flexibility	• High administrative requirements, poor regulatory quality, and low control of corruption • Infrastructure underdevelopment • Poor quality of education system
Fiji	• Flexible labor market • Institutions	• High administrative requirements and poor regulatory quality • Trade and investment barriers • Skills shortages
Hong Kong	• Highly educated workforce • Foreign investment and trade openness • Highly developed infrastructure and institutions	• Administrative requirements • Inequality
India	• Entrepreneurial culture • Innovation capability • Transportation infrastructure	• Burdensome administrative requirements • Labor market inflexibility • Inadequate access to education
Indonesia	• Entrepreneurial culture • Domestic competition • Social capital	• Labor market inflexibility • Barriers to trade and foreign investment • Internet adoption
IR Iran	• Educated workforce • High share of medium- and high-tech manufacturing	• Public sector's ineffectiveness and corruption • Low domestic competition • Labor market inflexibility
Japan	• Highly educated workforce • Highly developed infrastructure and strong institutions • Technological advancement	• High tax burden • Labor market rigidities • Slow SME productivity growth
ROK	• Highly developed infrastructure and strong institutions • Highly educated workforce • High technological advancement	• High tax burden • Labor market rigidities • Trade barriers

(Continued on next page)

(Continued from previous page)

Country	Strengths	Weaknesses
Lao PDR	• Low tax burden • Trade openness	• Burdensome administrative requirements • Poor regulatory quality • Low public-sector capacity • Low access to technology
Malaysia	• Entrepreneurial culture • Quality of education system • Technological advancement	• Administrative requirements • Barriers to services trade
Mongolia	• Openness to foreign investment • Labor market freedom • Low tax burden	• Infrastructure underdevelopment • Burdensome government regulation and administrative requirements • Limited domestic competition
Nepal	• Relatively low tax burden • High education expenditure	• Weak institutions and political instability • Low human capital • Barriers to trade and foreign investment
Pakistan	• Moderate administrative requirements to start a business • Above average availability of the latest technologies • Young population	• Poor regulatory quality, government ineffectiveness, and low control of corruption • Lack of business freedom and labor market rigidities • Weak institutions and political instability
Philippines	• Workforce skills • Entrepreneurial culture • ICT skills	• Political instability, and low control of corruption and rule of law • Burdensome administrative requirements • Underdeveloped infrastructure
ROC	• Highly educated workforce • Highly developed infrastructure and strong institutions • Advanced innovation system	• High tax burden • Inadequate labor freedom • Administrative requirements
Singapore	• Highly educated workforce • Highly developed infrastructure and strong institutions • High technological advancement • Foreign investment openness	• Barriers to services trade • Insolvency regulation • Lack of press freedom and political expression
Sri Lanka	• Relatively developed infrastructure, particularly access to electricity • Health system • Relatively low tax burden	• Labor market inflexibilities • High barriers to trade and foreign investment • Public sector's ineffectiveness
Thailand	• Efficient administrative requirements and business freedom • ICT adoption • Financial depth and stability	• Labor market inflexibility • Skills shortages • Political instability
Vietnam	• Relative openness to trade • Reasonably developed infrastructure	• Poor regulatory quality and low control of corruption • Relatively high tax burden • Inadequately developed transport infrastructure • Poor education system

Sources: Country studies (Part B of this report).

Other countries are noticeably behind on immediate determinants, such as skills and capital intensity. However, it is by working on the underlying determinants, such as the quality of the education system, openness to foreign investment, and the business environment, that progress in these areas will be achieved.

Participation in global value chains has provided countries at earlier stages of development with opportunities to industrialize without the need to set up entire industries. Low labor costs have provided many countries with a comparative advantage, although they have also offered further enticements to foreign capital through measures such as tariff reductions and tax breaks. However, as GVCs have become more complex, and as labor costs have risen in some countries, the need for higher skills and more fundamental reforms has emerged.

Governments in these economies should strive to bring economy-wide reforms and not just for the export-oriented participation in GVCs. This will broaden the base for productivity improvements and bring larger improvements in productivity and competitiveness.

The need for political and economic stability, improved government effectiveness, and better control of corruption are common themes coming from the country studies. These problems seem particularly prominent in the middle- and lower-productivity countries. An important part of avoiding the middle-income trap is to raise skills and remove stifling bureaucracy and regulation. However, these can be difficult to achieve if trust is low because of corruption or government ineffectiveness.

While many countries have improved their openness to trade and investment, there is further to go. Fiji, Indonesia, the ROK, Nepal, and Sri Lanka were all identified as having work to do on trade barriers. With the growing importance of services trade, and the role of services in reducing input costs and in coordinating cross-border trade in goods, reducing barriers to trade in services should also be a priority for countries. This was a specific weakness for Singapore and Malaysia.

Most APO countries could lift their IT engagement. Increased IT capital and greater capacity among countries' workforces to use IT capital should have productivity payoffs as in case of OECD countries.

Finally, resource allocation and structural change affect productivity. Structural change has been a feature of APO economies, with big shifts from agriculture to manufacturing and services. There are ongoing structural changes within sectors as well and the role of resource reallocation at a more micro level has also come into focus. Governments can distort the allocation of resources by overregulating markets for goods and services or by shielding specific firms from competition. Policies that discriminate based on business sizes get in the way of expansion of young, high-productivity firms, which would lift overall productivity. Easy credit has enabled 'zombie' firms to continue in business and this holds down 'industrial' and 'national' productivity.

Final Words

In the end, productivity growth is much more about firms, and the general conditions in which they prosper, than it is about industries. That is especially true in the modern world of fragmentation of production. The ideal way would be for policies to apply to firms generally, irrespective of their characteristics, such as size and industry of operation. Also, well-functioning financial markets are needed to ensure that capital goes to those firms with a productive future.

This suggests that good policy is more about improving the operating environment for firms than it is about giving special treatment to certain firms or industries. Policies that lower costs for firms can help. These include reforms to address inflexible labor market rules, expensive compliance rules, regulatory burdens, and potentially burdensome taxes on production. Targeted support to specific firms or industries, while often politically attractive, can easily lead to inefficiencies and corruption and is likely to have a smaller payoff than simply improving the operating environment for all.

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PART B
COUNTRY STUDIES

BANGLADESH

Bangladesh is one of the most populous APO countries, and its population growth rate is also above average for the group. Nearly two-thirds of the population is rural based, though the urban proportion is growing. While in absolute terms, the country's average income remains low, it has increased more than three times since 1970. Bangladesh's growth rate of average income is among the top three APO countries. A relatively low rate of employment, however, holds its average income level down (see Table 1 and Figure 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	161.8 (2017)	4	1.3 (growth rate in 2010–17)	8
Rural population proportion (%)	69.5 (2010)	5	64.1 (2017)	7
GDP (USD billion at PPP, % per year)	638.4 (2017)	12	6.4 (growth rate in 2010–17)	5
GDP per capita (USD at PPP, % per year)	3,900 (2017)	19	5.0 (growth rate in 2010–17)	6
Employment rate (%)	38.0 (2010)	15	38.6 (2017)	15
Age dependency ratio (%)	58.3 (2010)	6	50.3 (2017)	10
Old-age dependency ratio (%)	7.4 (2010)	13	7.7 (2017)	16

Source: Appendix G.

Productivity Performance

Bangladesh's labor productivity (LP) level is low within the APO group. However, its rate of LP growth in the 2010s (see Figure 3) was the second highest among APO countries. Bangladesh's rate of total factor productivity (TFP) growth has also increased from the 2000s to the 2010s, with a growth rate in the 2010s that is more in line with other APO members (see Table 2 and Figure 4).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	2.6 (2010)	19	3.8 (2017)	19
Labor productivity growth (% per year)	3.3 (2000–10)	12	5.7 (2010–17)	2
TFP growth (% per year)	0.03 (2000–10)	18	0.6 (2010–17)	12

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–2000	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	−0.6	2.0	2.2	3.3	5.7	5.7	5.8
TFP growth	−1.5	0.4	0.2	0.03	0.6	0.5	0.9
Capital productivity growth	−1.3	−1.0	−1.4	−2.5	−1.4	−1.7	−0.5
Output growth	0.8	4.0	5.1	5.4	6.4	6.1	7.0
Combined inputs growth	2.3	3.7	4.9	5.4	5.8	5.7	6.0
Capital growth	2.1	5.0	6.4	7.9	7.7	7.8	7.4
IT capital growth	9.4	12.2	14.8	14.3	21.3	22.3	18.7
Hours worked growth	1.4	2.0	2.9	2.2	0.6	0.4	1.1
Labor quality growth	1.1	0.4	0.4	0.3	2.4	2.3	2.7
Capital deepening	0.4	1.4	1.8	3.1	4.1	4.3	3.8

Source: Authors' estimates based on data from APO Productivity Database 2019.

Output growth has been rapidly increasing since a low of 0.8% a year in the 1970s. The annual rate of output growth hit 7.0% in 2017. Input accumulation, especially of capital, has been the most important source of output growth. The capital contribution to output growth was 4.2 percentage points in the 2000s and 4.5 percentage points in the 2010s, accounting for nearly three-quarters of the output growth (see Figure 2). Continued capital deepening can be seen in the growth of the capital–labor ratio (see Figure 6).

The APO [1] has observed that there has been a recent acceleration in LP growth, although it has been from a very low base. It has noted that productivity levels in all sectors remain low by international standards. LP growth picked up from 2.2% a year in the 1990s and 3.3% a year in the 2000s to a strong rate of 5.7% a year in the 2010s (see Table 3). The trend in LP growth has been mostly positive, with some fluctuations. The growth stood at 7.2% in 2017 (see Figures 3 and 4).

Increased LP growth was mostly due to a greater capital deepening, rather than the TFP growth. TFP growth in Bangladesh has been nearly nonexistent, being 0.5% in trend terms in 2017.

Capital productivity mostly fell in the years up to the early 2000s (see Figure 5), suggesting that all new capital may not have been well allocated. There has been improvement since the early 2000s, with capital productivity nearing zero.

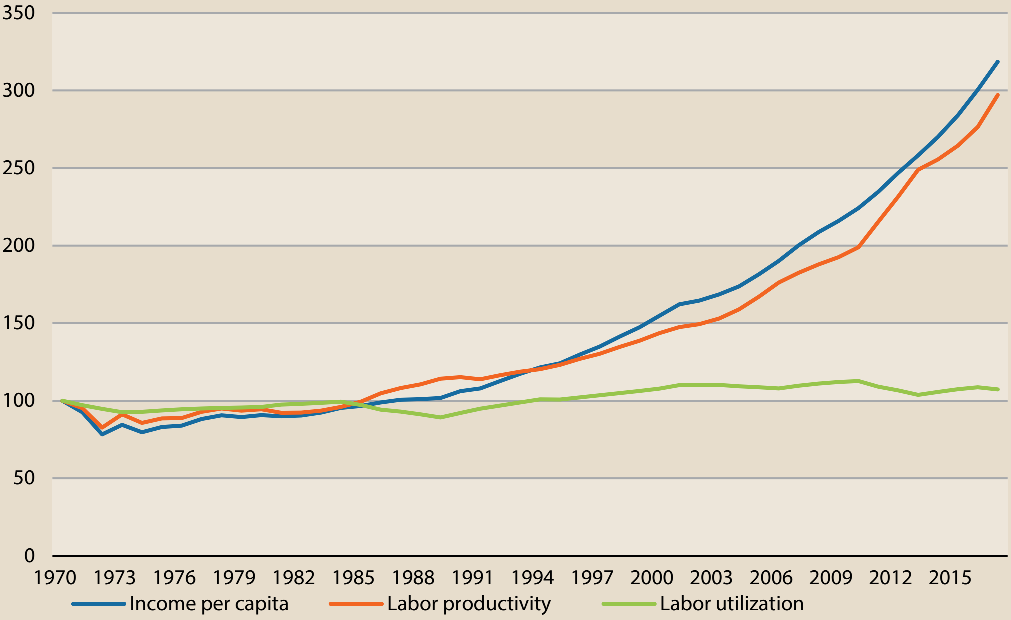
Bangladesh's economy has grown rapidly over the last three decades, due to a large increase in labor productivity and a strong population growth. "Economic growth took off only after the restoration of democracy in 1971," as political calm allowed for industrialization [1]. Liberalization reforms beginning in the mid-1980s, especially in the financial sector and in international trade, encouraged economic growth over the long run [2].

Remittances from Bangladeshis working abroad have supported domestic consumption and investment [3]. The APO [1] has noted that "…exports and foreign direct investment (FDI) have not played a significant role in the economy's growth."

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

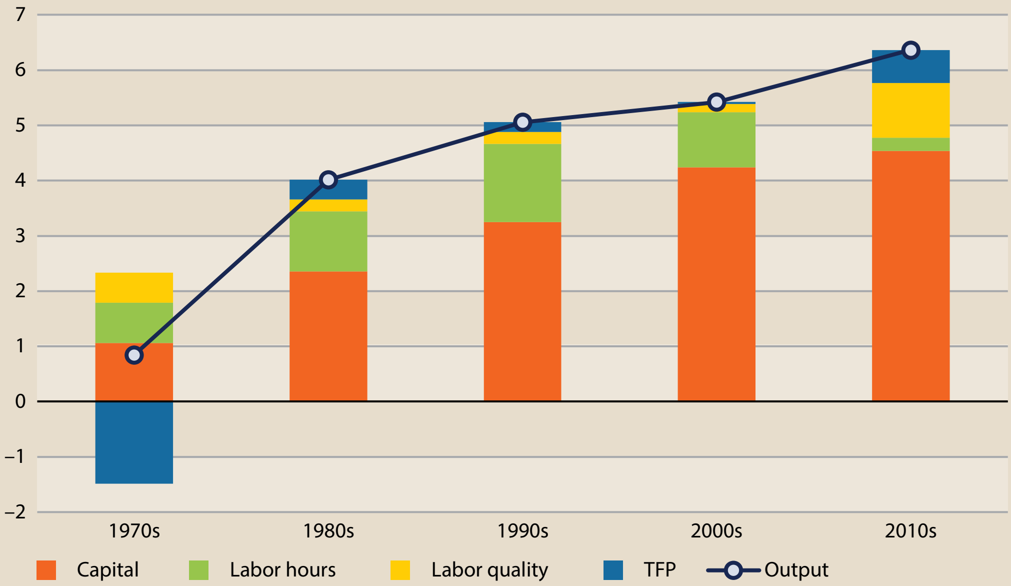


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PERCENTAGE POINT).

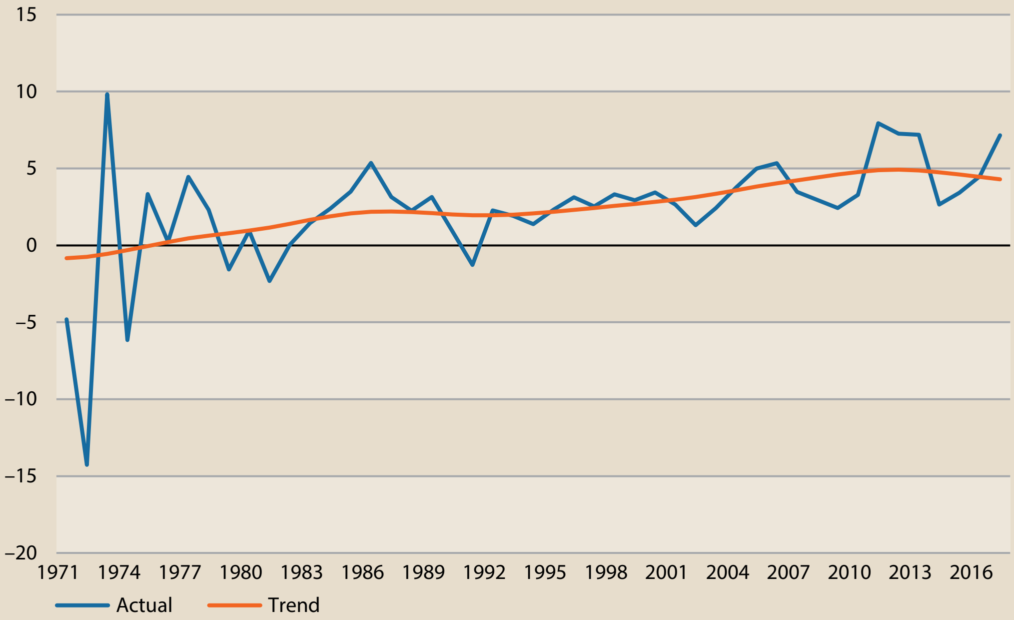


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %).

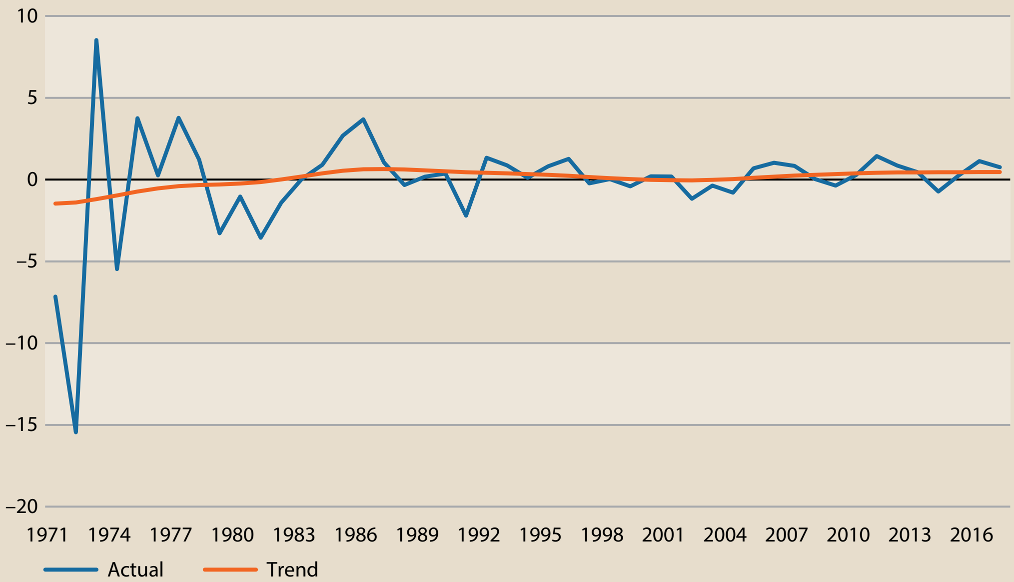


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

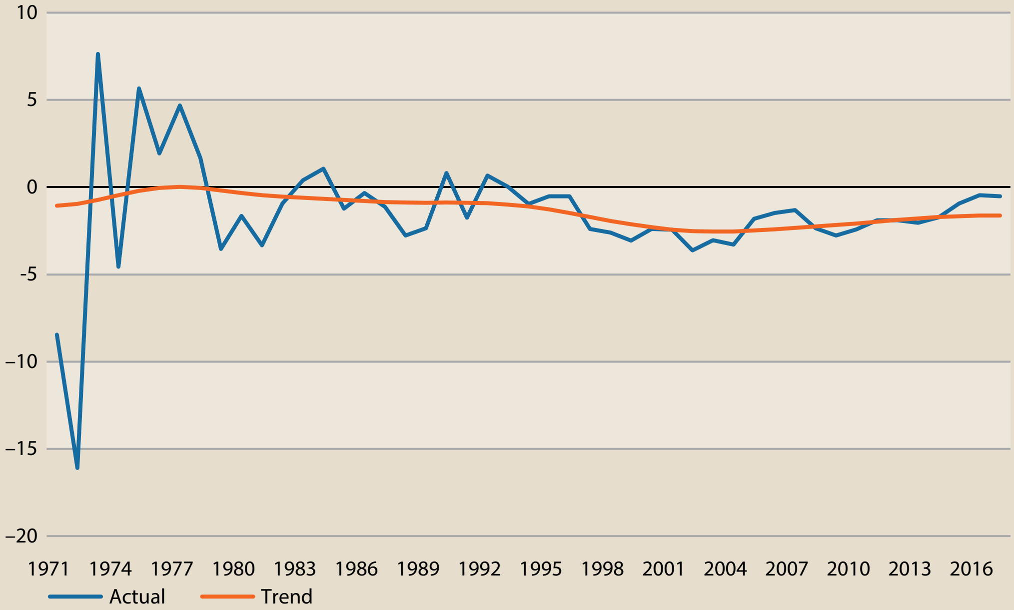


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

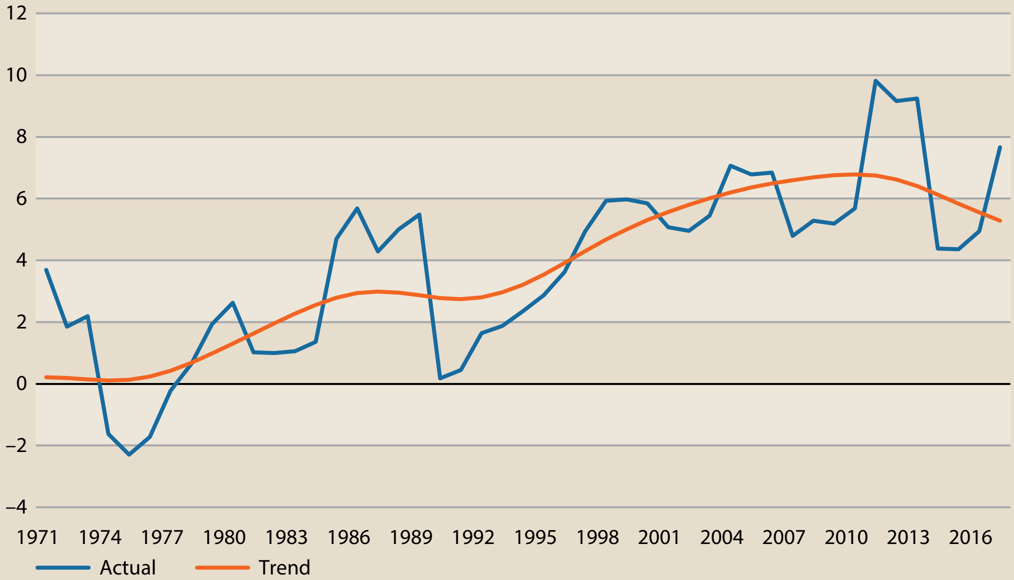


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Strong labor productivity improvement also accounted for 89% of growth [3] in the 2010–16 period, driven in part by this growth in remittances. Between 1990–16, the increased "labor productivity growth was determined very much by changes in non-IT capital deepening growth" [1]. The shift in workers from the lower-productivity agriculture to higher-productivity manufacturing and services also increased labor productivity, 'contributing more than one-quarter to overall growth' [3].

Overall, however, TFP growth in Bangladesh has been nearly nonexistent, partly because of an abundance of low-cost labor. Efficiency in production has been stagnant as employers lack incentives to invest in workers. "…the labor market is still dominated by agriculture and low-productivity services, with informality, unpaid work, low earnings, and lack of worker protection prevalent" [3].

Capital productivity has been declining as a result of inefficiencies in public and private spending. The inefficient use of capital in Bangladesh could be due to a number of factors including insufficient levels of public investment, inefficient delivery of investment, misaligned spending, weak management capacity, and workforce–skills gaps [3].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws from the quantitative analysis of indicators in Chapter 5, and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Many features of the Bangladeshi economy discussed above are evident in the indicators of the immediate determinants (see Table 4). Bangladesh's capital deepening and IT capital deepening contributions to labor productivity are some of the highest among APO countries, though the country has a relatively low capital-to-GDP ratio.

However, its human capital contribution to labor productivity is below average. The WEF has scored Bangladesh's current workforce and entrepreneurial culture lower than other APO countries.

The manufacturing and agricultural sectors contribute similar amounts to Bangladesh's GDP, though agriculture employs a much higher percentage of the population. Bangladesh has also slightly increased the share of its manufacturing sector (medium and high-tech), though the share is still one of the lowest among APO countries. The percentage of Bangladesh's GDP that is made up of imports and exports lags that of other APO countries, suggesting that Bangladesh is not as integrated in the global economy as others.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability (see Table 5). These indices have scores up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Bangladesh ranks 16th among the 16 APO countries for which indices could be calculated. This covers all overarching indices and the Productivity Readiness Index (see Table 6). Its score is weakest on capabilities. These scores are well behind the APO leader, Singapore, which has scores around 100. Clearly, there is a lot of policy and institutional work that could be done.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.4 (2010)	16	2.7 (2017)	13
Capital deepening (pp)	Open	4.6 (2017)	3	4.1 (average 2000-17)	1
IT capital deepening (pp)	Open	0.24 (2017)	6	0.27 (average 2000-17)	5
Human capital					
Labor quality contribution to LP growth	Open	-0.1 (2017)	16	1.0 (average 2000-17)	4
WEF Current Workforce	0-100	40.7 (2019)	17	35.4 points behind APO leader	
WEF Entrepreneurial Culture	0-100	41.3 (2019)	18	29.1 points behind APO leader	
Knowledge					
Availability of latest technologies*	1-7	4.1 (2018)	15	2.2 points behind APO leader	
NRI Technology Pillar	0-100	27.7 (2019)	17	50.8 points behind APO leader	
NRI People Pillar	0-100	25.1 (2019)	15	51.3 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	14.2 (2017 GDP)	8	40.3 (2017 employment)	4
Manufacturing share (%)	Open	18.3 (2017 GDP)	9	16.0 (2017 employment)	8
Medium- and high-tech share of manufacturing (%)	Open	9 (2010)	15	10 (2018)	14
Exports/GDP (%)	Open	16.0 (2010)	17	15.0 (2017)	18
Imports/GDP (%)	Open	21.8 (2010)	17	20.3 (2017)	16

Source: Appendix G of this report.
Note: * Supplementary indicator.

TABLE 5

VALUES OF OVERARCHING INDICES FOR BANGLADESH.

Index	Value	Rank
Motivation	25	16
Capabilities	20	16
Efficiency of markets	26	16
Stability	28	16
Productivity Readiness Index	25	16

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Bangladesh rates relatively poorly on nearly all indicators (see Table 6). If it is to continue to improve its productivity in the long term, it will need to improve the provision of education, the strength of its institutions, and the dynamism of its business environment.

Indicators reflecting Bangladesh's infrastructure rank low globally. This is specifically true of the country's utility infrastructure. Bangladesh's transport infrastructure is slightly below the average globally, while showing the country's relative strength in railroad and airport connectivity and its weakness in terms of the road infrastructure. Bangladesh performs more poorly in terms of its utility infrastructure. Bangladesh's high exposure to unsafe drinking water and the unreliability of this water supply drag down these indicators.

In terms of its institutions, Bangladesh ranks rather low globally, particularly in the areas of corruption and property rights, ranking 143rd out of 180 countries in Transparency International's 2017 Corruption Perceptions Index. The "lack of transparent and accountable governance, as well as the prevalence of impunity for well-connected shroud the true extent of corruption in Bangladesh," [4] though some have concluded that corruption is driven by "the close ties and networks between politics and business." However, "control of corruption indicators has improved in recent years but remains modestly below the average for South Asia and low-income countries" [4]. Finally, the property rights indicator is dragged down by low scores for the quality of land administration and for intellectual property protection.

The Bangladeshi government also ranks rather unfavorably against its APO peers in terms of government effectiveness and political stability. Its WEF indicators for public-sector performance are slightly above average globally, specifically because of the government's adoption of technology. However, policy stability in Bangladesh remains low compared to its global peers and the Bangladeshi government ranks about average in terms of its responsiveness to change.

The business environment in Bangladesh suffers from heavy administrative requirements and a weak entrepreneurial culture. The indicators representing the time and cost of starting a business, as well as the regulatory framework surrounding insolvency, are especially low. According to the WEF report, Bangladesh also does not have a high number of companies embracing disruptive ideas, nor do its companies delegate authority well.

While Bangladesh has made notable progress in expanding access to education [5], there are still major gaps in educational outcomes. For example, 98% of primary-school-age children were enrolled in schools, and 50.9% of all enrolled students were girls in 2016 [5] However, Bangladesh's educational system falls behind that of other APO nations, both in terms of training and spending. Of all students, 20% drop out before completing fifth grade, thereby lowering literacy rates and disrupting the pipeline of workers who might be productive in a knowledge-based economy [5]. Lower literacy rates and educational completion have kept Bangladesh's Innovation Capability score and its labor productivity low.

Bangladesh's relatively weak infrastructure, however, has not kept out foreign investment in the ready-made-garment (RMG) business. Despite suffering from a sluggish business environment, Bangladesh has attracted inflows in this sector because of 'the availability of cheap labor' [1]. Inflows may exist in the RMG sector, but foreign investment in Bangladesh overall has remained low, as shown in the country's foreign investment indicators. Nevertheless, its high proportion of remittances amounts to Bangladesh having one of the highest savings rates among APO countries.

Finally, Bangladesh's financial sector has suffered from mismanagement in recent years. The IMF states that 'the financial situation in the banking sector continues to weaken…the amount of restructured and rescheduled loans continues to increase' [6] because of weak internal control and corruption [6]. This high level of stressed loans limits banks' ability to engage in new lending and limits access to credit [6]. The indicators reflect this underperformance. Bangladesh is below average among APO countries in terms of its financial system.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.4	16	2.4
Quality of primary education*	1–7	3.1 (2017)	18	3.1
WEF Skills/Future Workforce	0–100	51.5 (2019)	17	29.9
Education expenditure/GDP* (%)	Open	2.0 (2017)	19	3.2
Innovation system				
WEF Innovation Capability	0–100	30.7 (2019)	17	49.5
KOF Informational Globalisation, de facto	0–100	63.9 (2017)	18	35.9
Infrastructure				
WEF Infrastructure	0–100	51.1 (2019)	19	44.3
Business environment				
THF Business Freedom	0–100	52.3 (2019)	19	43.9
WEF Administrative Requirements	0–100	56.7 (2019)	16	36.4
WEF Domestic Competition	0–100	45.1 (2019)	16	29.7
THF Tax Burden	0–100	72.7 (2019)	18	20.3
WB WGI Regulatory Quality	−2.5 to 2.5	−0.83 (2018)	19	3.06
WEF Labor Market	0–100	51.2 (2019)	17	30
THF Labor Freedom	0–100	68.4 (2019)	7	22.5
NRI Governance	0–100	47.8 (2019)	15	40.4
Financial system				
WEF Financial System	0–100	52.1 (2019)	17	39.3
IMF Financial Markets	0–1	0.15 (2018)	= 14	0.67
THF Financial Freedom	0–100	30 (2019)	= 17	60
Health system				
Life expectancy at birth (years)	Open	69.6 (2018)	15	15.1

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Indicator	Range	Value	APO rank	Points behind APO leader
Infant mortality* (deaths/1000 live births)	Open	28.0 (2018)	12	25.5
Foreign investment				
KOF Financial Globalisation	0–100	30.5 (2017)	18	61.1
KOF Financial Globalisation, de jure	0–100	37.4 (2017)	14	48.5
FDI Stock/GDP (%)	Open	5.4 (2019)	18	501.2
THF Investment Freedom	0–100	45 (2019)	14	40
Trade				
WEF Trade Openness	0–100	49 (2019)	14	39.7
THF Trade Freedom	0–100	63.6 (2019)	17	31.4
Services Trade Restrictions Index*	0–100	42.9 (2016)	7/14	15.5
KOF Trade Globalisation	0–100	29.0 (2017)	18	67.4
KOF Trade Globalisation, de jure	0–100	31.5 (2017)	18	62.1
Demand				
WEF Macroeconomic Stability	0–100	72.8 (2019)	14	27.2
THF Monetary Freedom	0–100	70 (2019)	17	15.6
Savings				
Gross savings (% of GDP)	Open	35.7 (2019)	5	12.5
Institutions				
WEF Institutions	0–100	45.9 (2019)	16	34.5
IMF Financial Institutions	0–1	0.31 (2018)	= 16	0.62
WB WGI Political Stability	−2.5 to 2.5	−0.99 (2018)	17	2.48
WB WGI Rule of Law	−2.5 to 2.5	−0.64 (2018)	16	2.48
WB WGI Control of Corruption	−2.5 to 2.5	−0.91 (2018)	17	3.08
WB WGI Government Effectiveness	−2.5 to 2.5	−0.75 (2018)	19	2.98
Social capital				
WEF Social Capital	0–100	47.2 (2019)	14	16
WB WGI Voice & Accountability	−2.5 to 2.5	−0.73 (2018)	14	1.75

Source: Appendix G.
Note: * Supplementary indicator.

Challenges Ahead

Bangladesh has made strides in improving its productivity and overall rates of growth. To continue its productivity growth, the country needs to focus on improving its infrastructure, decreasing the incidence of corruption, and stabilizing the financial sector.

Corruption in Bangladesh continues to weaken the country's institutions and destabilize the financial sector. Creating a more transparent government and severing ties between the political and financial spheres will lead to a stronger fiscal policy and better regulatory quality. While authorities have emphasized that controlling corruption is a priority of the current government, the IMF notes that officials lack the capacity and legal processes to do so [6].

Stronger growth also requires a stable financial system. The banking sector continues to face strain from a high percentage of stressed loans, which has decreased credit availability in Bangladesh. The government has begun the reform to hold defaulting borrowers accountable [6]. Better risk management and stronger legal systems will help the continued reform of this sector.

To improve its infrastructure, Bangladesh will need to make significant investments in its roads as well as in water supply. Bangladesh's tax revenue is currently insufficient for infrastructure projects [6]. Taxes currently stand at a mere 9% of GDP, but stronger tax administration and compliance can improve returns [6].

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CAMBODIA

Cambodia is a relatively small nation with a relatively young population. It has a large rural population and a relatively large agricultural sector. Its average income has increased 2.5 times since 1970. While its average income remains low within the APO group, its rate of increase has been strong since the 2000s. A high rate of employment has helped boost the average income (see Table 1 and Figure 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	15.6 (2017)	15	1.4 (growth rate in 2010–17)	5
Rural population proportion (%)	80.6 (2010)	2	77.0 (2017)	3
GDP (USD billion at PPP, % per year)	66.3 (2017)	17	6.9 (growth rate in 2010–17)	3
GDP per capita (USD at PPP, % per year)	4,200 (2017)	18	5.3 (growth rate in 2010–17)	4
Employment rate (%)	58.1 (2010)	3	60.2 (2017)	2
Age dependency ratio (%)	58.4 (2010)	5	55.2 (2017)	6
Old-age dependency ratio (%)	6.6 (2010)	18	7.6 (2017)	17

Source: Appendix G.

Productivity Performance

Cambodia's level of labor productivity (LP) is low within the APO group. However, its rates of LP and total factor productivity (TFP) growth in the 2010s put it among the top half of APO countries (see Tables 2 and 3).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	2.0 (2010)	20	2.7 (2017)	20
Labor productivity growth (% per year)	3.6 (2000–10)	10	4.3 (2010–17)	8
TFP growth (% per year)	0.9 (2000–10)	14	1.3 (2010–17)	7

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.
(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	−7.8	3.0	3.2	3.6	4.3	4.4	4.1
TFP growth	−8.8	3.5	2.4	0.9	1.3	1.0	2.1
Capital productivity growth	−9.1	4.3	2.2	−0.7	0.1	0.1	0.0
Output growth	−7.4	5.3	7.0	7.7	6.9	7.0	6.8
Combined inputs growth	1.4	1.8	4.5	6.8	5.6	6.0	4.7
Capital growth	1.7	1.0	4.7	8.4	6.8	6.8	6.7
IT capital growth	9.3	8.2	21.8	17.7	12.3	12.9	10.9
Hours worked growth	0.4	2.3	3.8	4.1	2.6	2.6	2.7
Labor quality growth	0.8	0.4	0.5	0.9	1.7	2.4	−0.1
Capital deepening	0.7	−0.7	0.5	2.2	2.1	2.2	2.1

Source: Authors' estimates based on data from APO Productivity Database 2019.

The Cambodian economy has grown rapidly since the armed conflict officially came to an end with the 1991 Paris Peace Agreements. Since then, GDP growth has averaged over 7% a year.

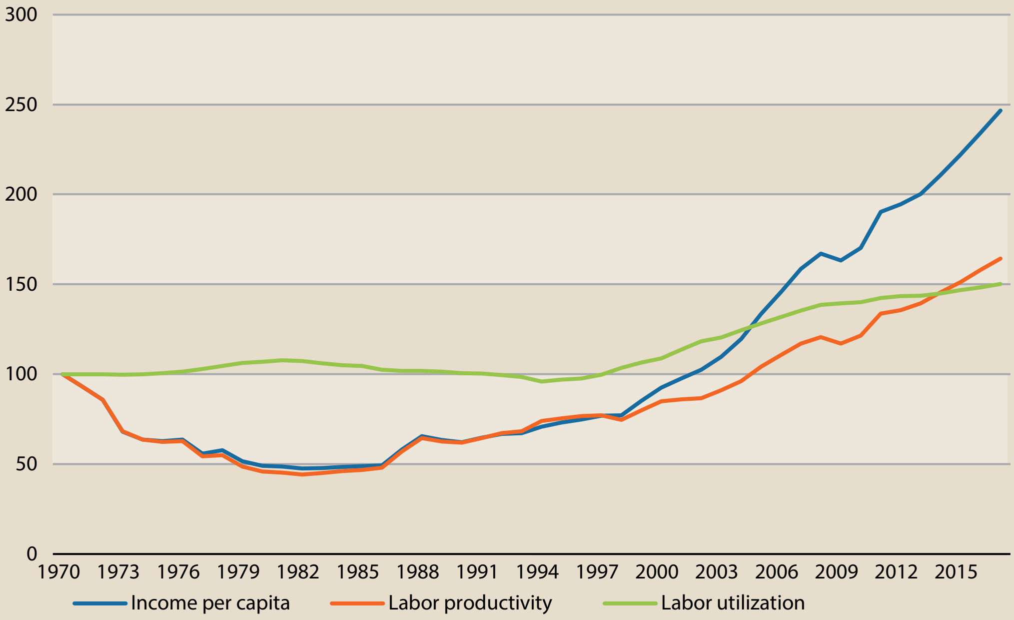
Strong output growth has brought about a strong growth in living standards (see Figure 2) and a reduction in poverty [1]. GDP per capita grew by an average of 4% a year in the 1990s and 6% a year in the 2000s. Average income levels continued to increase from 2010 to 2017, growing 5.3% annually as Cambodia became a lower-middle-income economy. Improved LP accounted for about 70% of growth in living standards, while increased labor utilization (hours worked per person) contributed significantly in the 2000s. LP growth has picked up since the 1980s, when civil war hindered economic reconstruction (see Figure 3). Growth in output per hour worked rose from 3.2% a year in the 1990s to 3.6% a year in the 2000s and 4.3% a year from 2010 to 2017. This recent performance, while strong compared with richer countries, does not match average productivity growth achieved in neighboring countries like Vietnam (5.8%); Lao PDR (5.4%); and Thailand (5.3%) over the same period.

Capital deepening has been a major factor behind LP growth. Labor and capital inputs grew in the 1990s and 2000s as Cambodia focused on the labor-intensive garment manufacturing and opened up to more foreign direct investment (FDI). Barriers to imports were removed over this period and restrictions on foreign trade were dismantled [2]. Exports grew from 16% of GDP in 1993, when UN-sponsored general elections were held, to 49% in 2009. FDI inflows, instrumental in establishing Cambodia's industrial productive capacity, more than quadrupled over the intervening years [2] and in 2016 were worth 11.5% of GDP [3]. Growth in capital exceeded growth in hours worked in the 1990s and 2000s. Capital deepening continued from 2010 to 2017, though at a slower rate. In recent years, growth in capital and labor inputs has slowed amidst continued structural change. Cambodia still depends on exports of garments, where low labor costs helped the country find a place in global value chains (GVCs). However, tourism and construction have also contributed to economic growth in recent years.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

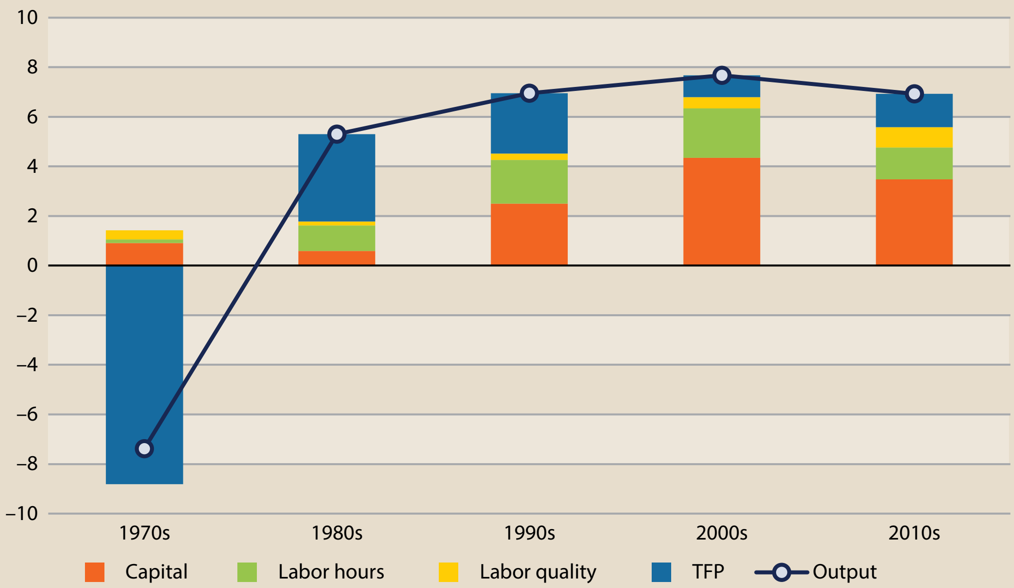


Source: Authors' estimates based on data from APO Productivity Database 2019
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

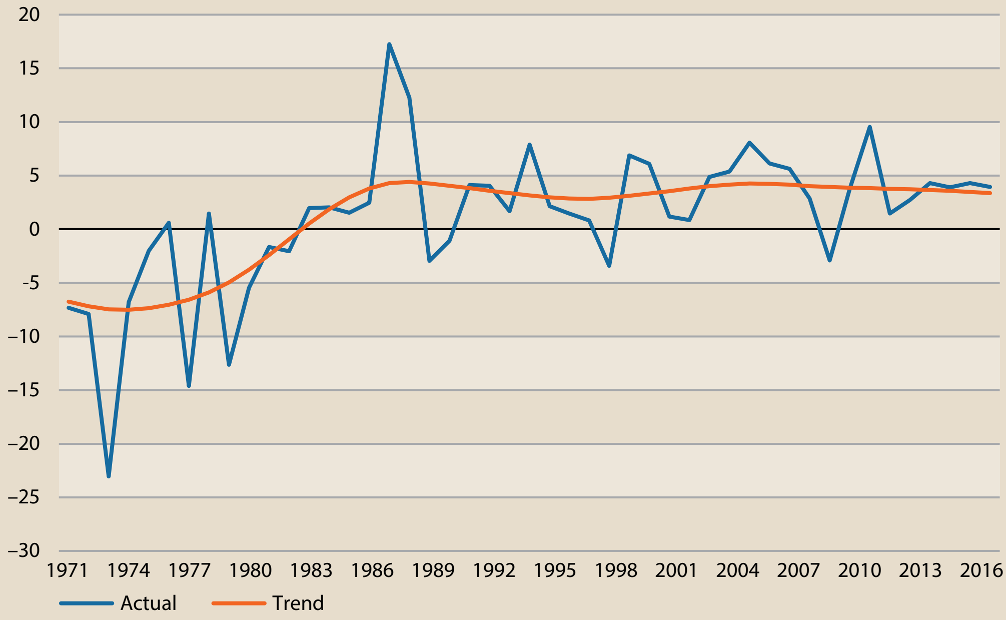


Source: Authors' estimates based on data from APO Productivity Database 2019
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

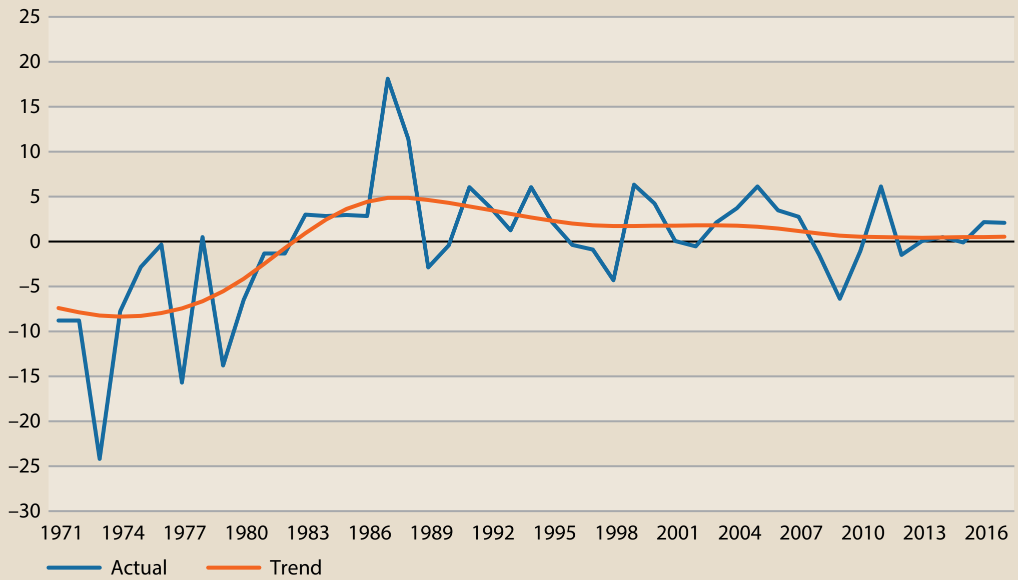


Source: Authors' estimates based on data from APO Productivity Database 2019
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

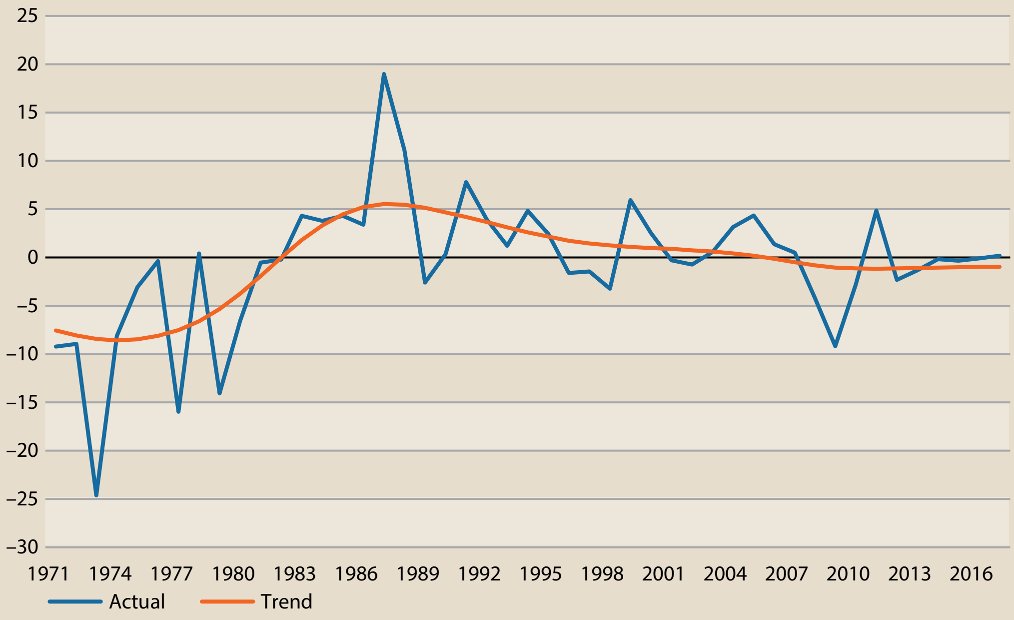


Source: Authors' estimates based on data from APO Productivity Database 2019
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

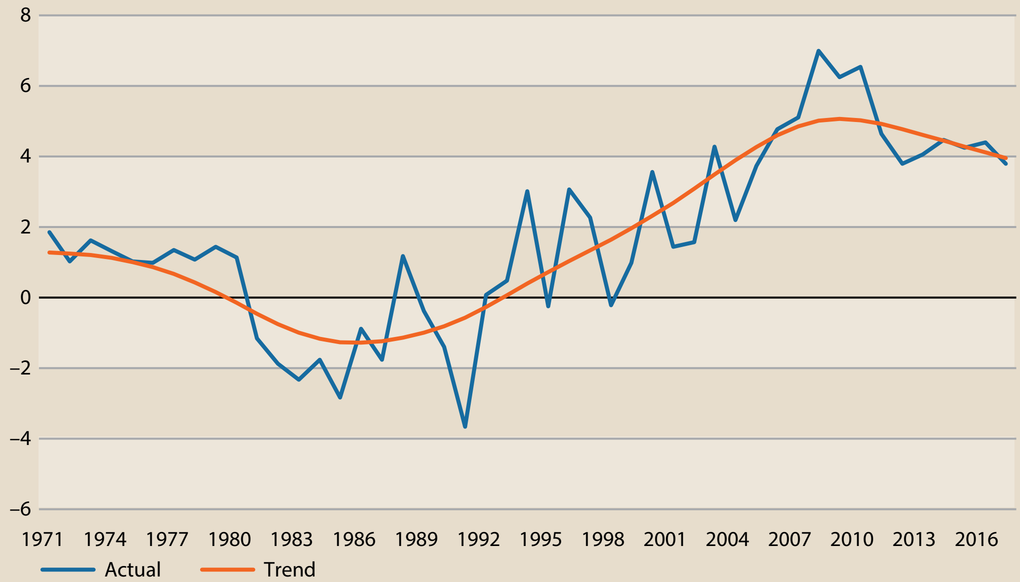


Source: Authors' estimates based on data from APO Productivity Database 2019
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Authors' estimates based on data from APO Productivity Database 2019
Note: Trend lines were formed with a Hodrick–Prescott filter.

TFP growth has contributed to the LP growth. It was especially strong at 2.4% a year in the 1990s, after which it drifted to 0.9% a year in the 2000s and rose to 1.3% a year in the 2010s (see Figure 4). The more recent performance over 2015–17 has again been strong at 2.1% a year.

The 2010s saw an increase in the use of skilled labor. Labor quality grew 1.7% a year from 2010 to 2017 to contribute 0.8 of a percentage point to LP growth. Enrollment in primary education has picked up. However, high-school-completion rates are low compared with countries at a similar stage of development [1].

While there has been strong growth in the use of IT, it has been from a low base. In the 2010s, IT contributed a little more than one-tenth of a percentage point to annual output growth.

Capital productivity was relatively stable through the 2000s and 2010s (see Figure 5), suggesting at first glance that additions to the capital stock have been productively employed.

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that add a more complete picture in certain areas. The section also draws on the quantitative analysis of indicators in Chapter 5, and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Cambodia has faced a challenge, since the end of the civil war, to build its capital stock, which until recently remained small relative to the size of its gross domestic product (GDP). Continued strong growth in capital since 2010 has contributed to LP growth and lifted the ratio of capital to GDP, which is now not far from the top 10 APO countries (Cambodia ranks 12th among 20). The contribution of IT capital accumulation to the total has been limited, in keeping with its small size relative to the total stock of capital (see Figure 6). This appears consistent with a concentration of production in industries reliant on low-skilled labor, such as garment manufacturing, where Cambodia is primarily involved in lower-value-added activities.

Indicators of human capital show that Cambodia continues to lag well behind other economies in the region, even though there were improvements in educational outcomes coinciding with rising skill levels in the period from 2010 to 2017 (see Table 4). Labor quality contributed 0.8 percentage points a year to LP growth over this period. The World Economic Forum (WEF) Current Workforce Index ranks Cambodia 19th among 20 APO countries, suggesting that further investment in its human capital could lift Cambodia’s productive potential.

In contrast, Cambodia is better placed than other countries at the same income level in terms of its access to technologies. This likely reflects its openness to foreign direct investment (FDI). Indicators of the availability of new technologies, such as those published by the WEF as well as the Portulans Institute’s NRI Technology pillar, rank Cambodia just outside the top ten APO countries (12th out of 20). It does not score as well on the NRI People pillar, which tracks tertiary the enrollment rate and indicators such as the adult literacy rate, ICT skills, staff training, and ICT use by the government.

While manufacturing has grown in importance, agriculture continues to account for a relatively large share of GDP and total employment. The low cost of its labor is a key advantage that has enabled Cambodia to cement a place in GVCs, in turn facilitating rapid growth in garment exports. The country's role in those GVCs is, however, confined to lower value-added activities. There is relatively little activity in medium- and high-technology manufacturing.

Trade has a large impact on economic outcomes. The value of exports and imports continued to grow faster than GDP in the past decade and total trade in 2017 was worth over 100% of GDP.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.1 (2010)	19	2.7 (2017)	12
Capital deepening (pp)	Open	1.9 (2017)	11	2.1 (average of 2010–17)	8
IT capital deepening (pp)	Open	0.09 (2017)	13	0.10 (average of 2010–17)	14
Human capital					
Labor quality contribution to LP growth	Open	−0.1 (2017)	19	0.8 (average of 2010–17)	5
WEF Current Workforce	0–100	37.2 (2019)	19	38.9 points behind APO leader	
WEF Entrepreneurial Culture	0–100	49.6 (2019)	14	55.2 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.3 (2018)	12	1.9 points behind APO leader	
NRI Technology Pillar	0–100	36.2 (2019)	12	42.2 points behind APO leader	
NRI People Pillar	0–100	21.3 (2019)	17	20.8 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	24.9 (2017 GDP)	2	40.2 (2017 employment)	5
Manufacturing share (%)	Open	17.2 (2017 GDP)	12	9.5 (2017 employment)	15
Medium- and high-tech share of manufacturing (%)	Open	0 (2010)	20	0 (2018)	20
Exports/GDP (%)	Open	53.5 (2010)	8	59.9 (2017)	8
Imports/GDP (%)	Open	58.9 (2010)	8	63.2 (2017)	5

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability (see Table 5). These indices have scores up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Cambodia has a Productivity Readiness Index value of 34, placing it 13th among 16 APO economies, with relatively low scores across the motivation, capabilities, and efficiency of markets subindices. Stability is a particular priority. Cambodia's score of 25 for this subindex places it behind all other APO economies in the database, consistent with other indicators related to institutional development and government effectiveness.

TABLE 5

VALUES OF OVERARCHING INDICES FOR CAMBODIA.

Index	Value	Rank
Motivation	32	13
Capabilities	34	12
Efficiency of markets	40	11
Stability	25	16
Productivity Readiness Index	34	13

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Cambodia has taken steps to liberalize trade and encourage foreign investment, which has supported the rapid pace of its economic development in recent years. More work remains to be done in other important areas, including reforms of regulations and institutions.

Cambodia scores poorly on indicators of institutional development and the regulatory environment, which are considered crucial underlying determinants of long-term economic development and productivity. Cambodia ranks 19th out of 20 APO countries on the WEF Institutions indicator (see Table 6). This is due to its weak performance on indicators of property rights, policy stability, and corporate governance. Corruption remains a problem too. Cambodia is placed at the 20th position among 20 APO economies on the World Bank WGI Control of Corruption indicator.

Data published in the WEF Global Competitiveness Report show that Cambodia has room to improve in the performance of its public sector. This reflects deficiencies in the country's legal framework for settling disputes as well as limited use of online services in government. Cambodia also scores relatively poorly on metrics of judicial independence, freedom of the press, and social capital, where it lags far behind the world's leading economies. It also ranks behind other lower-middle-income countries including India, the Philippines, and Vietnam, on the World Bank's WGI Government Effectiveness indicator.

Institutional development could support reforms to improve the business environment. WEF indicators show that administrative requirements make it harder to run a business in Cambodia. Cambodia ranks 18th among 20 APO economies on this metric, reflecting the relatively large time and cost involved in starting a business. Relatively weak scores on both the World Bank WGI Regulatory Quality indicator and the NRI Governance indicator appear to confirm the presence of challenges in the business environment. Cambodia performs poorly on NRI measures of the ease of doing business, the quality of its regulations (including those affecting ICT), cyber security, and the rule of law, which is an important underlying determinant of economic development. Financial market development could also enhance the business environment. IMF indicators rank Cambodia's financial market below the average of countries in the region on depth, access to finance, and efficiency.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	NA	NA	NA
Quality of primary education*	1–7	3.0 (2017)	19	3.2
WEF Skills/Future Workforce	0–100	48.1 (2019)	18	33.3
Education expenditure/GDP* (%)	Open	2.2 (2017)	17	3
Innovation system				
WEF Innovation Capability	0–100	30.9 (2019)	16	49.3
KOF Informational Globalisation, de facto	0–100	70.3 (2017)	16	29.4
Infrastructure				
WEF Infrastructure	0–100	54.9 (2019)	17	40.5
Business environment				
THF Business Freedom	0–100	31.2 (2019)	20	65.0
WEF Administrative Requirements	0–100	43.5 (2019)	18	49.6
WEF Domestic Competition	0–100	46.2 (2019)	15	28.6
THF Tax Burden	0–100	89.4 (2019)	3	3.6
WB WGI Regulatory Quality	−2.5 to 2.5	−0.5 (2018)	15	2.73
WEF Labour Market	0–100	60.3 (2019)	10	20.9
THF Labour Freedom	0–100	62.5 (2019)	= 9	28.4
NRI Governance	0–100	32.9 (2019)	17	55.3
Financial system				
WEF Financial System	0–100	56.4 (2019)	14	35.0
IMF Financial Markets	0–1	0 (2018)	17	0.82
THF Financial Freedom	0–100	50 (2019)	= 10	40
Health system				
Life expectancy at birth (years)	Open	69.6 (2018)	15	15.1
Infant mortality* (deaths/1000 live births)	Open	28.0 (2018)	12	25.5

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	70.5 (2017)	6	21.1
KOF Financial Globalisation, de jure	0–100	65.3 (2017)	5	20.6
FDI Stock/GDP (%)	Open	127.0 (2019)	4	379.6
THF Investment Freedom	0–100	50 (2019)	= 11	35
Trade				
WEF Trade Openness	0–100	50.8 (2019)	13	37.9
THF Trade Freedom	0–100	65.4 (2019)	15	29.6
Services Trade Restrictions Index*	0–100	NA	NA	NA
KOF Trade Globalisation	0–100	65.4 (2017)	6	31.0
KOF Trade Globalisation, de jure	0–100	46.5 (2017)	14	47.2
Demand				
WEF Macroeconomic Stability	0–100	74.9 (2019)	12	25.1
THF Monetary Freedom	0–100	74.8 (2019)	9	10.8
Savings				
Gross savings (% of GDP)	Open	23.6 (2019)	14	24.6
Institutions				
WEF Institutions	0–100	41.9 (2019)	19	38.5
IMF Financial Institutions	0–1	0.31 (2018)	= 16	0.62
WB WGI Political Stability	−2.5 to 2.5	0.11 (2018)	= 10	1.38
WB WGI Rule of Law	−2.5 to 2.5	−1.11 (2018)	20	2.95
WB WGI Control of Corruption	−2.5 to 2.5	−1.33 (2018)	20	3.50
WB WGI Government Effectiveness	−2.5 to 2.5	−0.57 (2018)	16	2.80
Social capital				
WEF Social Capital	0–100	43.9 (2019)	18	19.3
WB WGI Voice & Accountability	−2.5 to 2.5	−1.22 (2018)	17	2.24

Source: Appendix G.
Note: * Supplementary indicator.

While Cambodia has taken steps to liberalize trade in goods and services, there remain obstacles to trade. Cambodia's score on the WEF Trade Openness indicator is in the bottom half of APO countries, in line with relatively inefficient customs processes and high average tariffs. Reducing barriers to trade could improve Cambodia's competitiveness in GVCs, which have helped speed up its economic development.

Improving its regulatory and business environment could help Cambodia continue to attract large volumes of FDI. Cambodia's stock of FDI represented 127% of its GDP in 2019, placing Cambodia fourth in the APO group, behind Hong Kong, Singapore, and Mongolia.

Cambodia is roughly on par with countries at similar income levels in terms of the effectiveness of its transport infrastructure and utilities. However, WEF infrastructure indicators reveal that Cambodia continues to lag well behind richer countries in terms of the connectivity and quality of its roads, and the efficiency of its air and sea services. The quality of electricity supply has increased, but a significant proportion of Cambodia's population still has no access to electricity (39% according to the 2019 WEF Global Competitiveness Report), while 40% of the population are exposed to unsafe drinking water.

Indicators of human capital show that Cambodia still has work to do to improve health and educational outcomes. Life expectancy at birth of 70 years is 15 years below that in APO leader Hong Kong (85 years), while the infant mortality rate (28 deaths per 1,000 live births) keeps Cambodia among the bottom ten APO countries. Despite improvements in recent years, Cambodia remains well behind higher-income APO countries in terms of the quality of primary education, and on different skill measures. Cambodia ranks 18th among 20 APO economies on the WEF Skills/Future Workforce indicator, with relatively low scores on the quality of teaching and school-life expectancy.

In contrast, Cambodia is relatively competitive on labor-market indicators related to the ease of hiring and firing workers. It also taxes labor at a relatively low rate, and hiring foreign labor is relatively easy.

Challenges Ahead

Reform efforts have focused recently on improving competitiveness and diversification and lowering the cost of doing business [4]. Observers including the World Bank, IMF, and the OECD have noted that Cambodia could do more to address corruption, improve infrastructure, and lift education and health outcomes [1, 4, 5]. Efforts to increase skill levels and upgrade transport, energy, and communications infrastructure will be crucial for achieving sustained growth in LP. Success in this regard could set Cambodia up to build more value from the GVCs that have helped accelerate its development, particularly if more is done to remove the remaining costly barriers to trade. While it has contained the spread of the coronavirus in 2020, Cambodia's dependence on garments and tourism exports leaves it exposed to a significant economic slowdown this year. Planned suspension of tariff preferences by the European Union, a major trading partner, could further weaken exports and GDP [6]. In the longer run, the success of Cambodia's economic reforms, and its ability to sustain productivity growth at high rates, will hinge on the quality of its institutions and the regulatory environment.

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REPUBLIC OF CHINA

The Republic of China (ROC) has an advanced economy and a relatively large rural population for a high-income nation, reflecting its decentralized industrialization. Manufacturing grew rapidly from the 1960s, and accounted for roughly a third of GDP and just over a quarter of the total employment in 2017. Agriculture, in contrast, represented less than 2% of the economic activity and 5% of the employment in 2017. While low compared with other high-income APO economies, the employment rate rose over the period from 2010 to 2017 even as the older-age population increased relative to the total population. Fast productivity growth in the second half of the 20th century led to large increases in GDP per capita. The average-income level in 2017 was almost 13 times higher than in 1970 (see Table 1 and Figure 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	23.6 (2017)	13	0.2 (growth rate in 2010–17)	19
Rural population proportion (%)	29.6 (2010)	15	29.6 (2017)	14
GDP (USD billion at PPP, % per year)	1192.6 (2017)	7	2.5 (growth rate in 2010–17)	18
GDP per capita (USD at PPP, % per year)	50,600 (2017)	3	1.7 (growth rate in 2010–17)	17
Employment rate (%)	46.2 (2010)	9	49.4 (2017)	9
Age dependency ratio (%)	35.8 (2010)	18	37.0 (2017)	19
Old age dependency ratio (%)	14.6 (2010)	4	19.0 (2017)	3

Source: Appendix G.

Productivity Performance

Labor productivity (LP) in the ROC is higher than in all other APO economies except for Singapore and Hong Kong. Growth in LP has decreased in the past two decades and was slower in the 2010s than APO economies at earlier stages of development. Three high-income economies (Hong Kong, ROK, and Singapore) also outperformed the ROC over this recent period. This reflected a slowdown in capital accumulation relative to growth in hours worked. Total factor productivity (TFP), in contrast, continued to increase from 2010 to 2017, growing at a stronger rate than in all other high-income APO economies apart from Hong Kong (see Tables 2 and 3).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	43.9 (2010)	3	47.7 (2017)	3
Labor productivity growth (% per year)	3.7 (2000–10)	9	1.2 (2010–17)	18
TFP growth (% per year)	1.6 (2000–10)	6	1.1 (2010–17)	10

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	6.7	5.9	5.4	3.7	1.2	0.4	3.0
TFP growth	3.2	3.2	2.2	1.6	1.1	0.8	2.1
Capital productivity growth	−0.6	0.3	−1.2	1.0	2.2	2.3	2.1
Output growth	9.9	7.9	6.5	4.1	2.5	2.5	2.3
Combined inputs growth	6.7	4.7	4.3	2.4	1.3	1.8	0.2
Capital growth	10.6	7.6	7.7	3.0	0.3	0.3	0.2
IT capital growth	22.0	17.0	20.0	4.8	1.7	1.9	1.3
Hours worked growth	3.3	2.0	1.1	0.3	1.3	2.1	−0.7
Labor quality growth	0.8	0.8	1.0	1.6	1.1	1.1	0.9
Capital deepening	3.0	2.2	2.6	1.2	−0.5	−0.9	0.5

Source: Authors' estimates based on data from APO Productivity Database 2019.

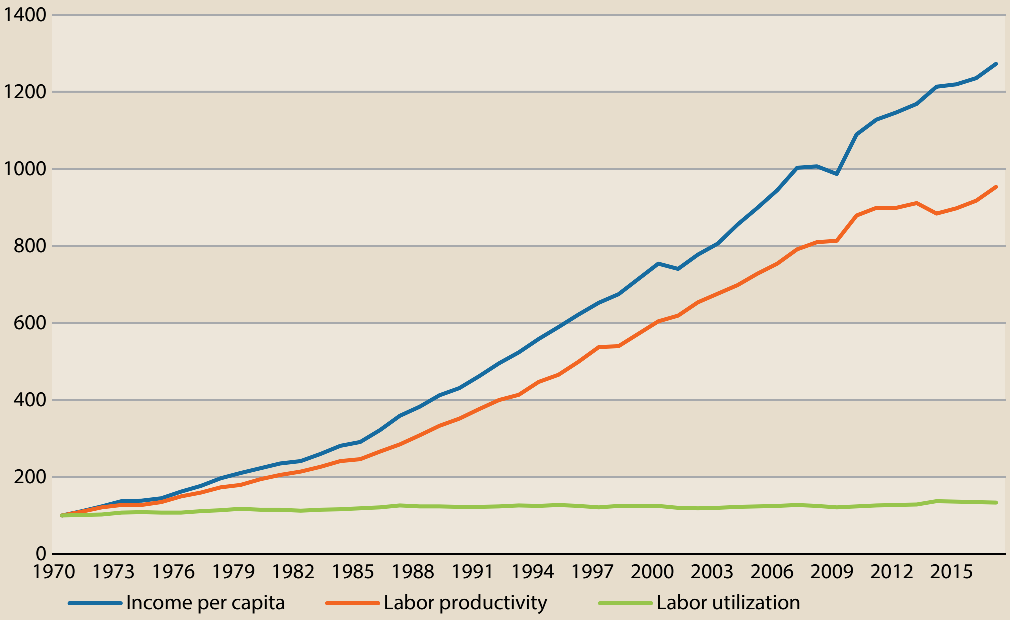
Sixty years ago, the ROC had a poor agrarian economy. Now a major producer of electronics and machinery and one of the world's richest nations, the ROC's transformation in the second half of the 20th century saw sustained growth in GDP per person for over four decades at rates matched by few other countries. The speed of the ROC's economic development was due to rapid accumulation of factor inputs (in particular, capital) but also due to strong growth in TFP.

Crucial to the ROC's growth acceleration from the early 1960s was a rapid expansion of the capital stock [1, 2]. Credit subsidies and tax incentives helped lift returns to private investment [3]. These returns were relatively large in the ROC as the labor force was better educated than in other countries at similar income levels [4]. The government also established new industries, while supervision of the bureaucracy removed opportunities for corruption [3, 4]. Public investment and the actions of state enterprises, including in plastics, fibers, steel, and electronics, ensured a cheap local supply of inputs to downstream producers and helped resolve a 'coordination failure' that had prevented earlier growth in industrial output [3, 4]. These interventions, together with a rise in domestic savings, supported an increase in capital accumulation (see Figure 2). The investment rate rose from 17% in 1960 to 31% in 1980, with purchases of foreign-made machinery and equipment contributing to an increase in imports.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

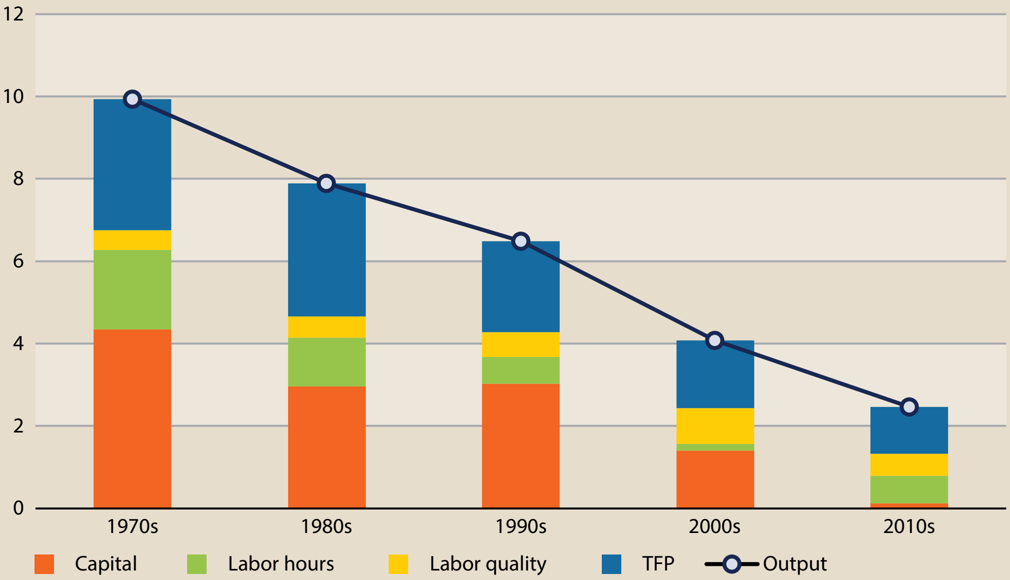


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were calculated with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PERCENTAGE POINT CONTRIBUTIONS).

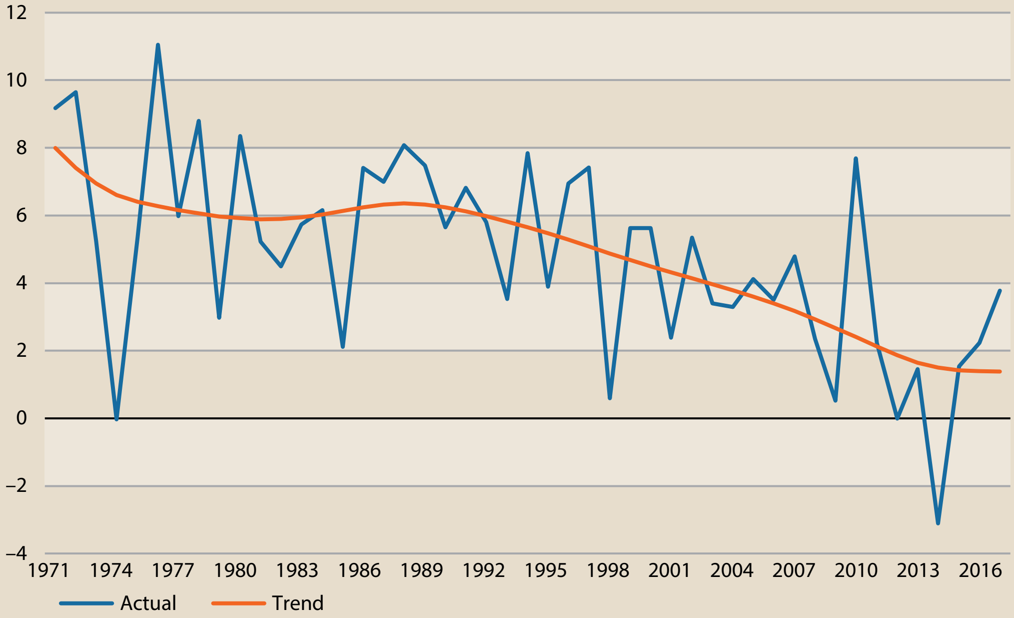


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were calculated with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(PERCENT).

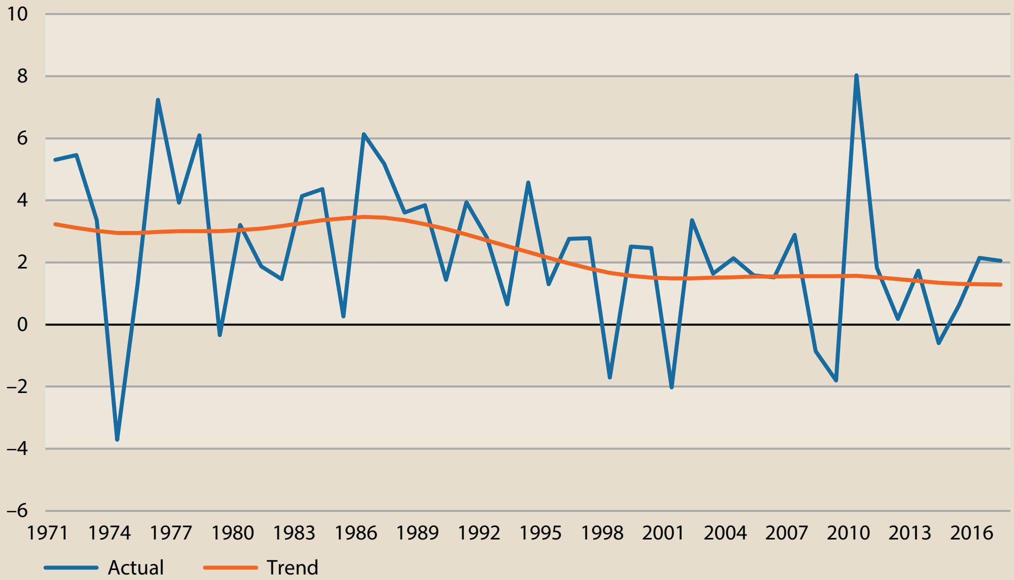


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were calculated with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(PER CENT).

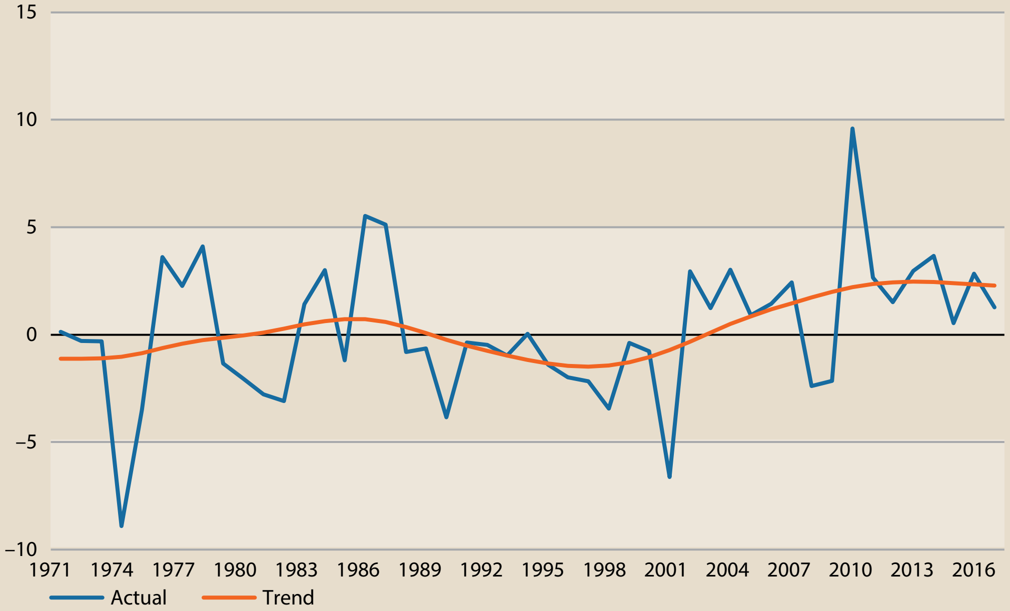


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were calculated with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(PERCENT).

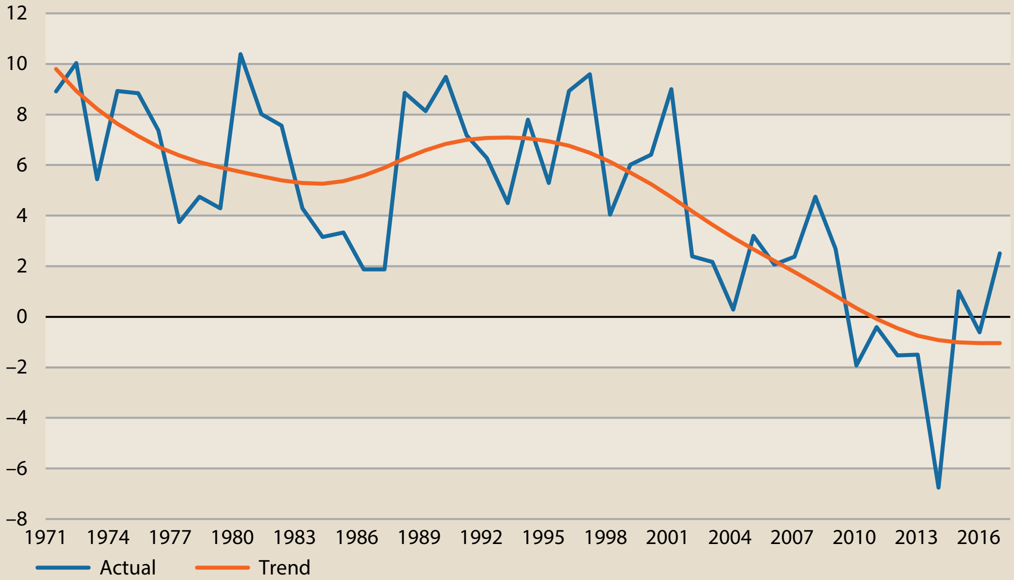


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were calculated with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(PER CENT).



Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were calculated with a Hodrick–Prescott filter.

Consistent with the government's export-oriented growth agenda, trade came to dominate other sources of growth. A currency reform and the removal of barriers to trade in imported inputs enabled a ramp-up in exports [2, 5], which rose from 7% of GDP in 1960 to 45% in 1990. By that time, the ROC had experienced three decades of average annual growth in per capita GDP above 7% (see Figure 1), pulling well ahead of countries such as Mexico and Argentina, which had been far richer in 1960 [4].

While capital accounted for the bulk of the ROC's massive accumulation of factor inputs in this period, inputs of labor also increased, both in terms of hours worked and workers' skills. Hours grew at an average rate of 3.4% per year over the 1970s and 2.0% over the 1980s. The labor force participation rate hit a peak of 60.9% in 1987 before declining in the 1990s as rates of enrollment in tertiary education increased [5]. Improvements in skill levels saw labor quality contribute 0.9 percentage points a year to GDP growth in the 2000s and 0.5 points per year from 2010 to 2017. Rising female participation has supported growth in labor inputs in recent years, even as the working-age population (15–64 years) has shrunk relative to the number of people aged 65 and above [5]. After slowing in the 1990s and 2000s, growth in hours worked picked up to an average of 1.3% a year from 2010 to 2017 as capital accumulation stalled (see Figure 6).

Improving TFP also made significant contributions to output growth in the course of the ROC's development [1]. TFP grew by an average of 2.9% a year from 1970 to 2000, which was stronger than the other three East Asian Tiger economies of Hong Kong, the ROK, and Singapore. Sound macroeconomic and social policies likely enabled large efficiency gains [2]. While reining in high inflation and encouraging saving and investment, the government increased compulsory education requirements over time [5]. This ensured the availability of skilled labor for a fast-growing manufacturing industry [2]. With a relatively equal society, stable institutions, and a national commitment to economic growth, the ROC was also well positioned to seize an unusual opportunity of rapid catchup following the destruction of its industrial capacity in the World War II [6]. Increasing trade with more advanced economies, combined with an openness to foreign ideas and technologies, likely facilitated innovation and productivity gains during the ROC's rapid development from 1960 to 1990 [2].

Subsequent improvements in TFP, while more modest than those achieved in earlier years, remain high compared with other advanced APO economies. In the 2000s and 2010s, as investment slowed following four decades of massive expansion of the capital stock, TFP gains enabled LP to continue to rise, albeit more gradually than in earlier phases of ROC's development (see Figures 3 and 4). Growth in both IT and non-IT capital slowed in the 2000s, consistent with diminishing returns to capital that had been anticipated earlier in the ROC's economic development [10]. Compared with the ROK and Singapore, the ROC achieved a faster average rate of TFP growth (1.4%) from 2000 to 2017 but was outperformed by Hong Kong (1.8%). After declining in the 1990s and also during a recession in 2001, the productivity of capital increased through most of the 2000s and 2010s (see Figure 5).

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Values for the indicators of immediate determinants are set out in Table 4. The capital–GDP ratio of 8.6 in the ROC was the highest among APO economies in 2017. Capital accumulation slowed in the 2010s following several decades of strong growth, with a decline in the ratio of capital to hours worked subtracting from the LP growth. IT capital expanded at roughly the same rate as work hours, making a net-zero contribution to LP. This subtracted from LP growth. In contrast, skills continued to increase. The ROC ranks 5th among APO economies on the WEF Current Workforce indicator, which is a measure of schooling and workforce skills. This is slightly behind the APO's other high-income economies.

Medium- and high-technology manufacturing represents a high proportion of manufacturing value added (e.g., 70% in 2018). Manufacturing accounts for roughly a third of GDP, which is a larger share than in any other APO economy. The ROC is also a highly open economy. The combined value of its exports and imports was worth well over 100% of GDP in 2017, consistent with its participation in global value chains (GVCs).

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity:					
Capital/GDP ratio	Open	6.8 (2010)	3	8.6 (2017)	1
Capital deepening (pp)	Open	1.3 (2017)	15	–0.5 (average of 2010–17)	20
IT capital deepening (pp)	Open	0.05 (2017)	14	0 (average of 2010–17)	20
Human capital:					
Labor quality contribution to LP growth	Open	0.5 (2017)	8	0.5 (average of 2010–17)	12
WEF Current Workforce	0-100	71.6 (2019)	5	4.5 points behind APO leader	
WEF Entrepreneurial Culture	0-100	60.2 (2019)	6	10.2 points behind APO leader	
Knowledge:					
Availability of latest technologies*	1-7	NA	NA	NA	
NRI Technology Pillar	0-100	NA	NA	NA	
NRI People Pillar	0-100	NA	NA	NA	
Products and markets:					
Agriculture share (%)	Open	1.8 (2017 GDP)	17	4.9 (2017 employment)	16
Manufacturing share (%)	Open	32 (2017 GDP)	1	26.8 (2017 employment)	1
Medium- and high-tech share of manufacturing (%)	Open	68 (2010)	2	70 (2018)	2
Exports/GDP (%)	Open	70.9 (2010)	5	64.9 (2017)	6
Imports/GDP (%)	Open	63.9 (2010)	5	52.1 (2017)	9

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants with the overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Sufficient data were not available to calculate the indices and the overall Productivity Readiness Index for the ROC.

Underlying Determinants: Specific Strengths and Weaknesses

The ROC has high-quality institutions and infrastructure and effective innovation and education systems. The regulatory environment is generally also of a high quality. However, there is still room for improvement in certain areas.

The ROC performs well on forward-looking indicators of workforce skills such as the World Economic Forum (WEF) Skills/Future Workforce indicator, on which it ranks an equal second in the APO just behind Singapore. This reflects the high quality of its education system, with primary education being particularly strong compared with other high-income APO countries (see Table 5).

The ROC has an advanced innovation system, ranking first among APO economies on the WEF Innovation Capability pillar. The sub-indicators that comprise the Innovation Capability pillar reveal that the ROC benefits from extensive collaboration between businesses and research organizations, having deep and developed clusters of firms and specialized institutions. The sub-indicators also show that research and development spending is relatively high, as is the number of patent applications with foreign-based coinventors, while the ROC's research institutions are well regarded. Given the ROC's high-quality education system, its advanced technological manufacturing capacity, and the authorities' commitment to innovation [7], ICT skills, and technologies are likely on par with the APO's leading economies.

The ROC also has effective transport infrastructure, as reflected in its strong performance on the WEF Infrastructure pillar. The ROC's place (5th) in APO rankings on this indicator would be higher but for lower scores on road connectivity and the reliability of the country's water supply. A small but significant proportion of its residents (4%) is also exposed to unsafe drinking water.

Success in opening the economy to trade is reflected in indicators such as the WEF Trade Openness indicator. Tariffs are higher and the tariff regime is more complex than in the best-performing high-income APO economies. On the other hand, the ROC has relatively low non-tariff barriers to trade and has relatively efficient border clearance processes, thereby enhancing its competitiveness in GVCs.

Trade in services is subject to a lower degree of protection than in most other APO economies. The ROC ranks 3rd on the World Bank's Services Trade Restrictions Index, with relatively low barriers to trade in distribution and professional services. Telecommunications, financial services, and transport services are subject to a higher degree of protection. However, except in the case of telecommunications, restrictions in the ROC are below APO average scores (see Appendix F).

Foreign investment is considerable, though still small compared with FDI inflows to Hong Kong and Singapore. Despite relatively limited restrictions on foreign investment, the ROC ranks 12th among APO countries on the value of the FDI stock relative to GDP.

TABLE 5

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.5 (2017)	5	1.3
Quality of primary education*	1–7	5.4 (2017)	3	0.8
WEF Skills/Future Workforce	0–100	80.8 (2019)	= 2	0.6
Education expenditure/GDP (%)*	Open	NA	NA	NA
Innovation system				
WEF Innovation Capability	0–100	80.2 (2019)	1	0
KOF Informational Globalisation, de facto	0–100	NA	NA	NA
Infrastructure				
WEF Infrastructure	0–100	86.7 (2019)	5	8.7
Business environment				
THF Business Freedom	0–100	93.9 (2019)	2	2.3
WEF Administrative Requirements	0–100	85.9 (2019)	5	7.2
WEF Domestic Competition	0–100	67.9 (2019)	5	6.9
THF Tax Burden	0–100	75 (2019)	17	18
WB WGI Regulatory Quality	−2.5 to 2.5	1.38 (2018)	3	0.85
WEF Labor Market	0–100	72.7 (2019)	3	8.5
THF Labor Freedom	0–100	60.3 (2019)	11	30.6
NRI Governance	0–100	NA	NA	NA
Financial system				
WEF Financial System	0–100	88.4 (2019)	3	3.0
IMF Financial Markets	0–1	NA	NA	NA
THF Financial Freedom	0–100	60 (2019)	= 4	30
Health system				
Life expectancy at birth (years)	Open	NA	NA	NA
Infant mortality (deaths/1000 live births)*	Open	NA	NA	NA
Foreign investment				
KOF Financial Globalisation	0–100	NA	NA	NA
KOF Financial Globalisation, de jure	0–100	NA	NA	NA

(Continued on next page)

(Continued from previous page)

Indicator	Range	Value	APO rank	Points behind APO leader
FDI Stock/GDP (%)	Open	16.4 (2019)	12	490.1
THF Investment Freedom	0–100	60 (2019)	= 5	25
Trade				
WEF Trade Openness	0–100	64.8 (2019)	4	23.9
THF Trade Freedom	0–100	86 (2019)	3	9
Services Trade Restrictions Index*	0–100	36.2 (2016)	3	8.8
KOF Trade Globalisation	0–100	NA	NA	NA
KOF Trade Globalisation, de jure	0–100	NA	NA	NA
Demand				
WEF Macroeconomic Stability	0–100	100 (2019)	= 1	0
THF Monetary Freedom	0–100	82.7 (2019)	3	2.9
Savings				
Gross savings (% of GDP)	Open	NA	NA	NA
Institutions				
WEF Institutions	0–100	68.6 (2019)	= 4	11.8
IMF Financial Institutions	0–1	NA	NA	NA
WB WGI Political Stability	−2.5 to 2.5	0.85 (2018)	4	0.64
WB WGI Rule of Law	−2.5 to 2.5	1.11 (2018)	5	0.73
WB WGI Control of Corruption	−2.5 to 2.5	1.03 (2018)	4	1.14
WB WGI Government Effectiveness	−2.5 to 2.5	1.36 (2018)	4	0.87
Social capital				
WEF Social Capital	0–100	57.4 (2019)	3	5.8
WB WGI Voice & Accountability	−2.5 to 2.5	0.98 (2018)	2	0.04

Source: Appendix G.
Note: * Supplementary indicator.

Sound macroeconomic policies have proved effective in keeping inflation and debt stable, which should help the ROC navigate the current global health and economic crisis. The ROC also benefits from an advanced financial system and effective institutions. It ranks an equal 4th on the WEF Institutions pillar, benefiting from political stability, a low incidence of corruption, and strong protection of property rights and the rule of law. The public sector is, in general, high performing. However, the framework for resolving legal disputes is less efficient than in other high-income APO countries such as Singapore.

High-quality regulations and a flexible labor market enhance the business environment. In contrast, the time and cost involved in starting a business are greater than what is required in Singapore and Hong Kong; while the legal framework for insolvency is less effective than in Japan and the ROK. Further, while competition is relatively strong, the ROC's tax and transfer system is perceived to be more distortionary than in Singapore and Hong Kong, the two best performing APO economies on the WEF Domestic Competition indicator.

Challenges Ahead

Having reaped the growth dividend of its vast accumulation of factor inputs in the 20th century, ROC, like other advanced economies, will have to rely more on productivity growth to sustain further improvements in living standards. Innovation and enhanced infrastructure remain priorities of the government's development strategy [5]. Attempts have also been made to entice greater inbound FDI (including by relaxing regulations), which is small compared with outbound FDI [7] and the stock of foreign investment amassed by other APO economies.

The government separately aims to deepen regional integration through free trade agreements [5, 7]. This would improve the competitiveness of the ROC's exports and further reduce the country's dependence on large individual trading partners [8]. However, without faster growth in services sector output, which declined from 66% of GDP in 2000 to 62% in 2017, the ROC will remain vulnerable to declines in world demand for its merchandise exports [8]. Falling global output in 2020 is expected to cause the ROC's exports to shrink this year [9].

In the longer run, the ROC could build on progress already made in establishing a favorable business environment. The economy benefits from high-quality regulations and developed institutions. However, the ROC could look to relieve the administrative burden involved in starting businesses. It also performs less strongly than other high-income APO countries on indicators of the distortionary effects of its tax and transfer system, as well as on the effectiveness of its insolvency and dispute-resolution frameworks.

Finally, while services trade restrictions are relatively low, there may be scope to wind back unnecessary regulation of sectors such as telecommunications and transport. Removing obstacles to services trade could reduce firms' input costs and improve the competitiveness of the ROC's services and goods-producing industries in GVCs.

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FIJI

Fiji is an island nation home to around 900,000 people. Expansion of the tourism industry and a relative decline in production of sugar and garments have seen exports of services grow faster than exports of goods. Agriculture now employs only a small share of the country's small, aging workforce. However, 44% of the population still lives in rural areas dispersed across an archipelago of 332 islands, 110 of which are permanently inhabited (see Table 1). Average incomes have doubled since 1970, lifting Fiji into the group of upper-middle-income countries. However, economic development has been uneven and slow, reflecting Fiji's small size and narrow economic base, as well as the disruption caused by political instability and frequent natural disasters.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	0.9 (2017)	20	0.7 (growth rate in 2010–17)	14
Rural population proportion (%)	47.8 (2010)	12	44.3 (2017)	12
GDP (USD billion at PPP, % per year)	8.7 (2017)	20	3.10 (growth rate in 2010–17)	15
GDP per capita (USD at PPP, % per year)	9,600 (2017)	12	2.4 (growth rate in 2010–17)	15
Employment rate (%)	36.5 (2010)	18	37.6 (2017)	17
Age dependency ratio (%)	51.1 (2010)	9	53.1 (2017)	7
Old age dependency ratio (%)	7.3 (2010)	16	9.5 (2017)	10

Source: Appendix G.

Productivity Performance

Fiji has not experienced the fast rates of productivity growth achieved in larger economies in the Asia-Pacific region. However, after almost no growth in the 2000s, total factor productivity (TFP) grew 1.2% per year, on an average, from 2010 to 2017. This supported a pickup in labor productivity (LP) growth (see Table 2). Over the same period, however, stronger productivity gains in Indonesia, Thailand, and Mongolia pushed Fiji from 9th to 12th position in the ranking of the most productive APO economies.

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	10.6 (2010)	9	11.5 (2017)	12
Labor productivity growth (% per year)	0.5 (2000–10)	20	1.2 (2010–17)	17
TFP growth (% per year)	0.1 (2000–10)	17	1.2 (2010–17)	9

Source: Data and calculations from APO Productivity Database 2019.

Fiji has experienced volatile growth since independence from the UK in 1970. Political instability and natural disasters have periodically interrupted Fiji's development, compounding challenges posed by its size and distance from larger markets. While it has outperformed other Pacific islands, Fiji has not achieved the growth in capital or productivity that has propelled larger Asian countries to higher income levels (see Table 3). In recent years, however, economic outcomes have improved. Political stability has enabled the expansion of a valuable tourism industry, contributing to Fiji's longest run of positive growth in GDP since independence. This has supported progress towards long-term objectives of higher productivity and better living standards even as extreme weather events and the current global health and economic crisis complicate the reform agenda.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	1.4	0.1	0.4	0.5	1.2	1.8	−0.4
TFP growth	−0.5	−1.2	−0.9	0.1	1.2	2.3	−1.5
Capital productivity growth	−0.2	−0.2	−0.4	0.4	1.8	2.8	−0.7
Output growth	4.7	2.2	2.4	1.4	3.1	3.6	1.9
Combined inputs growth	5.2	3.5	3.3	1.3	1.9	1.4	3.4
Capital growth	4.9	2.4	2.7	0.9	1.3	0.9	2.6
IT capital growth	6.6	11.5	4.2	4.5	5.8	4.0	10.4
Hours worked growth	3.2	2.1	2.0	0.8	2.0	1.9	2.2
Labor quality growth	2.3	2.2	2.0	0.8	0.9	0.3	2.5
Capital deepening	0.8	0.2	0.3	0.1	−0.4	−0.6	0.2

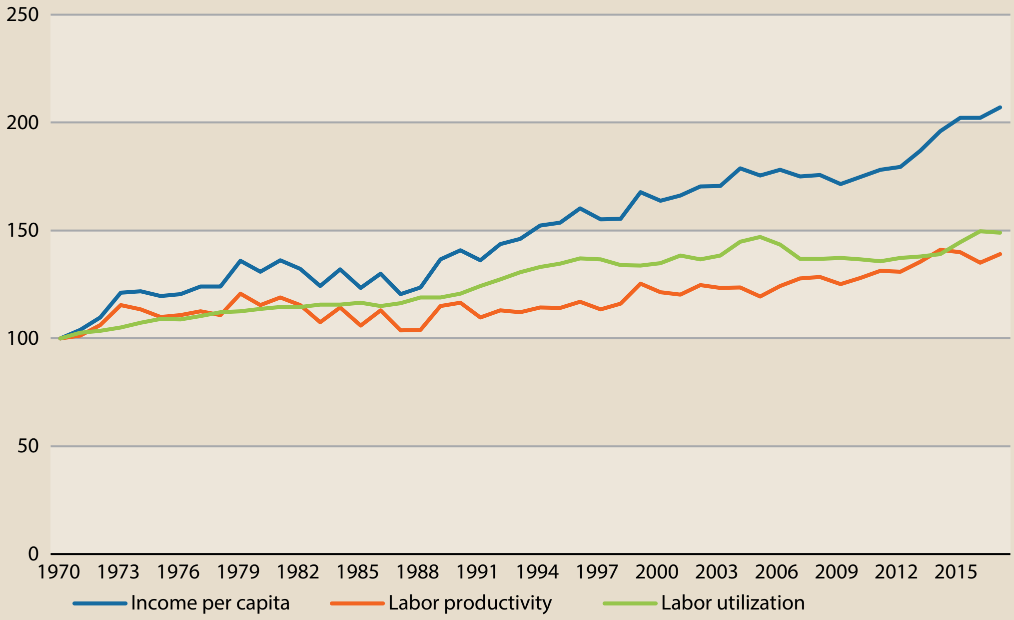
Source: Authors' estimates based on data from APO Productivity Database 2019.

At the end of its colonial history, Fiji was far from being a rich country. But income flows from an established and profitable sugar industry, responsible for Fiji's then biggest export, helped lift the average income level of the population [1]. Fiji's GDP per capita doubled over the next 47 years, from 1970 to 2017 (see Figure 1). This improvement was enough to propel Fiji into the group of upper-middle-income countries in 2012. But while rising income helped reduce poverty, economic

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

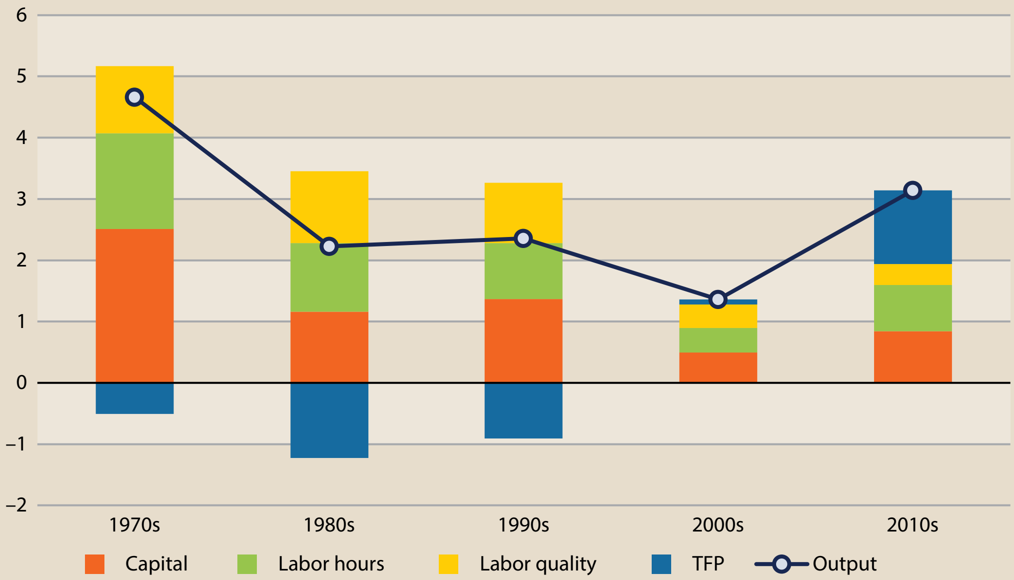


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PERCENTAGE POINT CONTRIBUTIONS).

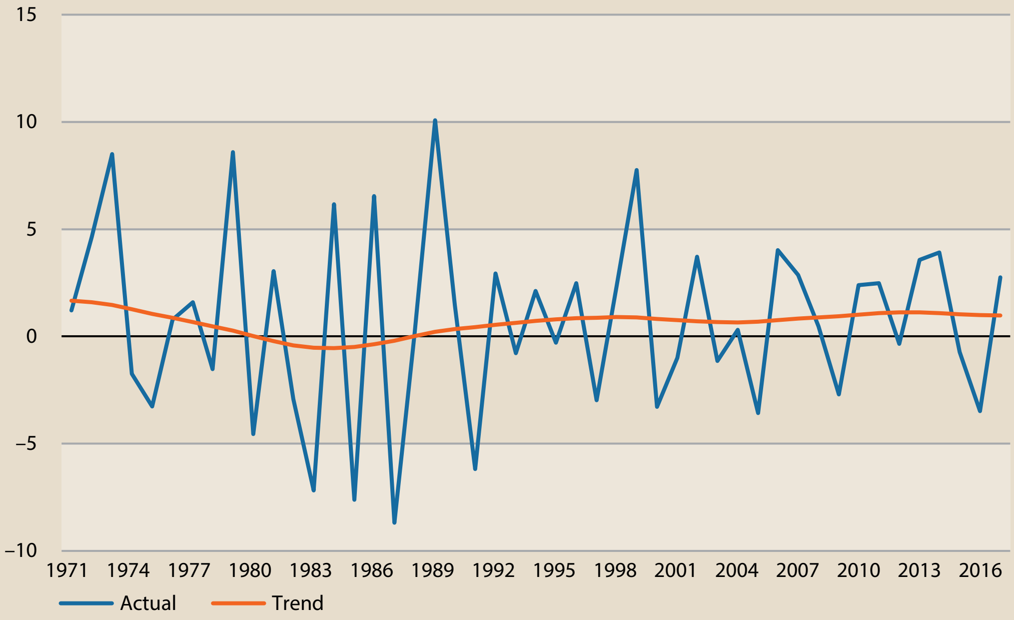


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

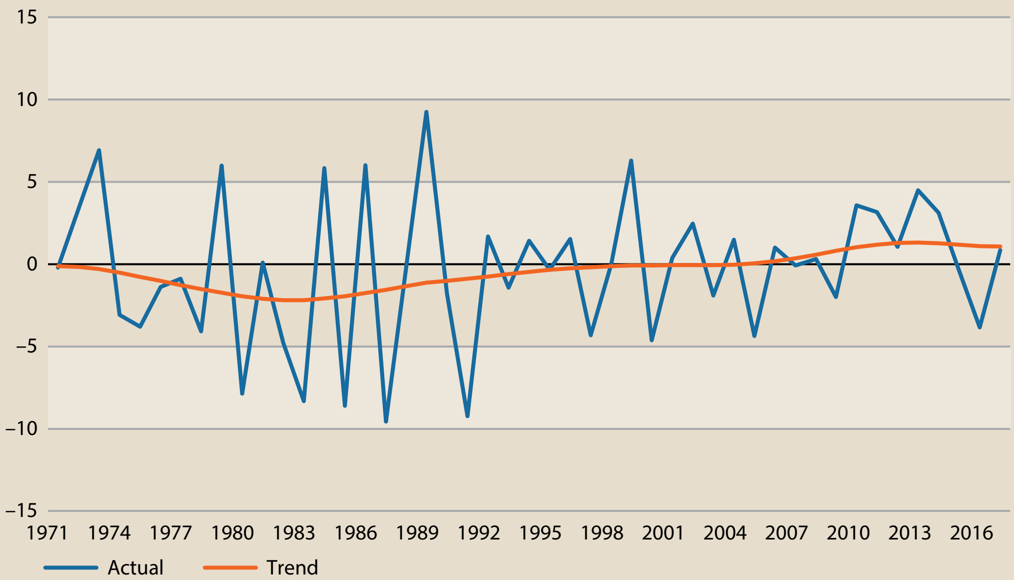


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

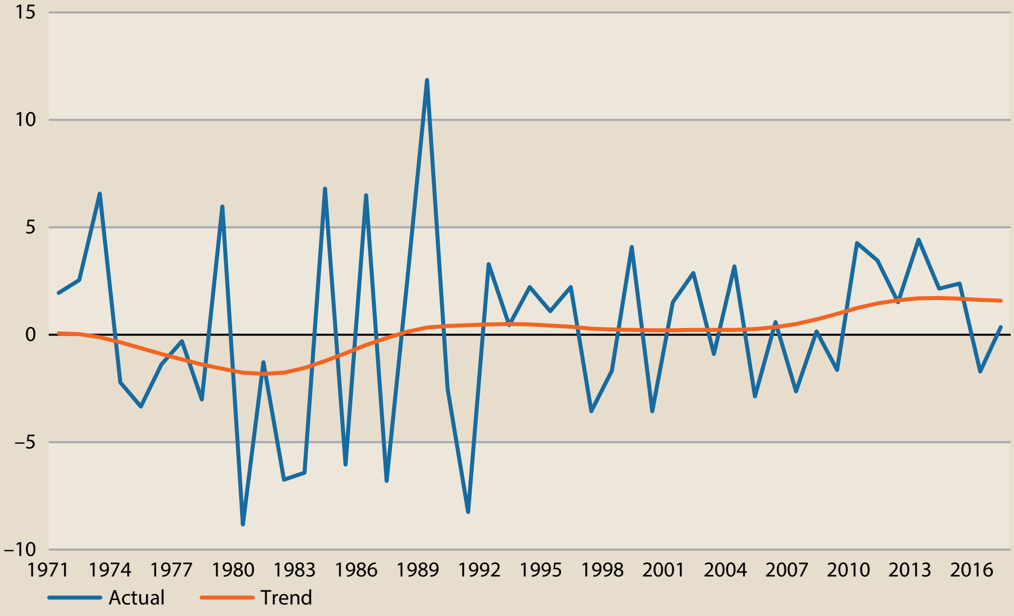


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

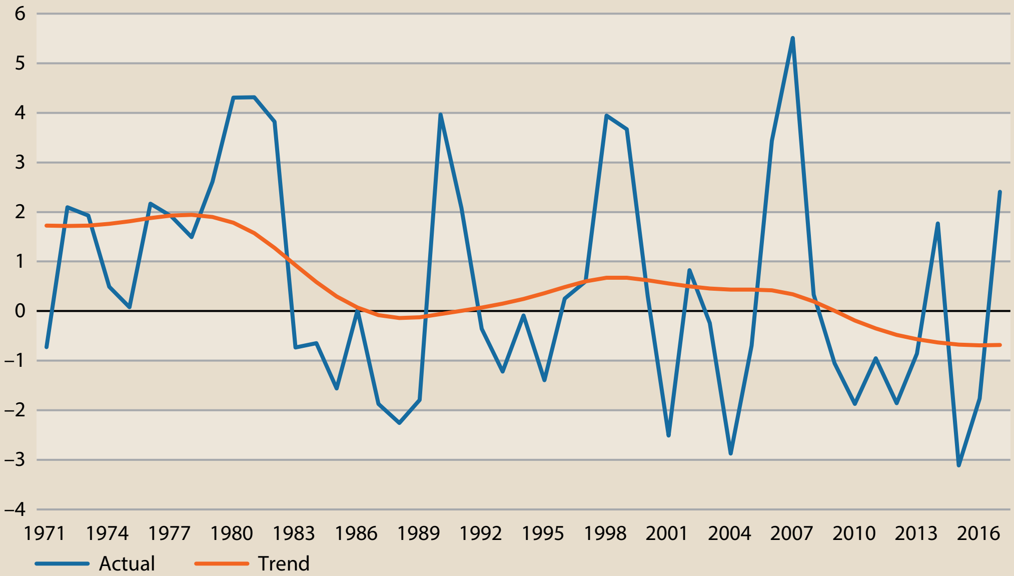


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

development has been slow compared with the gains in living standards achieved by larger countries on the Asian continent. It may be noted that Thailand, Malaysia, and the ROK each had average income levels lower than Fiji's in 1970. However, in 2017, Fiji's per capita GDP was half that of Thailand, one-third that of Malaysia, and one-quarter that of the ROK, in purchasing power terms.

Fiji's uneven growth over much of the past fifty years reflects not only its small size and the disruption caused by natural disasters, but also a narrow economic base. Now heavily reliant on international tourism (51% of exports in 2018), Fiji's GDP was previously highly sensitive to swings in the price of sugar [2]. Subsequent growth in garment manufacturing in the 1990s did little to reduce the country's exposure to external shocks. Vulnerability to global conditions remains significant even as the end of preferential trade deals for sugar (with the EU) and garments (with Australia, the USA, and New Zealand) has seen exports of goods shrink relative to exports of services [3]. The value of trade has fluctuated over time, and while lower than a recent peak of 135% of GDP in 2000, it is still high at 106% in 2017. Remittances from Fijians working abroad have separately risen since 2000 [3]. This partially insulates private consumption from domestic shocks but increases the sensitivity of household spending to foreign demand.

A period of strong investment after independence saw capital expand at a faster rate than hours worked in the 1970s (see Figure 6). This helped lift LP, which rose by an average of 1.4% a year over the decade (see Figure 3). Investment then slowed, declining from 25% of GDP in 1980 to 13% in 1990. There has been little capital deepening since then. IT capital grew by an average 4.7% a year from 1990 to 2017. However, being only a small part of the total capital stock, the average growth contribution of IT capital over this period was only 0.1 percentage points.

The rate of capital deepening in the past decade was affected by the major disruptions and property damage caused by cyclones. Cyclone Winston is estimated to have caused damage worth a quarter of GDP in 2016 [3].

From 2010 to 2017, hours worked grew faster than the capital stock, thereby diminishing LP growth. Weak private investment has slowed Fiji's development relative to other APO countries. Political instability helped destabilize economic conditions in the past. Coups d'état in 1987, 2000, and 2006 affected confidence, investment, and output; working against efforts to entice foreign direct investment (FDI), which remains small compared with FDI flows to other countries [4].

Capital per hour worked declined from 2010 to 2017 and the capital-to-output ratio fell as manufacturing value added shrunk relative to GDP (see Figure 5). TFP grew by an average of 1.2% per year during this period, supporting growth in LP (see Figure 4). This coincided with a return to political stability following democratic elections in 2014 [3]. Despite the recent pickup in TFP growth, an acceleration bettered only by Pakistan and Vietnam among APO countries, the level of TFP remains lower than in 1970.

In contrast to its disappointing historical TFP record, the skill level of Fiji's workforce has risen consistently over the past 30 years, contributing 1 percentage point to annual growth in output in the 1990s; 0.4 points in the 2000s; and 0.3 points in the 2010s (see Figure 2).

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that add a more complete picture in certain areas. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

A complete review of Fiji's indicators is hampered by a lack of data in many areas.

Immediate Determinants

Fiji's capital-to-output ratio declined in the 2010s as hours worked grew faster than the capital stock (see Table 4). A slowdown in non-IT capital accumulation was only partly offset by increased investment in IT capital.

Growth in workers' skills contributed to LP gains from 2010 to 2017, though at a lower rate than in the previous decade. The World Bank has encouraged Fiji to build on its progress in lifting educational attainment by working to reduce high-school dropout rates and through greater spending on schools in remote areas [3].

Relatively few indicators of availability and access to technologies are available for Fiji. The World Bank's 2017 Systematic Country Diagnostic notes that 4G mobile coverage is almost universal. A large share of Fiji's population also has internet access. However, access to the internet is limited in many isolated and rural areas [3].

Exports accounted for half of Fiji's GDP in 2017. While trade remains important for the country's economic performance, the composition of Fiji's exports and production has continued to evolve. Agriculture still represents 15% of GDP. However, the value of Fiji's water and sugar, the latter previously being the country's largest export, is small in comparison to the income generated by the tourism industry. Manufacturing's share of output declined in the 2010s. Garments still make up a significant share of manufactured exports. In comparison, medium- and high-technology goods comprise only a small portion of total activity in the industry.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability; and an overall Productivity Readiness Index. These indices give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Sufficient data were not available to calculate the Productivity Readiness Index and associated indices for Fiji.

Underlying Determinants: Specific Strengths and Weaknesses

With its already strong institutions, Fiji would benefit from reforms to remove barriers to trade and investment and improve the regulatory environment. Such changes should encourage private investment as well as support competition and productivity growth. Reducing the costs involved in starting and operating businesses, while ensuring a high degree of efficiency in public service provisioning, will be vital given the innate challenges of Fiji's geography and its distance from larger markets.

Fiji's institutions are of a reasonably high quality, while not yet as effective as those of the APO's best-performing high-income economies. The country performs well on World Bank indicators of control of corruption and political stability, ranking ahead of other upper-middle-income APO

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	3.7 (2010)	7	3.1 (2017)	10
Capital deepening (pp)	Open	1.5 (2017)	13	−0.4 (average of 2010–17)	19
IT capital deepening (pp)	Open	0.29 (2017)	5	0.1 (average of 2010–17)	13
Human capital					
Labor quality contribution to LP growth	Open	0.4 (2017)	13	0.3 (average of 2010–17)	15
WEF Current Workforce	0–100	NA	NA	NA	
WEF Entrepreneurial Culture	0–100	NA	NA	NA	
Knowledge					
Availability of latest technologies*	1–7	NA	NA	NA	
NRI Technology Pillar	0–100	NA	NA	NA	
NRI People Pillar	0–100	NA	NA	NA	
Products and markets					
Agriculture share (%)	Open	14.9 (2017 GDP)	7	8.3 (2017 employment)	15
Manufacturing share (%)	Open	13.5 (2017 GDP)	15	15.5 (2017 employment)	10
Medium- and high-tech share of manufacturing (%)	Open	8 (2010)	= 16	7 (2018)	17
Exports/GDP (%)	Open	57.0 (2010)	7	50.3 (2017)	9
Imports/GDP (%)	Open	63.4 (2010)	6	55.5 (2017)	7

Source: Appendix G.
Note: * Supplementary indicator.

countries. On the other hand, it ranks 11th on the World Bank's WGI Rule of law indicator. Further, its financial institutions are not as effective as those in other countries in its comparable income group (including Thailand, Malaysia, and IR Iran) in terms of depth, access, and efficiency of financial services. Fiji ranks 9th on the World Bank's WGI Government Effectiveness indicator. This likely reflects, in part, the difficulty of providing public services to inhabitants of isolated areas of the archipelago.

Fiji ranks behind other countries in its income group in terms of perceptions of regulatory quality, as captured by the World Bank WGI Regulatory Quality indicator. The World Bank has pointed to administrative requirements and inconsistency with international conventions on arbitration as barriers to greater private-sector investment [3]. Fiji ranks 13th among 20 APO countries on The Heritage Foundation's Business Freedom indicator, a measure of the time and cost involved in starting and wrapping up businesses, as well as the ease of obtaining licenses, and access to electricity. Other APO countries in Fiji's income group, particularly Thailand and Malaysia, perform more strongly on this indicator. The Heritage Foundation identifies Fiji's complex land ownership system as one of the factors weighing on regulatory efficiency. The Foundation also notes that policies are often developed without consulting the business community.

In contrast, Fiji performs strongly on The Heritage Foundation's Labor Freedom indicator, which tracks the ease and cost of hiring and firing workers, among other labor costs (see Table 5).

TABLE 5

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	NA	NA	NA
Quality of primary education*	1–7	NA	NA	NA
WEF Skills/Future workforce	0–100	NA	NA	NA
Education expenditure/GDP* (%)	Open	3.9 (2013)	8	1.3
Innovation system				
WEF Innovation Capability	0–100	NA	NA	NA
KOF Informational Globalisation, de facto	0–100	78.0	11	21.7
Infrastructure				
WEF Infrastructure	0–100	NA	NA	NA
Business environment				
THF Business Freedom	0–100	62.6 (2019)	13	33.6
WEF Administrative Requirements	0–100	NA	NA	NA
WEF Domestic Competition	0–100	NA	NA	NA
THF Tax Burden	0–100	80.5 (2019)	12	12.5
WB WGI Regulatory Quality	−2.5 to 2.5	−0.22 (2018)	12	2.45
WEF Labour Market	0–100	NA	NA	NA
THF Labour Freedom	0–100	76.2 (2019)	4	14.7
NRI Governance	0–100	NA	NA	NA
Financial system				
WEF Financial System	0–100	NA	NA	NA
IMF Financial Markets	0–1	0 (2018)	= 17	0.82
THF Financial Freedom	0–100	50 (2019)	= 10	40
Health system				
Life expectancy at birth (years)	Open	67.3 (2018)	18	17.4

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Indicator	Range	Value	APO rank	Points behind APO leader
Infant mortality* (deaths/1000 live births)	Open	25.6 (2018)	11	23.1
Foreign investment				
KOF Financial Globalisation	0–100	42.9 (2017)	13	48.7
KOF Financial Globalisation, de jure	0–100	21.0 (2017)	19	64.9
FDI Stock/GDP (%)	Open	93.9 (2019)	5	412.6
THF Investment Freedom	0–100	55 (2019)	= 8	30
Trade				
WEF Trade Openness	0–100	NA	NA	NA
THF Trade Freedom	0–100	52.8 (2019)	20	42.2
Services Trade Restrictions Index*	0–100	NA	NA	NA
KOF Trade Globalisation	0–100	64.2 (2017)	7	32.2
KOF Trade Globalisation, de jure	0–100	51.4 (2017)	12	42.3
Demand				
WEF Macroeconomic Stability	0–100	NA	NA	NA
THF Monetary Freedom	0–100	72.5 (2019)	= 13	13.1
Savings:				
Gross savings (% of GDP)	Open	NA	NA	NA
Institutions				
WEF Institutions	0–100	NA	NA	NA
IMF Financial Institutions	0–1	0.43 (2018)	= 9	0.5
WB WGI Political Stability	–2.5 to 2.5	0.88 (2018)	3	0.61
WB WGI Rule of Law	–2.5 to 2.5	–0.13 (2018)	11	1.97
WB WGI Control of Corruption	–2.5 to 2.5	0.38 (2018)	6	1.79
WB WGI Government Effectiveness	–2.5 to 2.5	0.26 (2018)	9	1.97
Social capital				
WEF Social Capital	0–100	NA	NA	NA
WB WGI Voice & Accountability	–2.5 to 2.5	0.22 (2018)	7	0.8

Source: Appendix G.
Note: * Supplementary indicator.

Fiji maintains significant tariff and nontariff barriers to trade. This is reflected in a poor performance on The Heritage Foundation's Trade freedom index, which ranks Fiji 20th among 20 APO economies. Fiji ranks more highly (12th among 19 APO countries) on the KOF Globalisation (de jure) index, which tracks taxes and regulations on trade, as well as trade agreements.

Fiji also maintains restrictions on investments. It ranks 8th on The Heritage Foundation's Investment Freedom index. Fiji's stock of FDI, while relatively large at 94% of GDP in 2019, is smaller than those of the APO's best-performers on this indicator, i.e., Hong Kong, Singapore, Mongolia, and Cambodia.

Fiji's score on the KOF Informational Globalisation (de jure) index is weak relative to other upper-middle-income APO countries. The country's poor performance on this indicator, which tracks used internet bandwidth, international patents, and high-technology exports, reflects the composition of its production, which is heavily weighted towards tourism-related services and agriculture, with limited involvement in high-technology manufacturing.

Provisioning of education and health services is a major challenge, given Fiji's geography. Health outcomes are poor compared with other countries in Fiji's income group. Notably, life expectancy is 17 years shorter than in Hong Kong, the best-performing APO country on this indicator.

Challenges Ahead

Fiji's objective of sustained economic growth will depend on increased business investment [5, 6]. This will, in turn, require reforms to improve the business environment and reduce uncertainty in returns to capital spending [3, 7]. Development partners cite skill shortages and the incidence of crime, including theft, among causes of weak investment [3]. Other problems relate to access to credit and the regulatory framework for starting and running a business [8, 9].

Ongoing efforts are being made to facilitate access to finance and strengthen contract enforcement [9]. The IMF has advised Fiji to address high tax-compliance costs and inadequate property-right protection while rationalizing price controls and implementing anti-corruption measures [8]. Successful reforms in these areas would support greater investment and productivity growth.

Fiji should also continue to invest in the human capital of its workforce, building on its recent success in lifting education outcomes. While skills will continue to be eroded by the emigration of highly educated workers, lifting high school completion rates would help alleviate skilled labor shortages.

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HONG KONG

Hong Kong has a relatively small population. However, it is one of the most densely populated places in the world, with over 7,000 people per square kilometer as of 2018 [1, 2]. Hong Kong's average income has increased 6.5 times since 1970 (see Figure 1) and is now the second highest within APO group. Because of this large base, the increase in GDP per capita has been low in the last decade. The old-age dependency ratio in Hong Kong is one of the highest among APO members, though its total age dependency ratio is one of the lowest (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	7.4 (2017)	16	0.73 (growth rate in 2010–17)	15
Rural population proportion (%)	0 (2010)	19	0 (2017)	20
GDP (USD billion at PPP, % per year)	456.1 (2017)	14	2.9 (growth rate in 2010–17)	17
GDP per capita (USD at PPP, % per year)	61,700 (2017)	2	1.7 (growth rate in 2010–17)	18
Employment rate (%)	49.3 (2010)	7	51.3 (2017)	7
Age dependency ratio (%)	33.5 (2010)	20	38.6 (2017)	18
Old age dependency ratio (%)	17.5 (2010)	2	22.8 (2017)	2

Source: Appendix G.

Productivity Performance

Hong Kong's level of labor productivity (LP) is the second highest in APO group. Earlier, its rate of total factor productivity (TFP) growth was also one of the highest among APO members, though its LP growth was about mid-range. Both growth rates have slowed over the last decade (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	44.9 (2010)	2	54.0 (2017)	2
Labor productivity growth (% per year)	3.3 (2000–10)	11	2.6 (2010–17)	12
TFP growth (% per year)	2.0 (2000–10)	4	1.5 (2010–17)	5

Source: Data and calculations from the APO Productivity Database 2019.

Hong Kong is one of the 'Asian Tiger' economies that experienced very rapid growth, based on strong TFP growth in the 1970s and 1980s (see Table 3). Once a British colony, Hong Kong passed into Chinese administrative control in 1997. However, under a 'one-country, two-systems' arrangement, it retained its low-tax regime and low government intervention in markets. The region has established itself as a global financial and shipping center, benefitting from both its proximity to PR China and the market orientation of its economy [3].

Hong Kong has had a very strong output growth, albeit with volatility, until the Asian Financial Crisis of the late 1990s (see Figure 2). The underlying rate of growth averaged around 8% a year. It halved in the 1990s and 2000s and fell further to just below 3% in the 2010s.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.
(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	4.9	5.5	1.9	3.3	2.6	2.3	3.4
TFP growth	3.3	2.6	–0.5	2.0	1.5	1.1	2.5
Capital productivity growth	2.5	1.2	–1.6	1.1	1.5	1.1	2.6
Output growth	8.6	6.5	3.9	4.0	2.9	2.9	3.0
Combined inputs growth	5.3	3.9	4.4	2.0	1.4	1.8	0.4
Capital growth	6.1	5.3	5.4	2.9	1.4	1.8	0.4
IT capital growth	19.4	18.4	17.6	7.7	3.5	6.2	–3.2
Hours worked growth	3.7	1.0	2.0	0.7	0.3	0.6	–0.4
Labor quality growth	0.8	1.6	1.3	0.5	1.1	1.1	1.0
Capital deepening	1.2	2.1	1.7	1.1	0.5	0.6	0.4

Source: Authors' estimates based on data from the APO Productivity Database 2019.

The output growth was principally sourced from capital (see Figure 5) and TFP growth. TFP contributed around 40% to the annual average rate of output growth from 1971 to 1990. Input accumulation accounted for just over 50%. The slowdown in growth in the 1990s was met by much weaker; rather, negative TFP growth. In the 2000s and 2010s, growth in capital contribution fell, as did the labor contribution to a milder degree (see Figure 2). TFP growth, on the other hand, returned to strength (see Figure 4). There was volatility around a strong average of 3% a year up until 1990. The underlying rate came back to 4.3% in 2005 but fell down to 2.6% by 2017.

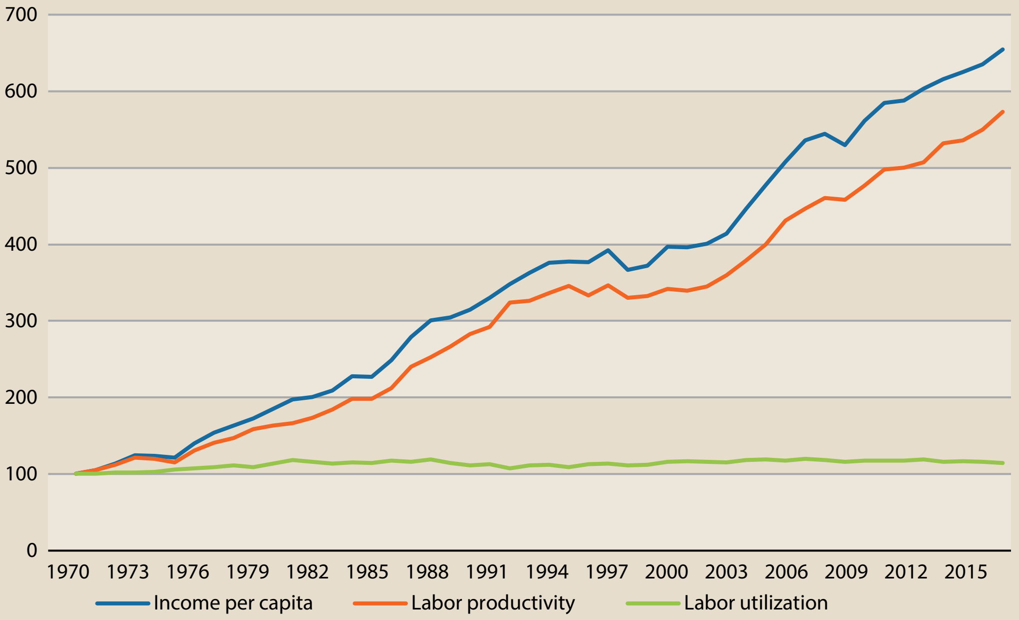
Labor productivity growth followed a similar pattern, albeit with greater volatility. The annual rate of growth in trend LP averaged over 5% through the 1970s and 1980s (see Figure 3). After dipping in the 1990s, it rose to 3.4% in 2006 and then drifted down to 2.4% in 2017.

Capital deepening and TFP have both made strong contributions to LP growth. The rate of capital deepening contributed around 1.7 percentage points to LP growth through the 1990s. Its contribution fell to 1.1pp in the 2000s and to 0.5pp in the 2010s. The decline in the rate of capital deepening can be further demonstrated by looking at the growth in the capital–labor ratio (see Figure 6). A general rise before 1990 gave way to a general decline in growth. This came from, mostly, a slower growth in capital, which fell quite sharply after 1998.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

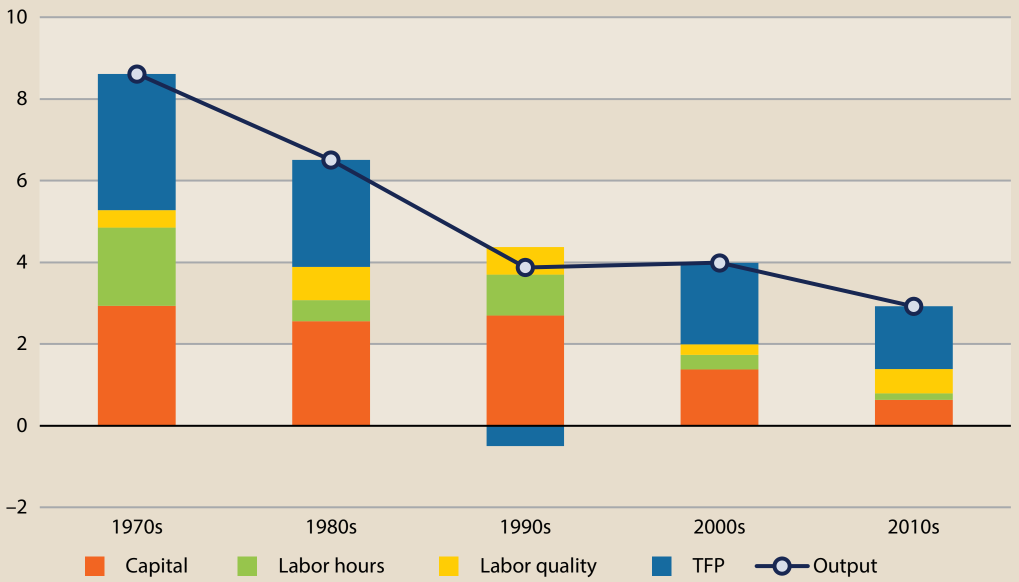


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

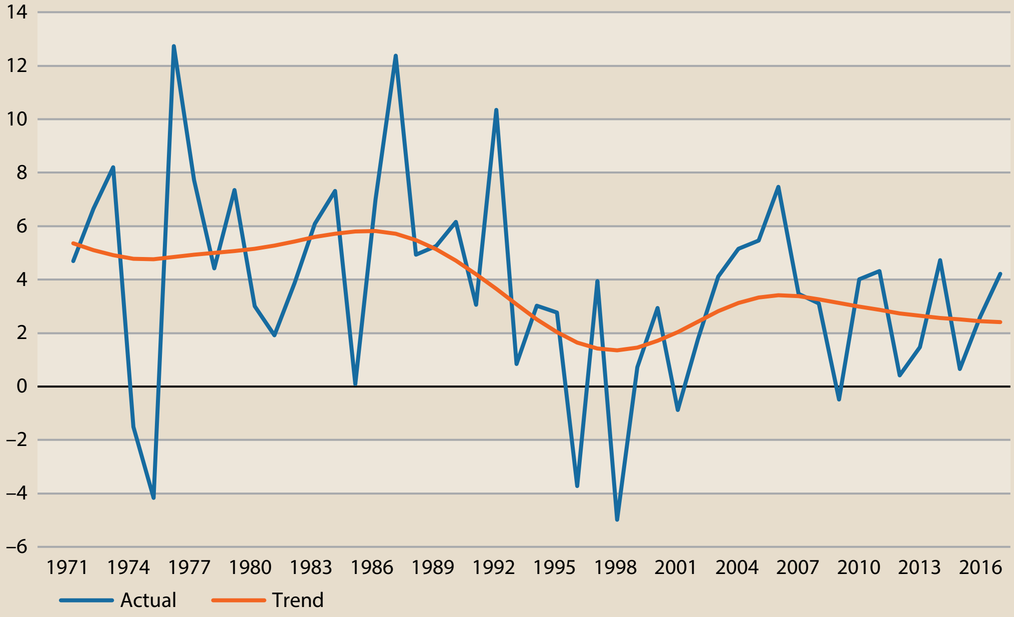


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

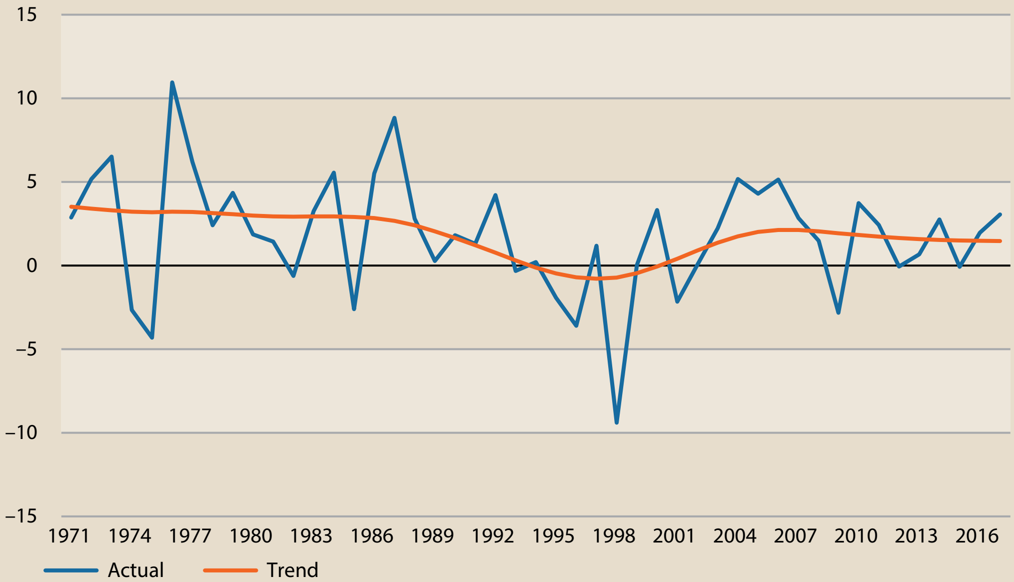


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

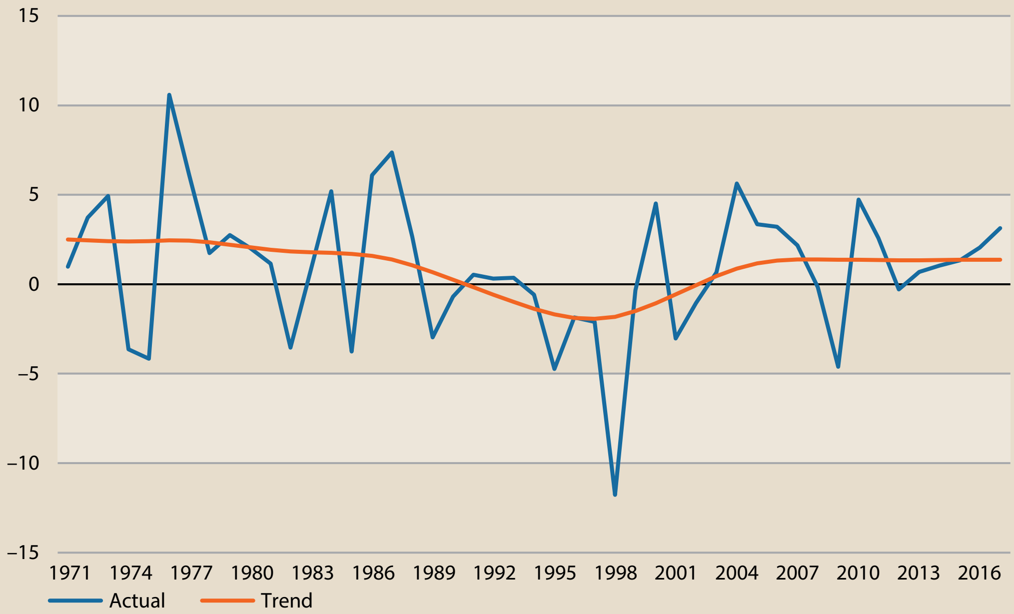


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

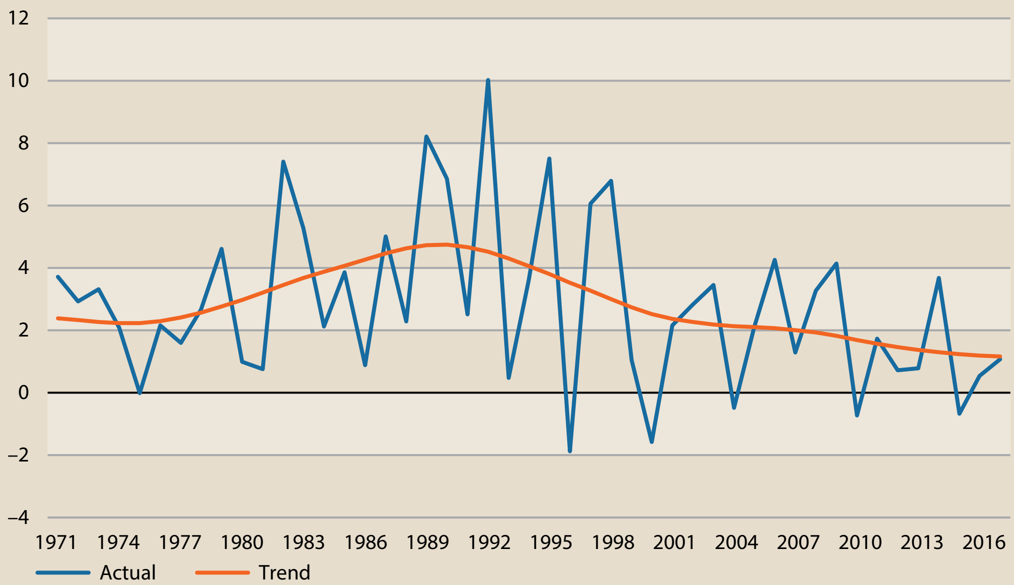


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Hong Kong's economy has transitioned from manufacturing to services. It was based on manufacturing until land and labor costs rose and firms moved their plants to southern parts of PR China in the late 1970s [4]. This manufacturing partnership between the 1980s and mid-1990s boosted development of supporting service industries in Hong Kong, notably trade and financial services [4]. In August 1998, Hong Kong was hit by a speculative attack on the Hong Kong dollar. The government provided an intervention, prompting "a sharp decline in the domestic prices of real estate, stocks, and consumer goods" [5].

Just as the economy began to regain momentum after the government reforms of the housing market and the local securities market, the dot-com bubble burst in 2000 [6]. Economic growth resumed with the Individual Visit Scheme (IVS), which boosted Chinese tourism to Hong Kong, and the Closer Economic Partnership Agreement (CEPA) with PR China. The CEPA eliminated import tariffs on over 1,400 Hong Kong products, increasing exports to PR China and capital investments in Hong Kong [6]. Hong Kong staged a swift recovery from the global financial crisis in 2009–11, but in 2019, uncertainties stemming from the USA–PR China trade tensions took a toll on exports and investments while tourism-related sectors were hard hit by the ongoing social incidents [4].

LP growth swelled as Hong Kong's economy became service-oriented but tapered afterwards. LP growth was mostly driven by manufacturing until the services sector sprang up in the 1990s [7]. Hong Kong's relatively fast LP growth over the last three decades can be attributed to the region's transformation from a manufacturing-based economy to a high-value-added services economy [8]. Growth slowed after the double shocks of the Asian financial crisis in 1998 and the dot-com bubble burst in 2001 [7]. The strong economic recovery following the SARS pandemic in 2003 enhanced labor productivity growth, but growth has been concentrated in the financial and trade-related sectors [7]. A tapering off of LP growth in the 2010s has been attributed to the service sector's dominance of the economy, there being little room for growth as services have accounted for over 90% of GDP since 2004 [8].

TFP growth has been mostly strong as Hong Kong's economy is largely based on high-value-added services. TFP growth in Hong Kong has been highly dependent on Hong Kong's trade links with PR China, especially in the trade and financial services areas [7]. Between the late 1980s and early 1990s, output growth in Hong Kong was mainly driven by factor inputs [7]. In 2002, TFP became the dominant growth driver, with one explanation being the outsourcing of lower-productivity jobs to the mainland so as to focus on high-value-added roles [7]. TFP growth accelerated for the next five years, which coincided with the rapid expansion in trade and services [7]. Import/export trade made the largest contribution to TFP growth until 2008 [9]. After the financial crisis, the banking sector's contribution to TFP growth remained resilient while trade's contribution declined [9].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws from the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Hong Kong has one of the highest capital-to-GDP ratios (see Table 4), in part because of its strong financial system, which was ranked first in the world in the WEF Global Competitiveness Report because of its depth and stability. Hong Kong was also the recipient of large foreign direct investment (FDI) inflows until political turbulence in the region caused FDI to decline by 48% in 2019 [10].

The quality of Hong Kong's workforce is high globally and among its APO peers. According to the WEF, Hong Kong's services are the most competitive globally. Hong Kong also boasts of high ICT adoption, except in the area of internet usage. (Hong Kong has the highest rate of mobile subscriptions per 100 people, but lags in its percentage of internet users as a share of the adult population.)

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	6.3 (2010)	4	8.1 (2017)	3
Capital deepening (pp)	Open	0.5 (2017)	17	0.5 (average 2000–17)	16
IT capital deepening (pp)	Open	−0.08 (2017)	18	0.12 (average 2000–17)	10
Human capital					
Labor quality contribution to LP growth	Open	0.7 (2017)	6	0.6 (average 2000–17)	10
WEF Current Workforce	0–100	74.3 (2019)	2	1.8 points behind APO leader	
WEF Entrepreneurial Culture	0–100	68.3 (2019)	2	2.1 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	5.6 (2018)	4	0.6 points behind APO leader	
NRI Technology Pillar	0–100	69.1 (2019)	3	9.3 points behind APO leader	
NRI People Pillar	0–100	57.1 (2019)	4	19.4 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	0.1 (2017 GDP)	19	0.2 (2017 employment)	20
Manufacturing share (%)	Open	1.1 (2017 GDP)	20	2.9 (2017 employment)	20
Medium- and high-tech share of manufacturing (%)	Open	38 (2010)	11	38 (2018)	11
Exports/GDP (%)	Open	205.3 (2010)	1	188.8 (2017)	1
Imports/GDP (%)	Open	199.4 (2010)	1	187.7 (2017)	1

Source: Appendix G.
Note: * Supplementary indicator.

Hong Kong is an export-driven economy. In 2018, it exported USD94.3 billion in services, and about USD127 billion in products. The top product exports were gold, broadcasting equipment, integrated circuits, diamonds, and telephones. Hong Kong's top service exports were in travel, transportation, and finance [11].

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Hong Kong ranks second in the APO across all overarching indices and in the Productivity Readiness Index (see Table 5). It also rates highly globally.

TABLE 5

VALUES OF OVERARCHING INDICES FOR HONG KONG.

Index	Value	Rank
Motivation	97	2
Capabilities	88	2
Efficiency of markets	98	2
Stability	92	2
Productivity Readiness Index	95	2

Source: Authors' estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Hong Kong performs well on a number of indicators both globally and compared to its APO peers (see Table 6). Current strengths include its education system, infrastructure, and trade and financial sectors. However, Hong Kong is currently facing institutional uncertainty, social unrest, and demographic weaknesses, which could disrupt its strong performance in future.

Hong Kong emerged as a global educational leader after its first Programme for International Student Assessment (PISA) assessment in 2000. Nearly two decades later, it has maintained its global standing. Over the last decade, Hong Kong has passed numerous teacher and school-leader reforms, expanded its vocational education programs, and increased access to higher education [12].

Hong Kong has remained highly competitive as a destination for doing business, despite its high costs. Its greatest advantages are its macroeconomic stability, robust financial sector, healthcare, and infrastructure [13]. Its WEF indicators for these factors are always in the top three globally. However, businesses have 'begun to express more pessimism about the effects of social unrest on their prospects' [13].

The strength of Hong Kong's institutions has aided its economic growth. Competitiveness has depended on the administration's 'sound rules and regulations,' as well as its stable macroeconomic environment and efficient institutions [14]. Strong public-sector performance and recognition of property rights have further bolstered Hong Kong's strong institutional rankings, both globally and among APO members.

Hong Kong's financial industry has been 'a cornerstone of the city's prosperity for a long time' and accounts for nearly one-fifth of GDP. The stock market was the fifth largest in the world, and Hong Kong was the most active market for raising IPO funds in 2019 [1]. Hong Kong's popularity as a financial center has been due, in part, to limited government intervention, high liquidity, and effective yet transparent regulations.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.7 (2017)	3	1.1
Quality of primary education*	1–7	5.2 (2017)	4	0.9
WEF Skills/Future Workforce	0–100	80.8 (2019)	= 2	0.6
Education expenditure/GDP* (%)	Open	3.3 (2017)	11	1.8
Innovation system				
WEF Innovation Capability	0–100	63.4 (2019)	5	16.8
KOF Informational Globalisation, de facto	0–100	97.9 (2017)	2	1.8
Infrastructure				
WEF Infrastructure	0–100	94 (2019)	2	1.4
Business environment				
THF Business Freedom	0–100	96.2 (2019)	1	0
WEF Administrative Requirements	0–100	82.5 (2019)	6	10.6
WEF Domestic Competition	0–100	74.8 (2019)	1	0
THF Tax Burden	0–100	93 (2019)	1	0
WB WGI Regulatory Quality	−2.5 to 2.5	2.23 (2018)	1	0
WEF Labour Market	0–100	75.8 (2019)	2	5.4
THF Labour Freedom	0–100	89.1 (2019)	2	1.8
NRI Governance	0–100	79.6 (2019)	3	8.6
Financial system				
WEF Financial System	0–100	91.4 (2019)	1	0
IMF Financial Markets	0–1	0.77 (2018)	= 2	0.05
THF Financial Freedom	0–100	90 (2019)	1	0
Health system				
Life expectancy at birth (years)	Open	84.7 (2018)	1	0.0
Infant mortality* (deaths/1000 live births)	Open	NA	NA	NA

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	90.2 (2017)	2	1.4
KOF Financial Globalisation, de jure	0–100	82.3 (2017)	2	3.6
FDI Stock/GDP (%)	Open	506.5 (2019)	1	0
THF Investment Freedom	0–100	80 (2019)	2	5
Trade				
WEF Trade Openness	0–100	88.4 (2019)	2	0.3
THF Trade Freedom	0–100	95 (2019)	1	0
Services Trade Restrictions Index*	0–100	34.8 (2016)	2/14	7.4
KOF Trade Globalisation	0–100	86.3 (2017)	2	10.1
KOF Trade Globalisation, de jure	0–100	88.5 (2017)	2	5.1
Demand				
WEF Macroeconomic Stability	0–100	100 (2019)	= 1	0
THF Monetary Freedom	0–100	80.7 (2019)	6	4.9
Savings				
Gross savings (% of GDP)	Open	25.1 (2019)	13	23.1
Institutions				
WEF Institutions	0–100	77.6 (2019)	2	2.8
IMF Financial Institutions	0–1	0.76 (2018)	= 3	0.17
WB WGI Political Stability	−2.5 to 2.5	0.79 (2018)	6	0.7
WB WGI Rule of Law	−2.5 to 2.5	1.77 (2018)	2	0.07
WB WGI Control of Corruption	−2.5 to 2.5	1.68 (2018)	2	0.49
WB WGI Government Effectiveness	−2.5 to 2.5	1.9 (2018)	2	0.33
Social capital				
WEF Social Capital	0–100	53.5 (2019)	8	9.7
WB WGI Voice & Accountability	−2.5 to 2.5	0.47 (2018)	4	0.55

Source: Appendix G.
Note: * Supplementary indicator.

The trade sector has flourished as a result of its convenient location next to one of the largest manufacturing centers in the world. External trade (imports as well as exports) amounted to about 360% of Hong Kong's GDP in 2019 [14]. The WEF ranks Hong Kong's product market as, in global terms, the most competitive domestically and the second-most open to trade after Singapore. The lowest tariffs in the world, and the second-lowest nontariff barriers further encourage trade.

The financial and trade industries together account for about 90% of Hong Kong's LP growth since the 2008 financial crisis. Continual skill upgrades and capital investments in these sectors have driven up productivity over the last decade [8, 13]. The government has planned further investment in human capital and technology to combat the downward pressures of slowing labor productivity, especially in light of the rapidly aging population.

Indeed, the working-age population in Hong Kong began shrinking in 2015. Over the 2020s, the United Nations projects that this population will shrink by about 1% a year [13]. This concern, as well as social unrest, high income inequality, and deteriorating housing affordability form the bulk of Hong Kong's current structural challenges [14]. Although the government has enacted progressive tax rates; various family and old-age allowances; and housing, education, and health benefits to combat income inequality, inequality still remains high by global standards [15]. This gap is expected to widen as the population continues to age and more workers drop out of the labor force [15]. Some research suggests that reducing income inequality could increase productivity growth, as higher inequality could create disparities in human capital accumulation, increase political instability, and depress aggregate demand [15].

Challenges Ahead

Hong Kong has developed sound policy and institutional settings, which have been good for productivity. Its current challenges include demographic shifts, exposure to USA–PR China trade tensions and integration with the mainland. Integration with the mainland raises some uncertainty about Hong Kong's economic activities.

Despite strong redistributive efforts from the government, inequality remains high in Hong Kong as the population ages and housing costs increase. The current aging of the population will decrease Hong Kong's labor force, and will also likely increase inequality, as workers drop out of the labor force.

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INDIA

India is the most populous APO nation, with over 1.3 billion people as of 2017. It has a relatively young population, with a large rural portion. India's average income has increased over five times since 1970 (see Figure 1). Its GDP per capita remains in the bottom half of APO group, but its rate of increase has been strong in the 2010s. India's employment rate has shrunk over the last decade and is now one of the lowest among APO members (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	1,339.2 (2017)	1	1.2 (growth rate in 2010–17)	10
Rural population proportion (%)	69.1 (2010)	7	66.4 (2017)	4
GDP (USD billion at PPP, % per year)	9511.0 (2017)	1	6.5 (growth rate in 2010–17)	4
GDP per capita (USD at PPP, % per year)	7,100 (2017)	14	5.3 (growth rate in 2010–17)	5
Employment rate (%)	38.7 (2010)	14	37.6 (2017)	18
Age dependency ratio (%)	56.3 (2010)	8	51.0 (2017)	8
Old age dependency ratio (%)	8.0 (2010)	10	9 (2017)	12

Source: Appendix G.

Productivity Performance

India's level of labor productivity (LP) is low within APO group. Although its LP growth slowed in the last decade, it was still among the highest in the group. TFP growth also declined during the 2010s but was still above average compared to its APO peers (see Table 2, Figure 3, and Figure 4).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	5.6 (2010)	15	8.3 (2017)	15
Labor productivity growth (% per year)	5.8 (2000–10)	1	5.6 (2010-17)	3
TFP growth (% per year)	2.4 (2000–10)	3	1.3 (2010-17)	8

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	0.5	3.4	3.6	5.8	5.6	5.3	6.6
TFP growth	–0.3	1.7	1.7	2.4	1.3	0.8	2.5
Capital productivity growth	–0.7	0.5	–0.009	–0.2	–3.0	–3.5	–1.8
Output growth	3.0	5.4	5.3	7.2	6.5	6.2	7.1
Combined inputs growth	3.3	3.7	3.6	4.8	5.2	5.4	4.6
Capital growth	3.8	5.0	5.3	7.4	9.5	9.8	8.9
IT capital growth	8.9	15.7	16.3	15.7	15.8	17.3	12.2
Hours worked growth	2.4	2.0	1.7	1.4	0.9	1.0	0.5
Labor quality growth	0.6	1.2	1.0	1.5	1.2	1.4	0.8
Capital deepening	0.4	0.9	1.3	2.5	3.6	3.6	3.6

Source: Authors' estimates based on data from APO Productivity Database 2019.

With a population over 1.3 billion, India is also the world's third-largest economy in purchasing parity terms [1]. Indian trade has been strong since the reduction in tariff barriers in the 1990s, especially in the information and technology sector [2]. Growth in this sector has created skilled labor opportunities and a surge in foreign investment. During the 1970s, GDP growth hovered around 3.0% a year but increased in the 1980s and 1990s to 5.4% a year. The growth rate jumped to 7.2% a year in the 2000s, before moderating to a still-strong 6.5% rate annually in the 2010s.

The accumulation of capital and labor inputs has been the most important source of output growth, although TFP growth has become stronger in recent decades (see Table 3). Input accumulation has accounted for one-half to two-thirds of India's output growth (see Figure 2). Growth in the use of labor was the most important contributor in the 1970s and 1980s, but the capital component increased to contribute 4 percentage points to the output growth of 6.5% annually in the 2010s. At the same time, the labor contribution declined. However, labor quality's contribution to output growth was quite strong. The biggest contribution of 0.9 of a percentage point came in the 2000s. TFP growth has been the most variable contributor. TFP growth (and its contribution to output growth) was especially strong at 2.4% per year in the 2000s, although this contribution faded in the 2010s, following the Global Financial Crisis.

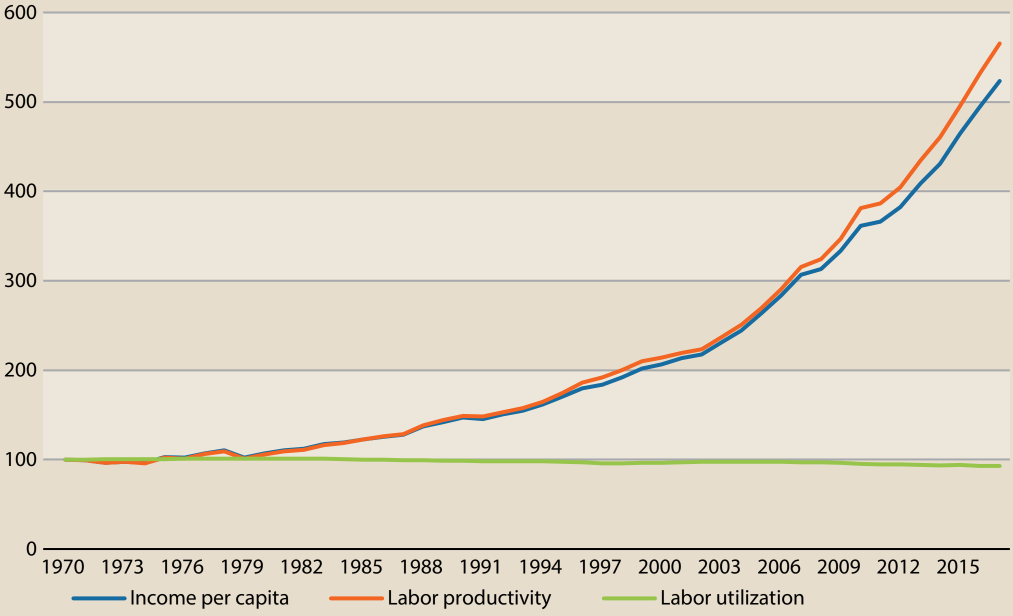
Capital deepening, TFP growth, and labor quality have all played important roles in LP growth in the last two decades. LP growth has increased from 0.5% in the 1970s to 5.6% in the 2010s. Capital deepening contributed 2.5 and 3.6 percentage points to LP growth in the 2000s and 2010s, respectively. The changes in the rate of capital deepening can be seen in the growth of the capital–labor ratio (see Figure 6). The figure shows the large step-up in capital growth from the mid-2000s. Meanwhile, the annual rate of growth in trend TFP increased to 2.4% in the 2000s before declining to 1.3% in the 2010s.

Capital productivity growth has hovered between zero and negative growth for the last few decades. Growth stayed around zero in trend terms until the mid-2000s (see Figure 5). It then turned negative, perhaps indicating that the growth in capital was not as productively employed.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

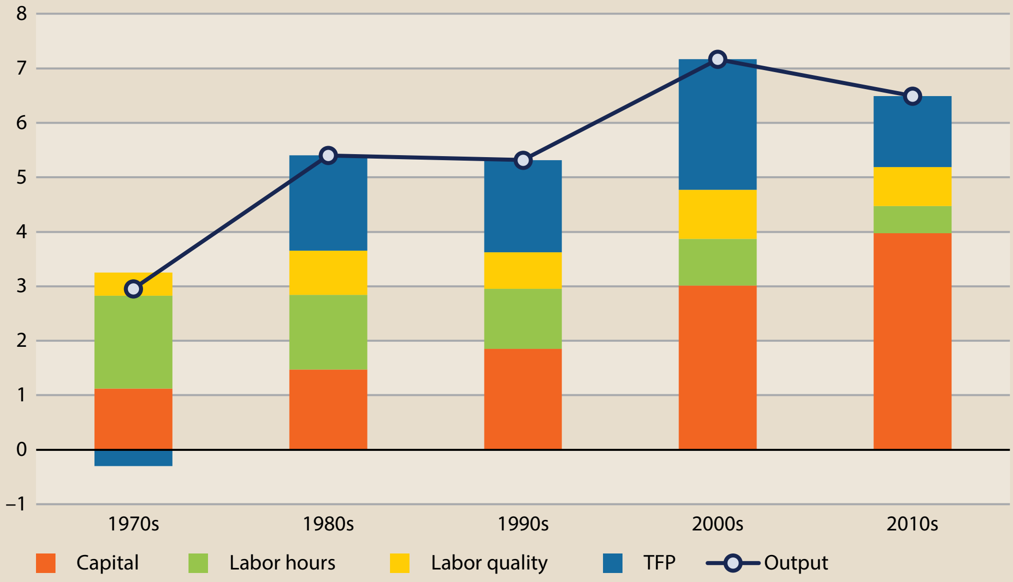


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

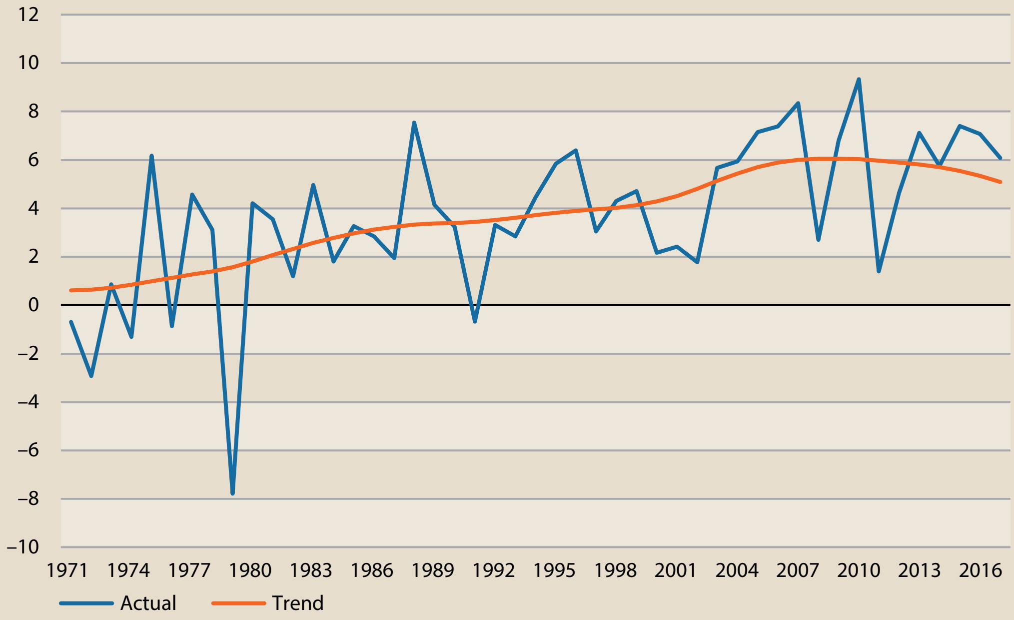


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

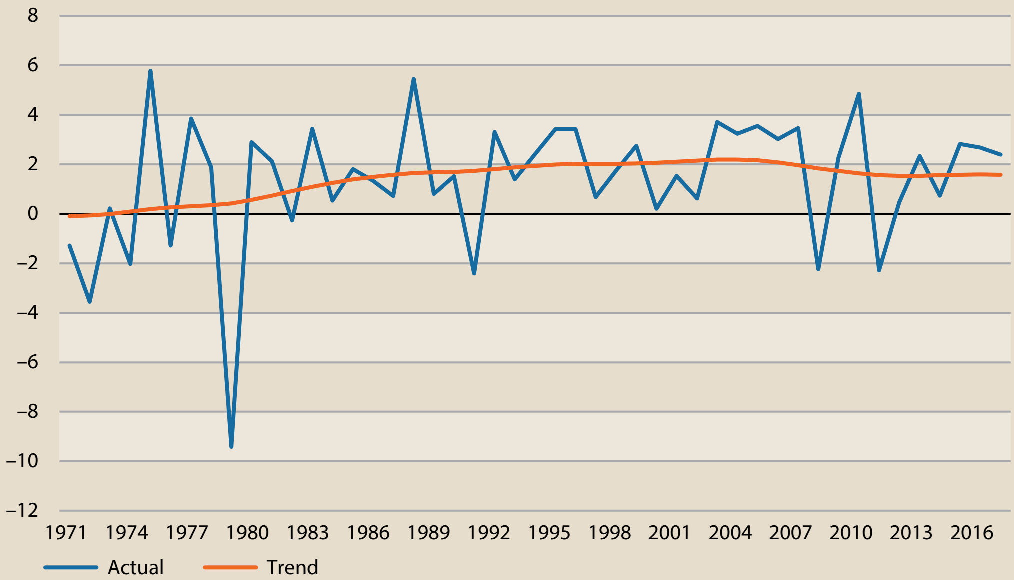


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

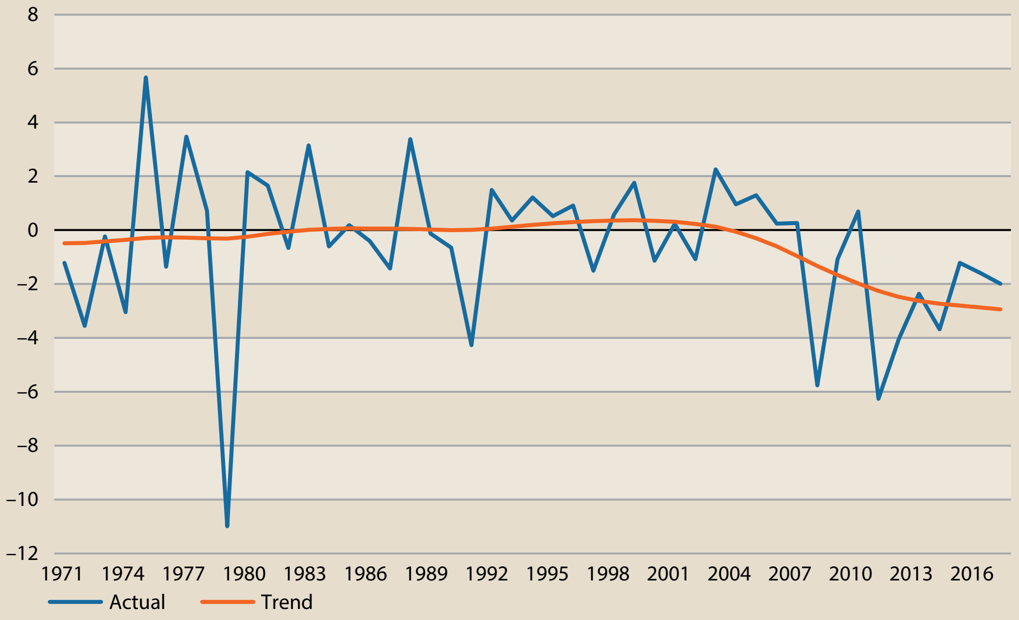


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

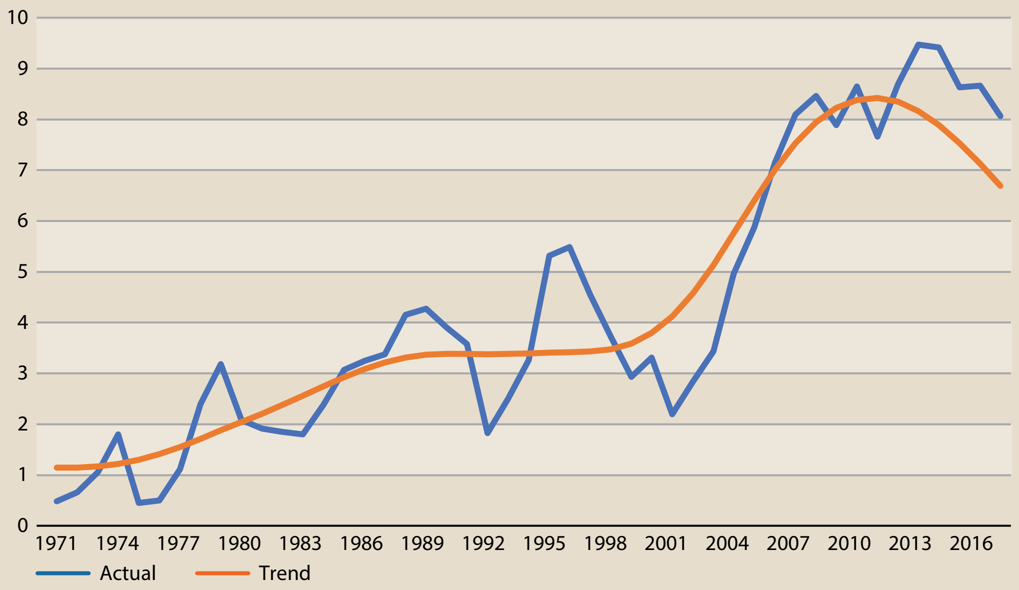


Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Authors' calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

India's economy suffered from low growth until the reforms of the 1980s, which launched an impressive growth trajectory lasting until the 2008 financial crisis. Reforms in the mid-1980s emphasized trade liberalization, devaluation, and delicensing of investment [3]. A currency crisis in 1991 served as the catalyst for more reform [4] and further liberalization [3]. Growth following the early 1990s reforms was both accelerated and stable [5].

Between 2004 and 2008, India experienced growth rates of over 8%, benefitting both from 'an unusual buoyancy in the global economy and easy global liquidity' and the reforms that permitted this globalization [4]. However, India's openness to trade became a vulnerability in the global financial crisis of 2008–10 [6]. Growth has picked up since the crisis because of, according to the IMF, the 'halving of global oil prices' [7]. However, India increased its deficit during the crisis, thus slowing its recovery [5]. Consumption, both private and public, has been the driving force behind growth recovery [5].

Capital accumulation, through FDI inflows and increased savings rates, played a pivotal role in India's growth, though the 2008 crisis dimmed the contributions. The contribution of capital accumulation to growth increased between 1975 and 2008 through rising investment and savings rates [5]. India's liberalization in economic policy from the early 1990s onwards accompanied a surge in overall investment [5] and in FDI inflows during the 2000s [8]. Between 2004–08, there was an unprecedented rise in cross-border flows of investment, an exuberance sustained until the global financial crisis [8]. The slowdown in FDI inflows may have been a result of procedural delays, supply bottlenecks, and rising policy uncertainty in India. In response, India has been easing regulations around FDI [9] and investment growth has picked up since 2017 [4]. The investment rate is now more aligned with the long-term trend rate.

Capital deepening and TFP growth have been the greatest sources of LP growth in India. Intersectoral movement, a common source of LP growth, has contributed only modestly [4]. Overall, LP growth between 2000–15 has been driven by capital deepening and growth in intermediate inputs per worker, except in a few service sectors, where TFP growth spurred LP growth [10]. Since 2013, however, TFP growth has emerged as a key driver of growth in India as capital accumulation has become less important [5]. Higher LP growth is hindered by the high-productivity service sector's inability to absorb more workers from agriculture [11].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Although India has one of the lower capital-to-GDP ratios among APO countries, its rate of capital deepening is one of the highest in the group (see Table 4). Further, the Indian government has passed numerous initiatives to increase FDI inflows during 2020 [12].

The skill level of India's workforce is ranked by the WEF Global Competitiveness Report 2019 at the bottom-third globally, dragged down by a low level of education among India's population. India's entrepreneurial culture is ranked much higher, placing it at the top-third globally because of the rapid growth of innovative companies and high number of companies embracing disruptive ideas.

India's level of ICT adoption is one of the lowest in the world. Compared with its global peers, India's mobile telephone subscriptions as a percentage of population is especially low, though the rate of internet subscriptions is slightly better.

The growth of India's economy has been primarily based on the 'rapid expansion of the service-producing industries' [13]. Despite its extraordinary growth, business services comprise only a small share of India's GDP and overall employment. India's economy is still fairly reliant on its agricultural sector.

Finally, India's levels of imports and exports are among the lowest in APO group. However, India was ranked 6th globally for total service exports in 2018 [14], due to the business services it provides.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.7 (2010)	12	2.6 (2017)	15
Capital deepening (pp)	Open	3.5 (2017)	3	3.6 (average 2000–17)	3
IT capital deepening (pp)	Open	0.2 (2017)	5	0.15 (average 2000–17)	7
Human capital					
Labor quality contribution to LP growth	Open	0.3 (2017)	14	0.7 (average 2000–17)	8
WEF Current Workforce	0–100	46.5 (2019)	14	29.6 points behind APO leader	
WEF Entrepreneurial Culture	0–100	55.5 (2019)	9	14.9 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.7 (2018)	9	1.6 points behind APO leader	
NRI Technology Pillar	0–100	42.8 (2019)	8	35.7 points behind APO leader	
NRI People Pillar	0–100	35.9 (2019)	10	40.6 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	16.3 (2017 GDP)	6	45.7 (2017 employment)	3
Manufacturing share (%)	Open	13.9 (2017 GDP)	= 14	12.9 (2017 employment)	14
Medium- and high-tech share of manufacturing (%)	Open	39 (2010)	= 9	41 (2018)	8
Exports/GDP (%)	Open	22.4 (2010)	15	19.0 (2017)	16
Imports/GDP (%)	Open	26.8 (2010)	15	22.2 (2017)	15

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

India ranks eighth in the APO across all overarching indices and in the Productivity Readiness Index. Its scores on the four overarching indices are below 50, suggesting that there are areas for substantial improvement (see Table 5).

TABLE 5

VALUES OF OVERARCHING INDICES FOR INDIA.

Index	Value	Rank
Motivation	46	8
Capabilities	46	8
Efficiency of markets	44	8
Stability	45	8
Productivity Readiness Index	46	8

Source: Authors' estimates.

Underlying Determinants: Specific Strengths and Weaknesses

India's indicators are relatively low in key productivity-enhancing areas, namely business environment, institutions, and education (see Table 6). Indicators for innovation and transport infrastructure are slightly above average, though India's utility infrastructure is well below the global average.

India is the world's fastest-growing major economy [15]. While the government encourages FDI inflows, bureaucracy and legislation often impede business. According to IHS Markit, Indian legislation is complex, and 'implementation is often delayed as politicians seek to appease different voter groups' [16]. Bureaucracy 'increases the likelihood of delays of up to several years' [16]. Acquiring land in India remains an arduous process; labor in the organized sector can be hired but not fired [17]. The Carnegie Endowment states that 'red tape, corruption, arbitrary taxation, and unpredictable policies continue to sap both foreign investment and domestic entrepreneurship' [17].

India is ranked near the bottom globally in terms of its trade openness, mostly because of its tariffs. India has increased duties on more than 3,600 tariff lines since 2014 and was planning further tariffs in 2020 [18].

Indian institutions still suffer from relatively high levels of corruption, though the country has been experimenting with solutions. Prime Minister Narendra Modi rose to power in 2014 pledging to break the cycle of corruption scandals. Although low-level corruption remains pervasive, the number of government scandals has fallen. Two ambitious initiatives launched in recent years, namely, demonetization and the Goods and Service Tax, were intended to 'combat corruption, promote transparency, and encourage good governance' [19].

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.6	4	1.2
Quality of primary education*	1–7	4.5 (2017)	9	1.7
WEF Skills/Future Workforce	0–100	54.5 (2019)	16	26.9
Education expenditure/GDP* (%)	Open	3.8 (2013)	9	1.3
Innovation system				
WEF Innovation Capability	0–100	50.9 (2019)	7	29.3
KOF Informational Globalisation, de facto	0–100	77.1 (2017)	12	22.6
Infrastructure				
WEF Infrastructure	0–100	68.1 (2019)	8	27.3
Business environment				
THF Business Freedom	0–100	65.6 (2019)	= 10	30.6
WEF Administrative Requirements	0–100	64.6 (2019)	13	28.5
WEF Domestic Competition	0–100	56.9 (2019)	7	17.9
THF Tax Burden	0–100	79.4 (2019)	15	13.6
WB WGI Regulatory Quality	−2.5 to 2.5	−0.23 (2018)	13	2.46
WEF Labour Market	0–100	53.9 (2019)	14	27.3
THF Labour Freedom	0–100	41.2 (2019)	20	49.7
NRI Governance	0–100	63.7 (2019)	6	24.5
Financial system				
WEF Financial Dystem	0–100	69.5 (2019)	8	21.9
IMF Financial Markets	0–1	0.48 (2018)	7	0.34
THF Financial Freedom	0–100	40 (2019)	= 14	50
Health system				
Life expectancy at birth (years)	Open	69.4 (2018)	16	15.3
Infant mortality* (deaths/1000 live births)	Open	36.6 (2018)	16	34.1

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	40.0 (2017)	15	51.6
KOF Financial Globalisation, de jure	0–100	42.5 (2017)	13	43.4
FDI Stock/GDP (%)	Open	14.0 (2019)	15	492.6
THF Investment Freedom	0–100	40 (2019)	= 15	45
Trade				
WEF Trade Openness	0–100	43.9 (2019)	15	44.8
THF Trade Freedom	0–100	73.4 (2019)	13	21.6
Services Trade Restrictions Index*	0–100	65 (2016)	14/14	37.6
KOF Trade Globalisation	0–100	43.5 (2017)	14	52.9
KOF Trade Globalisation, de jure	0–100	50.1 (2017)	13	43.6
Demand				
WEF Macroeconomic Stability	0–100	90 (2019)	= 7	10
THF Monetary Freedom	0–100	73 (2019)	12	12.6
Savings				
Gross savings (% of GDP)	Open	29.4 (2019)	9	18.8
Institutions				
WEF Institutions	0–100	56.8 (2019)	8	23.6
IMF Financial Institutions	0–1	0.38 (2018)	= 13	0.55
WB WGI Political Stability	–2.5 to 2.5	–0.98 (2018)	16	2.47
WB WGI Rule of Law	–2.5 to 2.5	0.03 (2018)	7	1.81
WB WGI Control of Corruption	–2.5 to 2.5	–0.19 (2018)	8	2.36
WB WGI Government Effectiveness	–2.5 to 2.5	0.28 (2018)	8	1.95
Social capital				
WEF Social Capital	0–100	46.8 (2019)	16	16.4
WB WGI Voice & Accountability	–2.5 to 2.5	0.38 (2018)	5	0.64

Source: Appendix G.
Note: * Supplementary indicator.

India's transportation infrastructure is well above the global average, though its utility infrastructure lags [20]. High airport connectivity, efficient train services, and liner shipping connectivity put India's infrastructure indicators in the top quintile globally. Despite recent pushes by the Indian government to increase rural access to electricity, India's access to electricity as a share of its population is among the lowest globally [20, 21]. Even for those with access to electricity, reliable supply remains a concern [21]. Further, India's water supply is considered unreliable, and a large portion of the population is exposed to unsafe drinking water, as compared to India's global peers [20].

While India's financial system has been deep enough to support the growth of the private sector, its stability is suffering. Heavily indebted Indian companies have left India's public-sector banks saddled with large nonperforming loans, while other Indian financial institutions fell victim to bad investments, thereby halting credit expansion [17].

In India, more than 27% of the country's youth are excluded from education, employment, or training [15]. Furthermore, educational attainment in India is not directly correlated to employment prospects. Many leave the country for better jobs and educational prospects, as Indian university graduates face high levels of unemployment and the supply of tertiary education is limited. According to World Education News and Review, 'large and growing numbers of aspiring youth remain locked out of the higher education system' [15].

However, India's innovation capability and research and development scores are above the global average [20]. India ranks in the top quarter for growth of innovative companies and companies embracing disruptive ideas. Further, India's research institutions and scientific publications are near the top globally.

Challenges Ahead

India's continued growth will require a number of policy and institutional reforms. Top priorities include reducing regulation in the business and trade sectors, strengthening the balance sheets of financial institutions, improving utility infrastructure, and further reducing corruption. However, priorities may be shifted in the short-term as the COVID-19 pandemic has created massive economic disruption in India on a scale worse than the 2008 financial crisis [22].

Before the pandemic, India had initiated a number of reforms meant to reignite growth, including a reduction in the corporate tax rate; recapitalization and consolidation in the banking sector; and business regulatory reforms [22]. COVID-19 has upended any plans of expanded growth, and the government can expect higher deficits in the coming years as revenue streams suffer and expenditures increase [22]. While India has passed a mix of trade-restrictive and liberalizing measures in recent years, the pandemic is expected to decrease global demand for Indian exports.

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INDONESIA

Indonesia has the second-largest population among APO nations, with a population growth rate that is midlevel. The country has one of the younger populations in APO group, as indicated by its low old-age dependency ratios. Its average income has increased nearly seven times since 1970 (see Figure 1), which puts Indonesia in the middle among APO nations. Indonesia's employment rate has remained roughly constant over the last decade (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	25.9 (2017)	2	1.2 (growth rate in 2010–17)	9
Rural population proportion (%)	50.1 (2010)	11	45.3 (2017)	11
GDP (USD billion at PPP, % per year)	3252.5 (2017)	3	5.3 (growth rate in 2010–17)	9
GDP per capita (USD at PPP, % per year)	12,600 (2017)	11	4.1 (growth rate in 2010–17)	9
Employment rate (%)	45.5 (2010)	10	47.5 (2017)	10
Age dependency ratio (%)	51.1 (2010)	10	48.5 (2017)	12
Old age dependency ratio (%)	7.3 (2010)	15	7.9 (2017)	15

Source: Appendix G.

Productivity Performance

Indonesia's labor productivity (LP) is ranked 11th within APO group. Its rate of LP growth showed strong gains during the last decade, although its rate of TFP growth declined over the same period (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	9.9 (2010)	12	12.9 (2017)	11
Labor productivity growth (% per year)	2.8 (2000–10)	13	3.8 (2010–17)	10
TFP growth (% per year)	0.3 (2000–10)	15	–1.5 (2010–17)	20

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	4.1	2.7	2.1	2.8	3.8	4.6	1.7
TFP growth	1.2	–0.6	–2.4	0.3	–1.5	–1.2	–2.3
Capital productivity growth	0.7	–1.1	–2.5	0.5	–1.9	–1.2	–3.6
Output growth	8.0	6.1	4.1	5.1	5.3	5.4	4.9
Combined inputs growth	6.8	6.7	6.6	4.8	6.8	6.6	7.2
Capital growth	7.3	7.2	6.6	4.6	7.1	6.6	8.5
IT capital growth	24.0	18.7	12.2	13.7	12.4	12.3	12.6
Hours worked growth	4.0	3.4	2.1	2.3	1.5	0.8	3.2
Labor quality growth	1.9	2.4	4.2	2.8	5.0	6.0	2.4
Capital deepening	2.2	2.4	2.7	1.5	3.5	3.7	2.9

Source: Authors' estimates based on data from APO Productivity Database 2019.

Indonesia experienced quite a strong growth of around 7% a year until the Asian financial crisis in the late 1990s (see Figure 2). As growth recovered after the crisis, it settled at a rate of around 5% a year.

Input accumulation has accounted for most of Indonesia's output growth. Capital accumulation alone has accounted for more than half of output growth, while increased use of labor has accounted for up to 20%. Input accumulation dipped in both absolute and relative terms in the 2000s as output growth slowed. Labor growth has been volatile with a downward trend during the period. Growth in trend labor use was around 1.7% a year in the 2010s, with strong growth in the actual series in the last two years. The strength of labor quality's contribution is also notable. The contribution ranged from 0.8 to 1.8 percentage points, suggesting that productive upskilling has contributed a lot to output growth. To some extent, this also compensates for the very weak TFP performance.

TFP growth and its contribution to output growth has been weak or even negative. The strongest rate of TFP growth was 0.3% a year in the 1970s, the 1980s, and again in the 2000s (see Table 3 and Figure 4). In the 1990s and 2010s, however, TFP growth was strongly negative on an average.

LP growth has shown volatility around a trend that has shown long cycles without much change over the entire period (see Figure 3). The rate of growth in trend LP settled at around 3.5% a year in the 2010s. Variations in LP growth have been mostly due to variations in capital deepening.

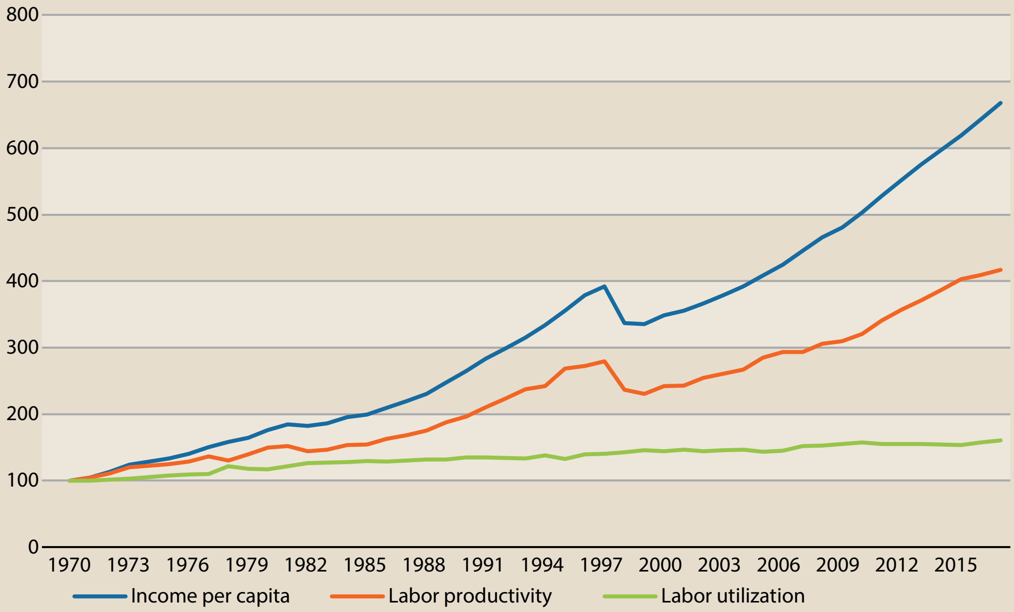
Capital deepening contributed 2.3–2.7 percentage points to LP growth in the 1970s, 1980s, and 1990s. Its contribution came down in the 2000s but recovered strongly in the 2010s. The lower rate of change in the capital–labor ratio in the late 1990s and 2000s is also evident in Figure 6. Changes in capital growth were mostly behind the changes in capital deepening. Capital growth fell sharply to 2% with the financial crisis but climbed back steadily to around 8% a year in the 2010s.

Capital productivity growth has been quite steady around a zero rate for most of the period (see Figure 5). There was a very sharp dip around the financial crisis as the available capital stock generated much less output. Capital productivity also fell in the 2010s as capital has grown more rapidly than output.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

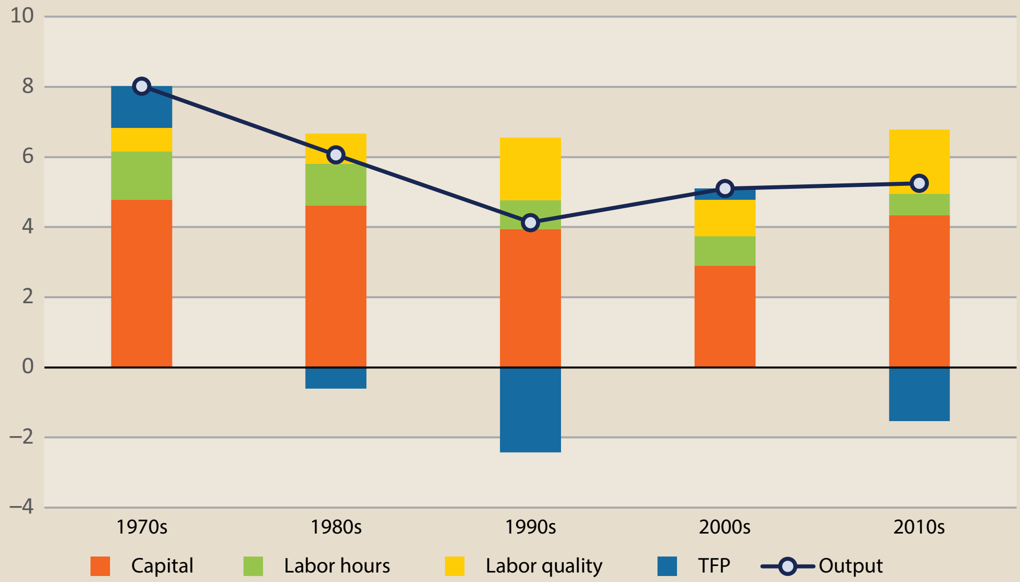


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

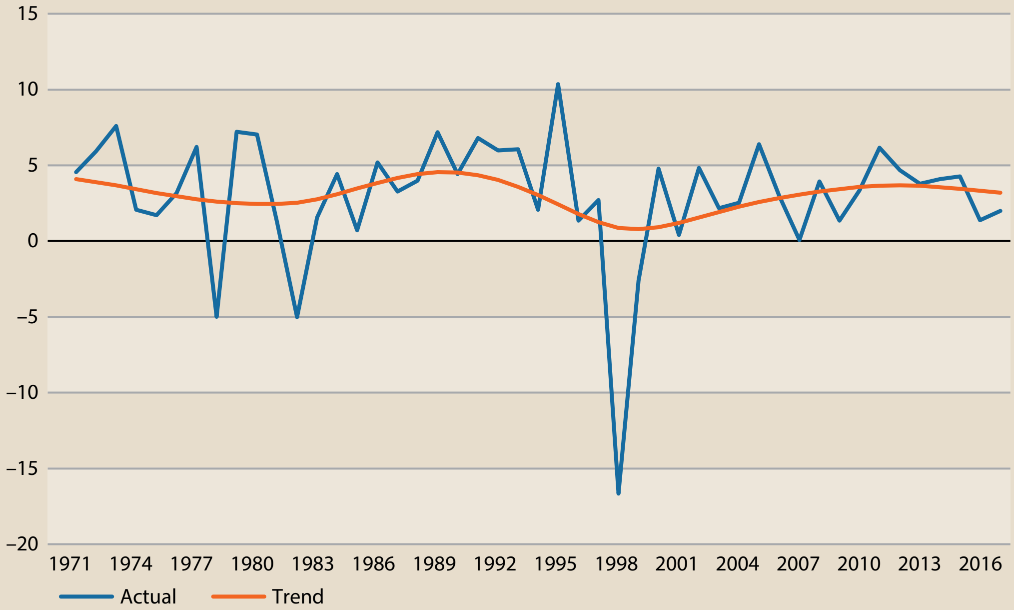


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

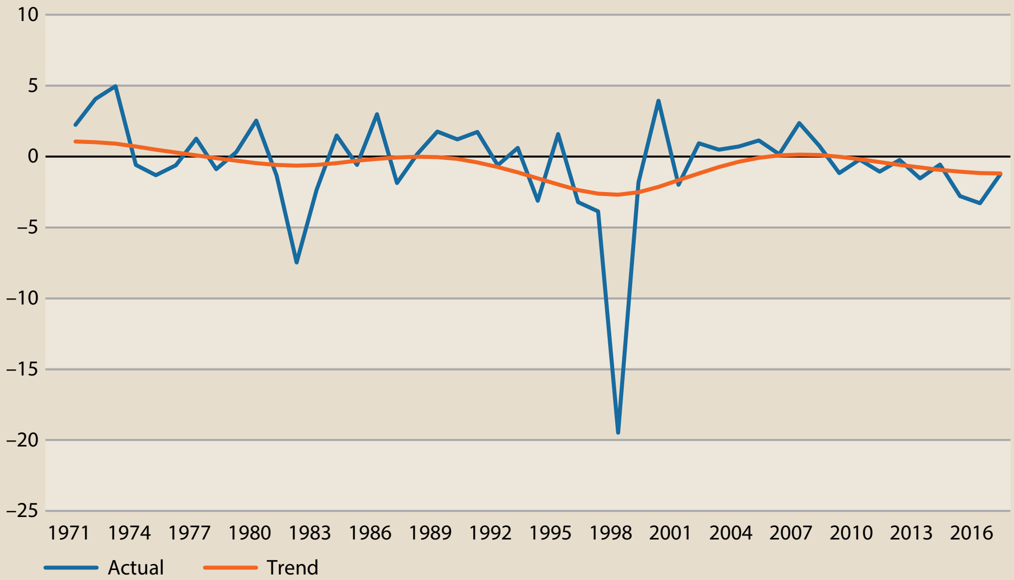


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

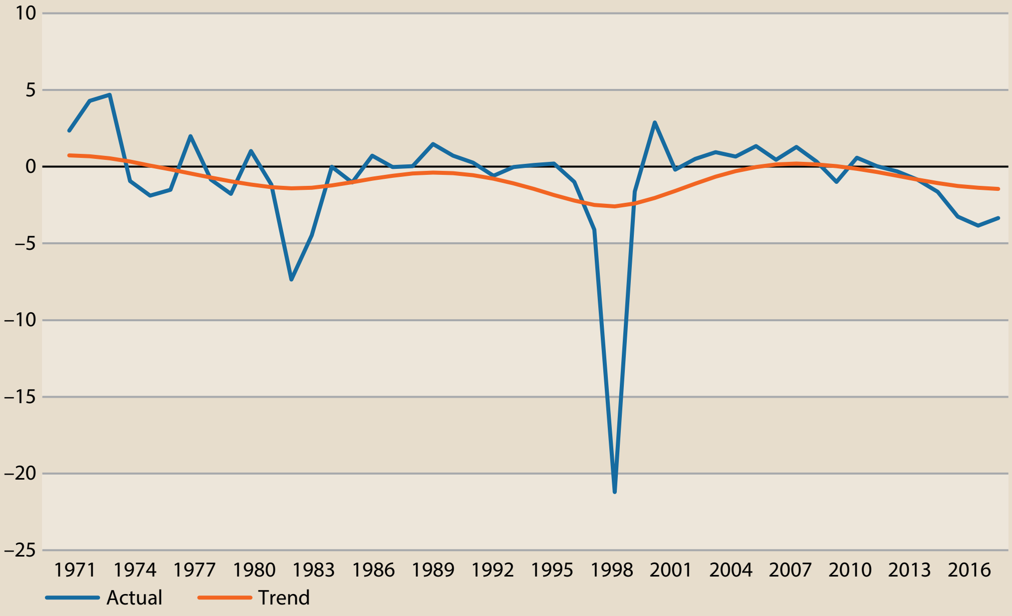


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

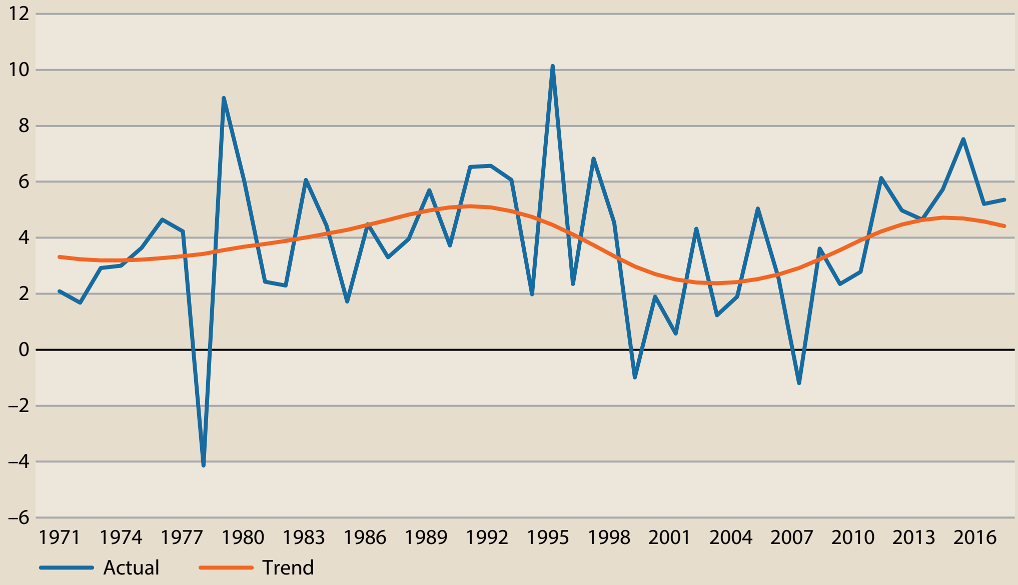


Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Authors' estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

The Indonesian economy expanded rapidly under the Suharto government's macroeconomic stabilization program of the late 1960s [1]. The value of Indonesia's exports rose alongside the global price of oil in the 1970s, and oil exports formed an important revenue stream for the economy [2]. As oil prices fell in the 1980s, the industrialization and urbanization, which began in the 1960s, accelerated as the Indonesian government focused on diversifying away from oil exports and towards manufactured exports [2]. In the years leading up to the Asian Financial Crisis, many competitive manufacturing firms were established and Indonesia was a favored destination for foreign investment [3]. When the crisis hit, Indonesia was 'the far worst affected economy' [4]. After the Thai baht collapsed, the public lost faith in the banking sector and foreign customers cancelled orders for exports [3]. The economy bottomed out in 1999 and began growing in the following year [3]. Policies after the crisis focused on restructuring the banking sector and corporate debt [5], allowing Indonesia to pull out of its IMF arrangement in 2004 [6]. In the 2010s, 'Indonesia has been a consistent performer in an otherwise weak and volatile global economy' [7].

Capital growth made significant contributions to output growth in the last fifty years. Strong investment growth underpinned domestic demand until the Asian crisis, when investment fell from around a third to 11% of the nominal GDP [2]. Foreign investment rebounded nearly a decade after the Asian crisis, though 'the poor quality of physical infrastructure in Indonesia' posed an impediment to higher growth in FDI [2], which limited FDI as a 'vehicle for technological change' [8]. Domestic firms have been a much more significant source of investment than foreign firms [8]. In 2017, the World Bank remarked that investment growth was 'strong' and 'expected to firm up' in the short term because of the recovery in commodity prices; the reforms to improve the business environment; and better business sentiment, though the bank suggested easing regulations to increase FDI [9].

TFP contributed –4% to economic growth between 1971–2007 [8]. Indonesia's TFP growth during 1962–2004 was also consistently lower than most southeast and East Asian countries [5]. Up until the early 1980s, incoming investments were used for capital investment 'rather than for technological development' and the 'windfall gains' [5] from oil did not necessitate improvements in TFP. TFP growth only became positive and significant during the 2000–08 period because the slowdown in capital 'required a more efficient use of productive resources' [10]. Decelerating TFP growth since the global financial crisis (GFC) has been attributed to slowing human capital accumulation, a steady increase in protectionism, and a weaker regulatory environment in Indonesia [11].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Indonesia has seen high capital growth relative to its GDP (see Table 4). Additionally, although its IT capital deepening has slowed during the last decade, its capital deepening has grown significantly over the same period.

Indonesia has the strongest growth in its labor quality contribution to labor productivity growth. According to the World Economic Forum report [12], the skills of Indonesia's current workforce place it in the top quartile globally. Its entrepreneurial culture is ranked even higher, as there is high growth of innovative companies and companies embracing disruptive ideas.

Though Indonesia appears to have embraced mobile phones, the country has been slower to access the Internet; the percent of Indonesia's adult population that uses internet is in the bottom-third globally [12]. Indonesia's NRI People Pillar, which reflects the integration of ICT into business, government, and individual life is about average for APO group, but lower than its indicator reflecting access to, and development of, technology.

Indonesia's exports as a share of GDP have shrunk in recent years, 'thanks to a manufacturing slump and the country's reliance on commodities, for which prices sank' [13]. With fierce competition from neighboring countries like Vietnam, which liberalized its trade policy, Indonesia 'has fallen behind' [13]. Indeed, Indonesia's imports and exports as percentages of GDP have fallen over the last decade.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity:					
Capital/GDP ratio	Open	3.4 (2010)	8	3.6 (2017)	7
Capital deepening (pp)	Open	2.9 (2017)	8	3.5 (average of 2010–17)	4
IT capital deepening (pp)	Open	0.12 (2017)	10	0.16 (average of 2010–17)	8
Human capital:					
Labor quality contribution to LP growth	Open	0.4 (2017)	12	1.8 (average of 2010–17)	1
WEF Current workforce	0–100	56.3 (2019)	9	19.8 points behind APO leader	
WEF Entrepreneurial culture	0–100	60.8 (2019)	5	9.6 points behind APO leader	
Knowledge:					
Availability of latest technologies*	1–7	4.8 (2018)	7	1.5 points behind APO leader	
NRI Technology Pillar	0–100	41.6 (2019)	9	36.9 points behind APO leader	
NRI People Pillar	0–100	34.8 (2019)	12	41.7 points behind APO leader	
Products and markets:					
Agriculture share (%)	Open	13.5 (2017 GDP)	9	29.8 (2017 employment)	9
Manufacturing share (%)	Open	20.7 (2017 GDP)	6	14.6 (2017 employment)	12
Medium- and high-tech share of manufacturing (%)	Open	39 (2010)	= 9	35 (2018)	= 12
Exports/GDP (%)	Open	24.3 (2010)	14	20.4 (2017)	15
Imports/GDP (%)	Open	22.4 (2010)	16	19.1 (2017)	17

Source: Appendix G.
Note: * Supplementary indicator.

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Indonesia's performance across these four indices is relatively consistent, scoring in the 40s and ranking 7th among APO countries. Its overall Productivity Readiness Index has a value of 47, which again gives it the 7th ranking. Given that the leading APO country, Singapore, scores around 100 on all indices, Indonesia's scores suggest that there is plenty of policy and institutional work that could be done (see Table 5).

TABLE 5

VALUES OF OVERARCHING INDICES FOR INDONESIA.

Index	Value	Rank
Motivation	48	7
Capabilities	48	7
Efficiency of markets	48	7
Stability	42	7
Productivity Readiness Index	47	7

Source: Authors' estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Indonesia's underlying determinants in key areas such as infrastructure, business environment, and education are areas for improvement (see Table 6). Its young and increasingly skilled population could enhance Indonesia's economic growth if the country strengthens its institutions and increases its global presence.

The Indonesian government has shown mixed public-sector performance. Indonesia's regulatory burden is one of the lowest globally [12]. Property rights and judicial independence are generally upheld, according to the indicators in the WEF report. However, Indonesia still struggles with corruption and freedom of the media. Its incidence of corruption indicator puts Indonesia below the global average [12]. Most recently, critics of the government's handling of the COVID-19 pandemic faced digital attacks [14].

While Indonesia's transport infrastructure performs relatively well on the WEF report, its utility infrastructure is lagging [12]. Indonesia's transport scores are bolstered by its high airport connectivity and the efficiency of its train services, though its road connectivity is among the lowest globally. Further, in terms of its utilities, electricity access is ranked near the bottom. A high percentage of the country is also exposed to unsafe drinking water.

The cost of doing business in Indonesia has declined in recent years as a result of government reforms simplifying the process of getting credits and registering property [15]. Indonesia's entrepreneurial culture is relatively strong as well, with high scores for the growth of innovative companies and the companies embracing disruptive ideas [12]. However, Indonesia's regulation excessively protects some firms while making it difficult to start a new business [16]. The financial system in Indonesia is also above-average globally, especially regarding the availability of venture capital and the financing of small- and medium-sized enterprises [12]. However, Indonesia's labor market is one of the least flexible globally, in part because of the high cost of terminating an employee [12].

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.4 (2017)	6	1.4
Quality of primary education*	1–7	4.5 (2017)	7	1.7
WEF Skills/Future Workforce	0–100	71.7 (2019)	8	9.7
Education expenditure/GDP* (%)	Open	3.6 (2017)	10	1.6
Innovation system				
WEF Innovation Capability	0–100	37.7 (2019)	11	42.5
KOF Informational Globalisation, de facto	0–100	78.9 (2017)	10	20.8
Infrastructure				
WEF Infrastructure	0–100	67.7 (2019)	10	27.7
Business environment				
THF Business Freedom	0–100	70 (2019)	9	26.2
WEF Administrative Requirements	0–100	78.4 (2019)	8	14.7
WEF Domestic Competition	0–100	57 (2019)	6	17.8
THF Tax Burden	0–100	83.4 (2019)	= 8	9.6
WB WGI Regulatory Quality	−2.5 to 2.5	−0.14 (2018)	10	2.37
WEF Labour Market	0–100	57.7 (2019)	12	23.5
THF Labour Freedom	0–100	49.2 (2019)	18	41.7
NRI Governance	0–100	60.6 (2019)	8	27.6
Financial system				
WEF Financial System	0–100	64 (2019)	11	27.4
IMF Financial Markets	0–1	0.29 (2018)	10	0.53
THF Financial Freedom	0–100	60 (2019)	= 4	30
Health system				
Life expectancy at birth (years)	Open	71.5 (2018)	11	13.2
Infant mortality* (deaths/1000 live births)	Open	25.0 (2018)	10	22.5

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	52.8 (2017)	11	38.8
KOF Financial Globalisation, de jure	0–100	54.7 (2017)	9	31.2
FDI Stock/GDP (%)	Open	20.5 (2019)	11	486.0
THF Investment Freedom	0–100	50 (2019)	= 11	35
Trade				
WEF Trade Openness	0–100	59.5 (2019)	9	29.2
THF Trade Freedom	0–100	80.8 (2019)	8	14.2
Services Trade Restrictions Index*	0–100	64 (2016)	13/14	36.6
KOF Trade Globalisation	0–100	43.5 (2017)	15	52.9
KOF Trade Globalisation, de jure	0–100	58.6 (2017)	8	35.0
Demand				
WEF Macroeconomic Stability	0–100	90 (2019)	= 7	10.0
THF Monetary Freedom	0–100	78.4 (2019)	7	7.2
Savings				
Gross savings (% of GDP)	Open	31.0 (2019)	8	17.2
Institutions				
WEF Institutions	0–100	58.1 (2019)	7	22.3
IMF Financial Institutions	0–1	0.43 (2018)	= 9	0.5
WB WGI Political Stability	−2.5 to 2.5	−0.54 (2018)	13	2.03
WB WGI Rule of Law	−2.5 to 2.5	−0.32 (2018)	13	2.16
WB WGI Control of Corruption	−2.5 to 2.5	−0.25 (2018)	9	2.42
WB WGI Government Effectiveness	−2.5 to 2.5	0.18 (2018)	10	2.05
Social capital				
WEF Social Capital	0–100	63.2 (2019)	1	0
WB WGI Voice & Accountability	−2.5 to 2.5	0.18 (2018)	8	0.84

Source: Appendix G.
Note: * Supplementary indicator.

Indonesia currently struggles to provide high-quality education to its citizens. An analysis by the World Bank showed that 55% of Indonesians who complete schools are functionally illiterate [17]. Since the mid-2000s, Indonesia has implemented a number of education reforms, and its educational indicators reflect these improvements. However, more substantial efforts will be required to 'overcome structural weakness' [17].

As of 2018, Indonesia had been one of the top ten destinations globally for FDI in a decade. Most FDI has been channeled to non-manufacturing, non-export-oriented sectors, unlike its neighbor Vietnam. The Asian Development Bank (ADB) has stated that to attract more FDI, Indonesia needs to provide its export-oriented sectors with more FDI-friendly policies [18] and reduce the 'significant restrictions to foreign investors' [15].

Indonesia has also seen low growth in exports over the last few years. Its share of exports as a portion of GDP has declined from 40% in 2000 to 20% in 2018, unlike its export-oriented neighbors Thailand and Vietnam. The Indonesian government has passed various reforms since 2015 aimed at simplifying import and export processes and reducing barriers to entry in specific sectors. However, a number of problems remain, including 'regulatory bottlenecks, such as trade and investment restrictions, inefficiencies in labor and capital markets, and infrastructure deficiency' [15].

Challenges Ahead

Outside suggestions for reforms in Indonesia have centered on undoing barriers to international trade and investment. "The decline in export-oriented FDI reduces both overall FDI and exports… increasing Indonesia's vulnerability to external shocks" [15] and keeping productivity low. Further enhancing infrastructure, especially utility infrastructure, could not only enhance economic growth, but also increase FDI flows.

While Indonesia has reduced the cost of doing businesses over the last few years, the World Bank notes that it could benefit from further reforms, including eliminating foreign equity limits, reducing import tariffs, and lowering barriers to hiring highly skilled foreign workers.

Although government regulation has been streamlined in recent years, structural bottlenecks remain, such as rigid labor markets and complex regulations for new businesses. The government could also work to uphold the integrity of contract and property rights. Indonesia has made efforts to reduce the high incidence of corruption [16] and could continue to do so. Also, the freedom of the press could be further protected.

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ISLAMIC REPUBLIC OF IRAN

Islamic Republic of Iran (IR Iran) is an upper-middle-income economy with a highly educated population and capital deepening close to the USA's levels [1]. The Iranian GDP at purchasing power parity (PPP) was the fifth highest in the APO in 2017. Average income doubled since 1970 and was the seventh highest in APO region in 2017. Both GDP growth and average income growth were among the slowest in the APO over the 2010s on average. IR Iran is currently in a 'demographic window of opportunity' with low dependency ratios (15th in the APO) that will diminish from the mid-2040s [2, 3]. IR Iran has the lowest employment rate in the APO. It was just 28.9% in 2017 (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	80.8 (2017)	8	1.2 (growth rate 2010–17)	11
Rural population proportion (%)	31.1 (2010)	14	25.4 (2017)	15
GDP (US$ billion at PPP, % per year)	1172.3 (2017)	5	2.2 (growth rate 2010–17)	19
GDP per capita (US$ at PPP, % per year)	21,900 (2017)	7	2.3 (growth rate 2010–17)	16
Employment rate (%)	27.7 (2010)	20	28.9 (2017)	20
Age dependency ratio (%)	40.6 (2010)	15	42.8 (2017)	15
Old age dependency ratio (%)	7.0 (2010)	17	9.0 (2017)	13

Source: Appendix G.

Productivity Performance

Labor productivity (LP) levels in IR Iran were the fifth highest among APO countries in 2017. The average annual LP growth was the third highest in the 2000s, before falling dramatically to become the slowest in the APO in the 2010s. Similarly, average annual TFP growth was the fifth highest in the APO in the 2000s before falling to the second slowest level in the 2010s, with –0.1% a year (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (US$ at PPP)	30.8 (2010)	5	32.2 (2017)	5
Labor productivity growth (% per year)	4.8 (2000–10)	3	0.6 (2010–17)	20
TFP growth (% per year)	1.8 (2000–10)	5	–0.1 (2010–17)	19

Source: Data and calculations from APO Productivity Database 2019.

IR Iran is an upper-middle-income economy and the fifth largest in terms of GDP at PPP in the APO. However, its continued reliance on energy resources and the public sector as the engines of growth have dampened productivity incentives [4]. Centrally planned prices, credit and labor market frictions, and low job creation in productive and high-skill sectors have all constricted the flow of capital and labor toward high-productivity sectors [1, 4]. IR Iran ranked 173rd out of 180 countries in the 2019 Corruption Perceptions Index [5] and 127th out of 190 countries in the World Bank Ease of Doing Business rankings [6], both of which are factors that constrain investment in efficient sectors. Tightened international sanctions since 2012 have limited output and productivity growth, as well as improvements in overall economic and social wellbeing.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	0.6	0.1	1.3	4.8	0.6	−1.1	5.1
TFP growth	−3.8	0.0	2.1	1.8	−0.1	−2.7	6.4
Capital productivity growth	−5.2	0.5	2.9	1.6	0.0	−2.7	6.8
Output growth	3.3	2.6	4.0	6.3	2.2	0.0	7.7
Combined inputs growth	7.1	2.6	1.9	4.4	2.3	2.7	1.3
Capital growth	8.5	2.1	1.1	4.6	2.2	2.7	0.9
IT capital growth	12.5	12.2	10.7	19.0	6.9	9.2	1.1
Hours worked growth	2.7	2.5	2.7	1.5	1.5	1.1	2.6
Labor quality growth	1.2	1.1	1.8	2.0	1.1	1.5	0.0
Capital deepening	4.0	−0.2	−1.2	2.6	0.5	1.2	−1.3

Source: Author's estimates based on data from APO Productivity Database 2019.

Nevertheless, living standards have improved, albeit relatively slowly, over the last few decades; per capita income had doubled by 2017 since the end of the Iran–Iraq War in 1988 (see Figure 1). Income per capita in IR Iran was 83rd in the world and eighth highest among APO countries as per the 2019 World Economic Outlook data [7]. Rising living costs due to exchange rate depreciation and high inflation have eroded the real value of cash transfers and incomes, and increased poverty rates since 2017–18 [2].

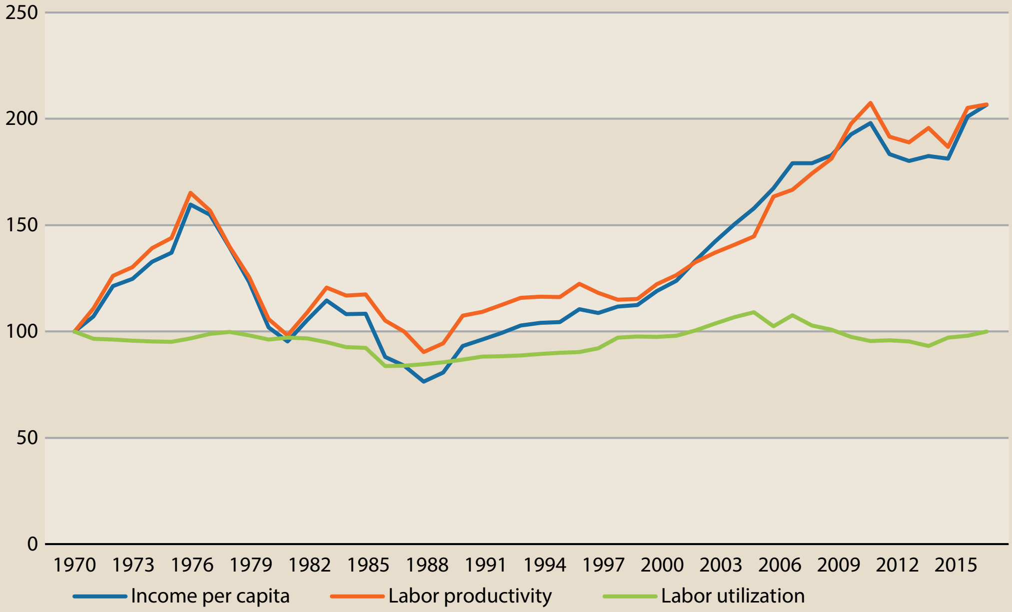
Average annual output growth increased in the 1990s and the 2000s to reach over 6% in the 2000s, before dropping dramatically to average rates of 2.2% in the 2010s following tightened sanctions from 2012, notably restrictions on Iranian oil exports and its financial sector. The economy has been in deep recession since the intensification of the USA's sanctions in 2018 [8].

Capital growth has been the most important source of output growth (see Figure 2), except for the 1990s when TFP growth contributed over half of the growth in output (see Table 3). The contribution of capital growth increased from over one-half in the 2000s to more than three-quarters of output growth in the 2010s (see Figure 2). Labor hours and labor quality growth have made smaller contributions of about 0.2–0.4 percentage points each in the 2000s and 2010s. In the 2010s, the contribution of TFP growth declined to small negatives.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

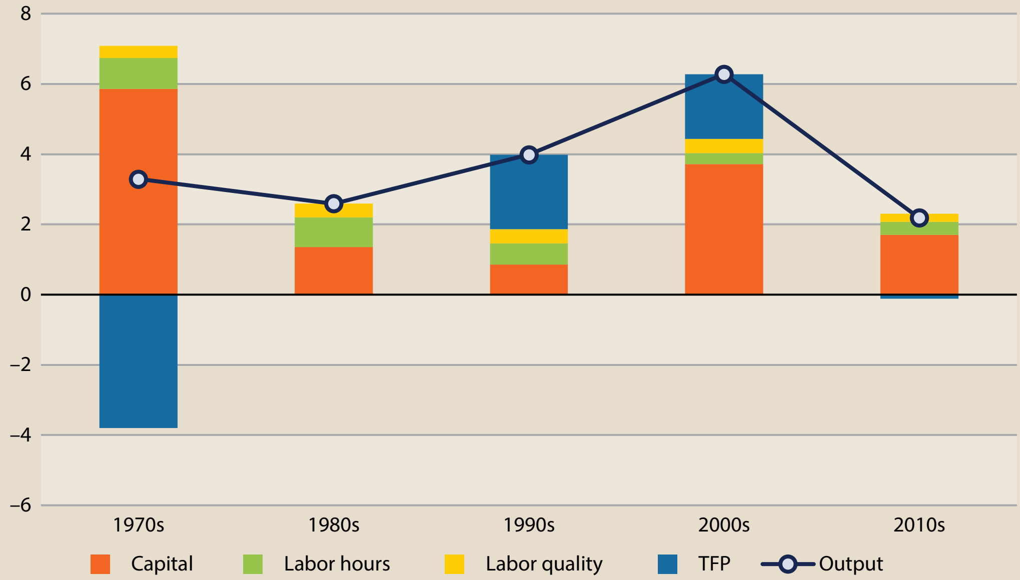


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

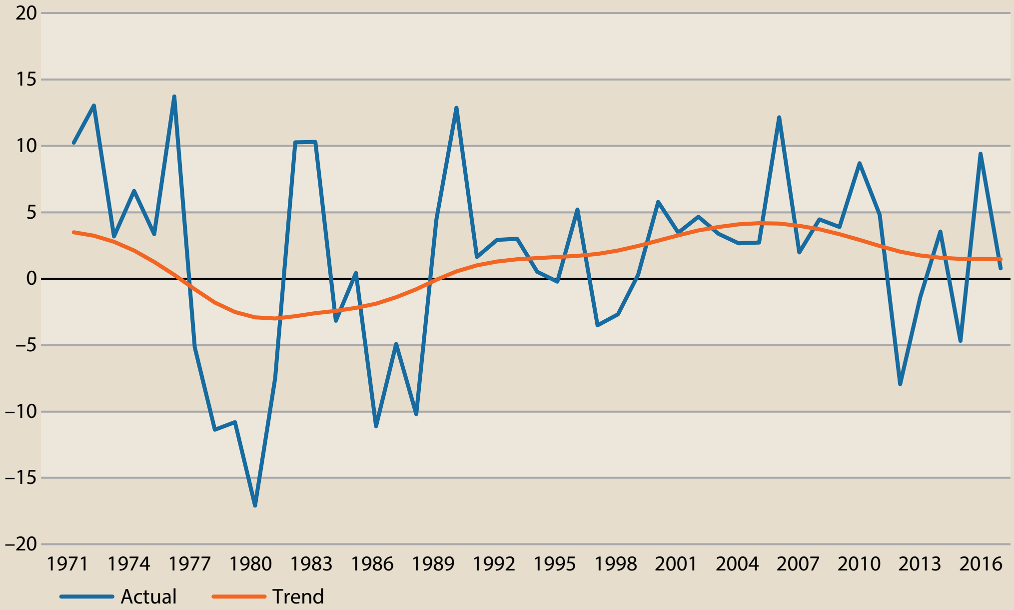


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

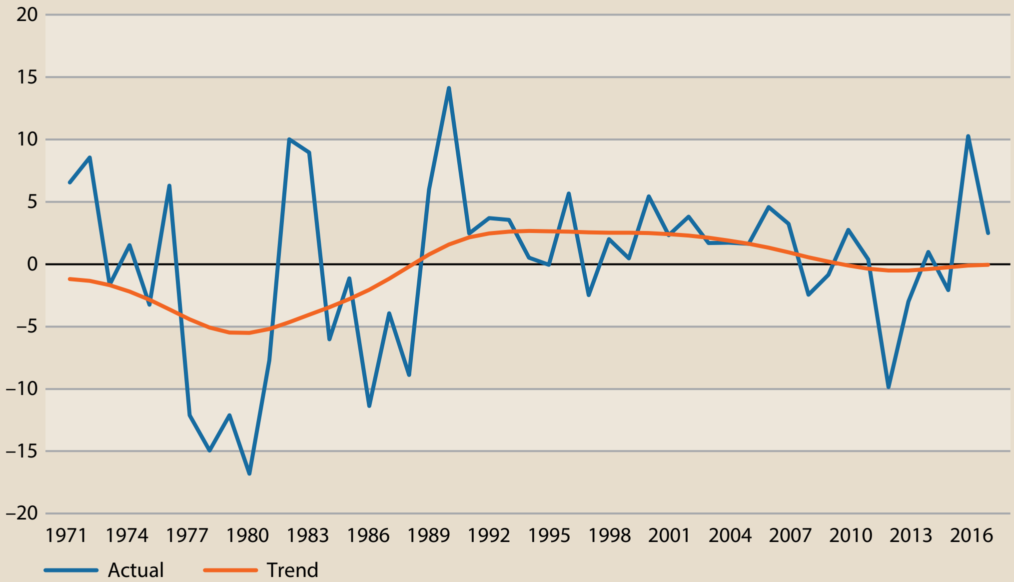


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

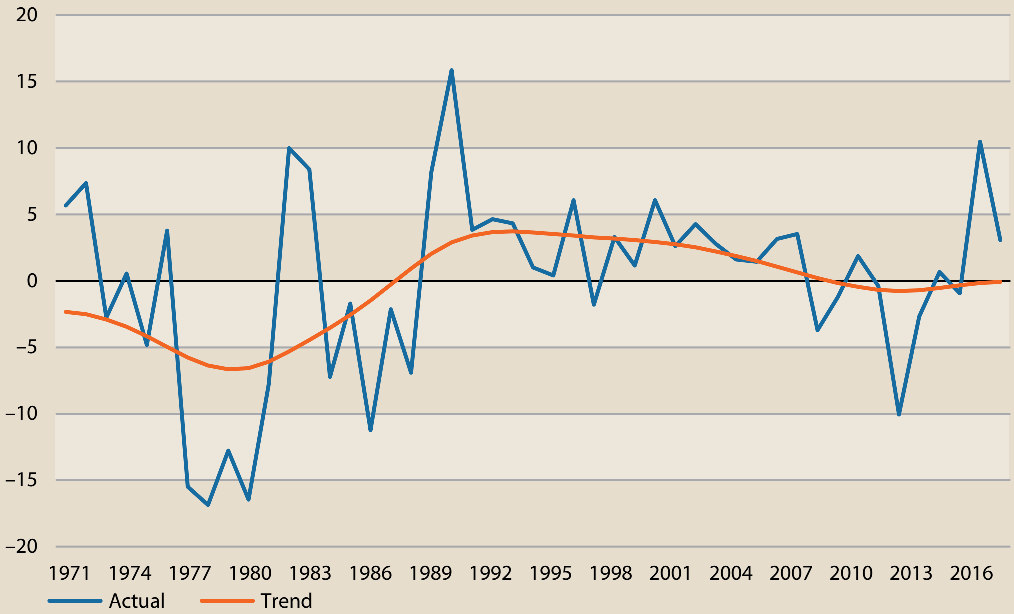


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

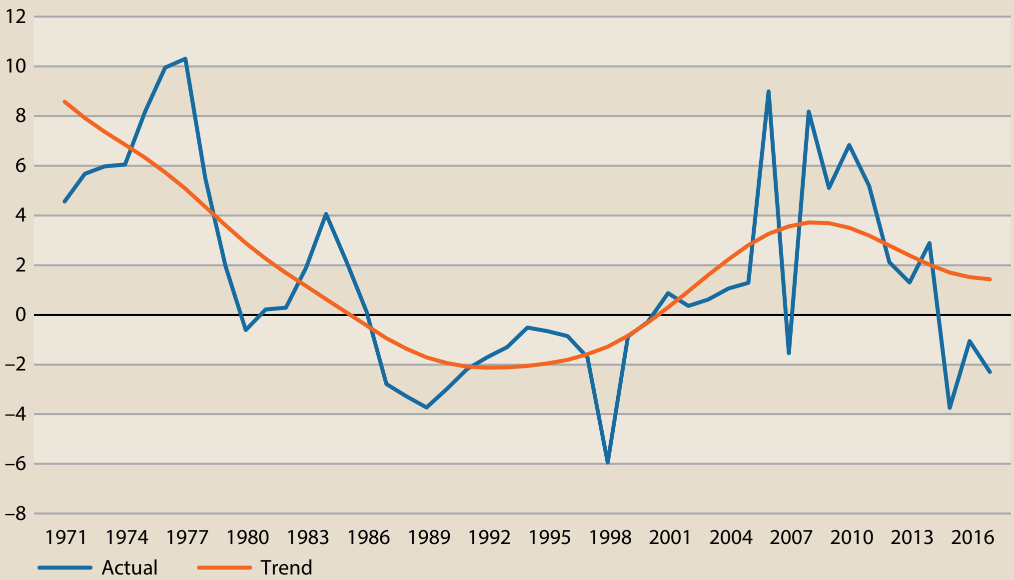


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Average annual TFP growth was strong in the 1990s and 2000s at 2.1% and 1.8%, respectively, but has otherwise been either weak or negative (see Figure 4). Low TFP has been identified by the IMF as explaining the bulk of IR Iran's labor productivity shortfall [1].

Iranian LP levels are the fifth highest among APO countries and marginally higher than the Republic of Korea (ROK), a high-income economy, but LP growth slowed dramatically to 0.6% a year in the 2010s since its peaks of 4.8% a year in the 2000s (see Figure 3). This deceleration in LP growth from the 2000s to 2010s was the steepest among APO countries. Over half of the rise in LP growth in the 2000s was due to capital deepening, exhibited in the significant rise in the growth of the capital–labor ratio to a trend peak of 3.5% in 2010 (see Figure 6). Most of the fall in LP growth in the 2010s was due to the drop in TFP growth and capital deepening. Labor quality has made consistently positive, but small marginal contributions to LP growth.

However, as the IMF has argued, IR Iran has underperformed in LP growth, even in the 2000s, when compared to other resource-rich economies in the Middle East and North African region [1]. This is largely because of structural constraints that have inhibited both labor and capital from being reallocated to the most productive sectors, or to the most productive firms within sectors [1]. There is evidence that the gap in productivity levels between sectors has widened over time [1]. The labor that was freed up from the decline in agriculture's share of employment mostly migrated to other weak productivity sectors like construction and transportation [1]. Most recent job creation has been in lower-skilled services and agriculture, with few opportunities for IR Iran's skilled youth [4]. Meanwhile, communications was the sector with the highest LP gains during 1990–2011, and yet its labor share of the non-oil labor force only increased by 1% over the period and physical capital per worker in the sector declined [1]. Much of this can be attributed to administered prices that thwart price signals and profitability of new investment; credit market inefficiencies; energy subsidy policies that favor capital accumulation; and labor market rigidities that disincentivize hiring more labor in productive sectors [1].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Levels of capital intensity have remained relatively stable since 2010 in IR Iran, resulting in a fall in IR Iran's ranking from 13th to 16th in the APO (see Table 4). Capital deepening was low but positive on an average in the 2010s, though it fell to negative rates in 2017. IT capital deepening was low over the past decade on an average, ranked 16th in the APO.

The contribution of labor quality growth to LP growth has been one of the lowest in the APO over the last decade, at a level close to zero. Iranian human capital is moderately high, ranking 10th in the APO as measured by the education and training of the current workforce by the World Economic Forum (WEF). However, IR Iran ranked 19th among APO members on the WEF Entrepreneurial Culture indicator.

IR Iran lags APO leaders in its limited availability of the latest technologies and in access to technological infrastructure and content as measured by the NRI Technology pillar. However, IR Iran ranks eighth in the APO for the technological integration of individuals, businesses, and governments.

Manufacturing makes up a relatively high proportion of employment in IR Iran, ranking sixth in the APO. A high proportion of Iranian manufacturing is medium- and high-tech manufacturing, at 5th in the APO. Imports make up the lowest proportion of GDP in the APO, while exports maintain a stable and relatively important contribution to the economy.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.7 (2010)	14	2.6 (2017)	16
Capital deepening (pp)	Open	−1.8 (2017)	19	0.5 (average of 2010–17)	15
IT capital deepening (pp)	Open	−0.02 (2017)	16	0.05 (average of 2010–17)	16
Human capital					
Labor quality contribution to LP growth	Open	0.0 (2017)	17	0.2 (average of 2010–17)	18
WEF Current Workforce	0–100	54.3 (2019)	10	21.8 points behind APO leader	
WEF Entrepreneurial Culture	0–100	39.1 (2019)	19	31.3 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.1 (2018)	14	2.1 points behind APO leader	
NRI Technology Pillar	0–100	35.7 (2019)	13	42.7 points behind APO leader	
NRI People Pillar	0–100	39.3 (2019)	8	37.2 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	8.3 (2017 GDP)	= 14	17.6 (2017 employment)	13
Manufacturing share (%)	Open	17.8 (2017 GDP)	10	16.9 (2017 employment)	6
Medium- and high-tech share of manufacturing (%)	Open	46 (2010)	= 5	45 (2018)	5
Exports/GDP (%)	Open	24.9 (2010)	13	23.3 (2017)	13
Imports/GDP (%)	Open	18.4 (2010)	19	14.9 (2017)	20

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

IR Iran has some of the lowest rankings for all of these indices, while ranking second-last (among the countries for which indices could be calculated) in the overall Productivity Readiness Index (see Table 5). It scores and ranks most lowly on efficiency of markets.

TABLE 5

VALUES OF OVERARCHING INDICES FOR IR IRAN.

Index	Value	Rank
Motivation	25	15
Capabilities	28	14
Efficiency of markets	23	16
Stability	28	14
Productivity Readiness Index	26	15

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

IR Iran has experienced declines in LP and TFP growth over the past two decades. Despite IR Iran's high LP levels, the fifth highest in the APO in 2017, it has low rankings for many of the underlying determinants of productivity growth due to tight economic and political restrictions.

Infrastructure in IR Iran is moderately developed, ranking 12th in the APO for the WEF Infrastructure indicator (see Table 6). The WEF Global Competitiveness Report identifies inefficiencies in air transport services and unreliable water supply as particular infrastructural weaknesses. IR Iran performs relatively well, however, for indicators of road connectivity and liner shipping connectivity [9].

IR Iran has a very low ranking for both the WEF Financial System and The Heritage Foundation (THF) Financial Freedom indicators at 19th and 20th, respectively, although it ranks 11th for the IMF Financial Markets indicator among APO countries. IR Iran has very limited financing of SMEs, very low availability of venture capital, poor soundness of banks, and a high proportion of gross total loans that are nonperforming [9].

Apart from the IMF Financial Institutions indicator for which IR Iran ranks eighth in the APO, the country has very low rankings for other institutional indicators, including the WEF Institutions indicator and the World Bank WGI indicators for political stability, rule of law, control of corruption, and government effectiveness. Lack of judicial independence, inefficiencies of the legal framework in challenging regulations, and lack of press freedom all limit checks and balances on government decisions [9]. Equally, there are significant burdens from government regulations, a high incidence of corruption, limited property rights, poor corporate governance, and a lack of government policy stability [9]. All of these institutional weaknesses weigh on investor confidence, thus further limiting FDI inflows. IR Iran has a moderately high social capital ranking at 10th, although it ranks 18th in the APO on voice and accountability.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.3	17	2.6
Quality of primary education*	1–7	4.0 (2017)	11	2.2
WEF Skills/Future Workforce	0–100	61.5 (2019)	12	19.9
Education expenditure/GDP* (%)	Open	4.0 (2016)	7	1.2
Innovation system				
WEF Innovation Capability	0–100	38 (2019)	= 9	42.2
KOF Informational Globalisation, de facto	0–100	74.0 (2017)	= 13	25.7
Infrastructure				
WEF Infrastructure	0–100	64.8 (2019)	12	30.6
Business environment				
THF Business Freedom	0–100	57.3 (2019)	16	38.9
WEF Administrative Requirements	0–100	49.6 (2019)	17	43.5
WEF Domestic Competition	0–100	43.4 (2019)	18	31.4
THF Tax Burden	0–100	81 (2019)	10	12
WB WGI Regulatory Quality	−2.5 to 2.5	−1.38 (2018)	20	3.61
WEF Labour Market	0–100	41.3 (2019)	19	39.9
THF Labour Freedom	0–100	50.7 (2019)	17	40.2
NRI Governance	0–100	55.8 (2019)	10	32.4
Financial system				
WEF Financial System	0–100	47.5 (2019)	19	43.9
IMF Financial Markets	0–1	0.26 (2018)	11	0.56
THF Financial Freedom	0–100	10 (2019)	20	80
Health system				
Life expectancy at birth (years)	Open	76.5 (2018)	7	8.2
Infant mortality* (deaths/1000 live births)	Open	14.4 (2018)	7	

(Continued on next page)

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	33.8 (2017)	17	57.8
KOF Financial Globalisation, de jure	0–100	46.2 (2017)	12	39.6
FDI Stock/GDP (%)	Open	9.7 (2019)	17	496.9
THF Investment Freedom	0–100	5 (2019)	20	80
Trade				
WEF Trade Openness	0–100	39.8 (2019)	18	48.9
THF Trade Freedom	0–100	54.6 (2019)	19	40.4
Services Trade Restrictions Index*	0–100	NA	NA	NA
KOF Trade Globalisation	0–100	22.6 (2017)	19	73.8
KOF Trade Globalisation, de jure	0–100	24.0 (2017)	19	69.6
Demand				
WEF Macroeconomic Stability	0–100	52.2 (2019)	19	47.8
THF Monetary Freedom	0–100	49 (2019)	20	36.6
Savings				
Gross savings (% of GDP)	Open	37.7 (2000)	3	10.5
Institutions				
WEF Institutions	0–100	42.5 (2019)	18	37.9
IMF Financial Institutions	0–1	0.61 (2018)	8	0.32
WB WGI Political Stability	–2.5 to 2.5	–1.34 (2018)	19	2.83
WB WGI Rule of Law	–2.5 to 2.5	–0.69 (2018)	18	2.53
WB WGI Control of Corruption	–2.5 to 2.5	–0.96 (2018)	18	3.13
WB WGI Government Effectiveness	–2.5 to 2.5	–0.43 (2018)	15	2.66
Social capital				
WEF Social Capital	0–100	52.8 (2019)	10	10.4
WB WGI Voice & Accountability	–2.5 to 2.5	–1.32 (2018)	18	2.34

Source: Appendix G.
Note: * Supplementary indicator.

Whilst IR Iran has a relatively moderate tax burden, ranking 10th in the APO, the business environment is highly restricted overall. The country ranks 18th for domestic competition, with taxes and large subsidies distorting the competitive landscape; little competition in services; and crowding out of private-sector activities by the many state-owned enterprises [9]. The Iranian labor market is both highly inflexible and has limited elements of meritocracy and incentivization [9], with IR Iran ranking 19th and 17th for the WEF Labor Market and THF Labor Freedom indicators, respectively. It takes over 70 days to start a business in IR Iran, one of the longest periods globally, while the insolvency regulatory framework also requires improvement [9].

IR Iran is one of the least open economies to trade and foreign investment. It has the highest trade tariffs in the world, has a high prevalence of nontariff trade barriers [9], and is ranked 18th or 19th for all trade openness indicators. Similarly, foreign investment in IR Iran is subject to heavy state restrictions and is banned in many sectors of the economy [10].

IR Iran is the most macroeconomically unstable economy in the APO, and experiences some of the highest inflation rates in the world [9]. Persistently high inflation erodes living standards, particularly of those dependent on cash transfers, and undermines investor sentiment by entrenching uncertainty.

While IR Iran spends a relatively high proportion of GDP on education (seventh highest in the APO), weaknesses in the education system should be addressed to boost productivity growth. High pupil-to-teacher ratios in primary education and very limited critical thinking in teaching may be holding back improvements in education quality [9].

Challenges Ahead

While IR Iran has relatively high LP levels, its LP and TFP growth have been declining for some time. Positioning productivity growth as an economic driver is more important than ever, given the likelihood of continued negative output growth and constrained capacity for fiscal responses, due to additional USA sanctions, the especially severe COVID-19 crisis, and persistently low oil prices and demand [2].

Greater economic integration and targeting of the agriculture and services sectors, given that they comprise over half the labor force, will be essential to raise sector-specific productivity levels [1]. The Iranian service sector is ranked as the most restricted for international trade amidst a sample of 51 countries in the World Bank's Services Trade Restrictions Database. Measures could be undertaken to reduce barriers to entry and increase competitive pressures, reduce foreign-ownership restrictions, and encourage IT-facilitated firm reorganization [1].

Removing distortionary subsidies and credits may boost productivity by facilitating the flow of capital to the most productive firms. Rahmati and Pilehvari [11] found in their study of Iranian manufacturing firms during 2005–11 that there was a positive correlation between a firm's size and its productivity, and that the energy subsidy reform had a negative effect on productivity in energy-intensive sectors.

There is scope to reduce frictions that prevent the allocation of labor and capital to the most productive sectors. Financial intermediation efficiency could be improved through banking-sector reforms [1]. Equally, making the reformation of contract and wage determination to be more flexible, as well as making it easier to hire new workers, will likely boost LP growth. Internal labor mobility should be promoted to improve the flow of labor to productive sectors.

Streamlining administrative requirements and improving the business environment are important for promoting investment and new business growth. In particular, cutting the time to start a business and improving the insolvency regulatory framework are important steps to achieving this objective [9]. Improving small and medium enterprises' (SMEs') access to finance, currently ranked 126th in the world [9], would also promote small business investment and expansion to achieve better economies of scale.

Rahmati and Pilehvari [11] found that increased R&D expenditures, currently just 0.3% of GDP [9], would likely be effective in boosting productivity. This may, however, be challenging given the strained public finances.

Given the slowing growth dividends from the oil sector, IR Iran should take advantage of its other plentiful resource, i.e., its highly educated population [12]. The IMF has recently described the highly educated female population as an 'untapped source of growth and productivity,' and so removing restrictions and disincentives for female labor force participation are important for achieving sustained productivity growth [13]. However, promoting economic and employment opportunities for women, who have thrived in higher education, will be difficult given that restrictions on women are deeply entrenched in the legal system. The recession and COVID-19 have worsened labor market's gender gaps, with the female labor force participation rate being 14% in 2019/20, down 0.6 percentage points from the previous year [8]. This is in the context of a labor force utilization level that has been stagnant since 1970, a concerning trend given that IR Iran is currently in a 'demographic window of opportunity' of low dependency ratios that will diminish from the mid-2040s [2, 3]. Simulations suggest that reducing labor market discrimination against women and the gender pay gap by half could increase GDP by 26% [13].

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JAPAN

Japan experienced a dramatic and sustained post-War economic expansion referred to as the Japanese 'economic miracle' to become a technological and industrial powerhouse. Japan's average income has increased 2.5 times since 1970 (see Figure 1). However, the economy has stagnated since its financial and property bubble burst in 1992 and triggered the 'lost decade' of the 1990s [1]. Both Japan's GDP growth and average income growth rates during 2010–17 have been the lowest in the APO (see Table 1). Japan is at the frontier of population ageing, with the oldest population in the world at a median age of 48.4 [2]. Initiatives to address high dependency ratios by raising the participation rates of women and older individuals have had success to the extent of boosting the employment rate from 49% in 2010 to 51.5% in 2017.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	126.7 (2017)	5	−0.2 (growth rate in 2010–17)	20
Rural population proportion (%)	5.4 (2010)	18	8.5 (2017)	18
GDP (USD billion at PPP, % per year)	5427.1 (2017)	2	1.1 (growth rate in 2010–17)	20
GDP per capita (USD at PPP, % per year)	42,800 (2017)	4	0.5 (growth rate in 2010–17)	20
Employment rate (%)	49.0 (2010)	8	51.5 (2017)	6
Age dependency ratio (%)	56.8 (2010)	7	66.8 (2017)	1
Old-age dependency ratio (%)	36.1 (2010)	1	46.3 (2017)	1

Source: Appendix G.

Productivity Performance

Labor productivity levels in Japan are the fourth highest among APO countries, behind Hong Kong, Singapore, and the Republic of China (ROC). Labor productivity (LP) growth in the past two decades has been low, at just 1.3% a year in the 2000s and 0.7% a year during 2010–17, placing Japan at the bottom of the APO rankings. TFP growth, dwindling in the 2000s at just 0.3% a year and ranking 16th among APO countries, made a modest recovery to 0.7% a year in the 2010s with a ranking of 11 (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (US$ at PPP)	42.7 (2010)	4	45.0 (2017)	4
Labor productivity growth (% per year)	1.3 (2000–10)	18	0.7 (2010–17)	19
TFP growth (% per year)	0.3 (2000–10)	16	0.7 (2010–17)	11

Source: Data and calculations from APO Productivity Database 2019.

Post the World War 2, the Japanese economy underwent significant transformation and industrialization throughout the 20th century, pursuing a manufacturing-led income growth strategy. Today, Japan is the third largest economy in the world and a global technological leader with high productivity levels.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	4.4	3.8	2.0	1.3	0.7	1.0	0.1
TFP growth	1.0	1.6	0.2	0.3	0.7	0.9	0.3
Capital productivity growth	−1.8	−0.2	−1.2	0.0	1.1	1.1	0.9
Output growth	4.6	4.6	1.3	0.6	1.1	1.0	1.3
Combined inputs growth	3.6	3.0	1.1	0.3	0.3	0.1	1.0
Capital growth	6.3	4.8	2.5	0.7	0.0	−0.1	0.4
IT capital growth	12.7	16.0	8.2	4.1	1.2	1.5	0.4
Hours worked growth	0.2	0.7	−0.7	−0.6	0.3	0.0	1.2
Labor quality growth	1.6	1.0	0.7	0.7	0.3	0.3	0.3
Capital deepening	2.5	1.6	1.4	0.6	−0.1	0.0	−0.3

Source: Author's estimates based on data from APO Productivity Database 2019.

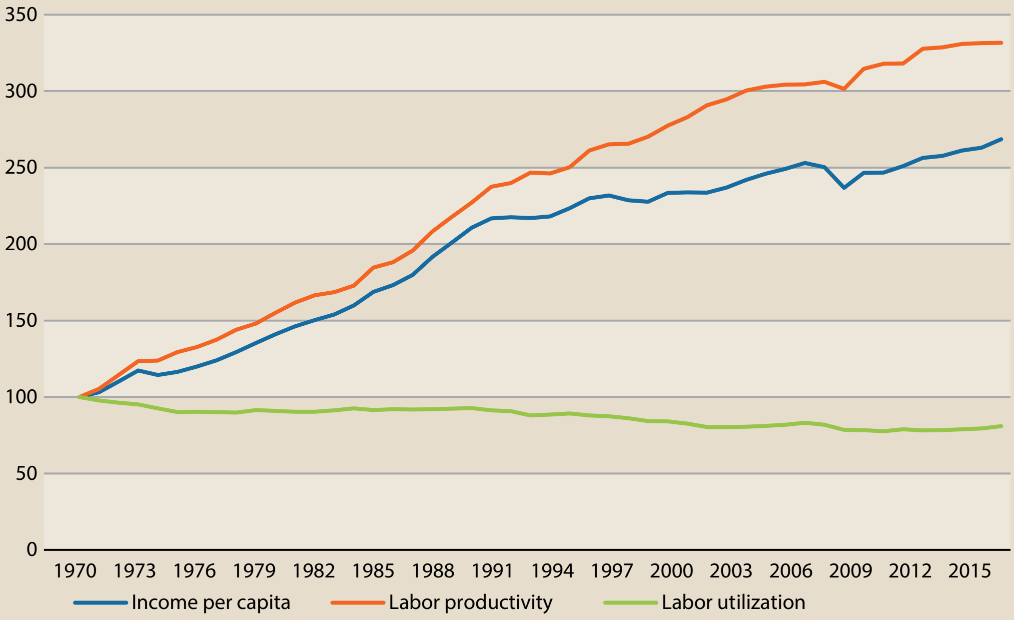
Output growth was strong in Japan in the 1970s and 1980s at an average annual rate of 4.6%, before falling to rates that have hovered around 1% annually since the early 1990s (see Figure 2). About half of the output growth in the 1970s and 1980s was due to capital growth, though TFP growth also made an important contribution. From the early 1990s, capital growth fell away, and labor hours growth in the 1990s and 2000s was forced into negatives (see Table 3). The fall in hours worked can be attributed to the adoption of a five-day work week, increased national holidays, and a rise in part-time employment as a result of tax benefits for spouses who worked parttime [3]. A slight improvement in TFP growth in the 2010s accounted for the majority of the output growth, and successful policies to boost the labor force participation of women and older workers contributed to the return of positive growth in hours worked [4].

The reasonably strong TFP growth in the 1970s and 1980s at 1.3% a year dwindled over the 1990s and 2000s, before a modest recovery in the 2010s due to accelerated output growth amidst stable inputs growth (see Figure 4). There is evidence of a dual economy, given the high TFP growth rates in export industries but productivity growth lagging significantly behind the USA in non-tradeable

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

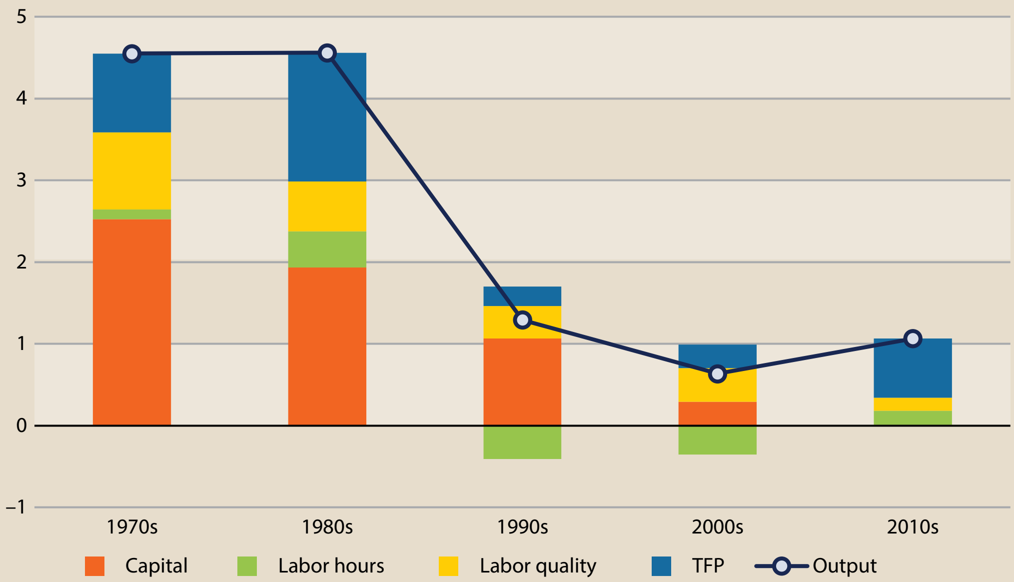


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

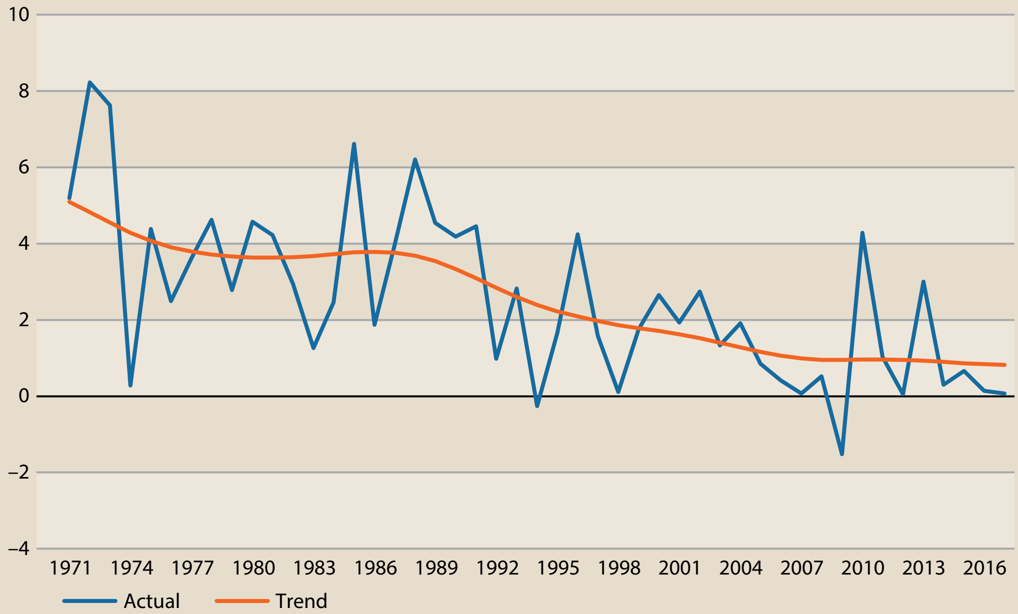


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

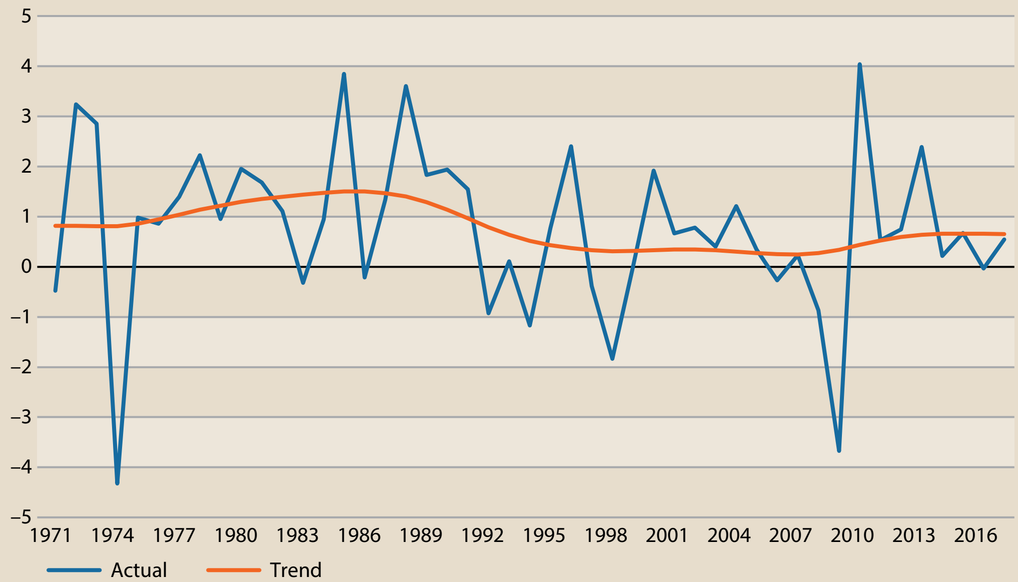


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

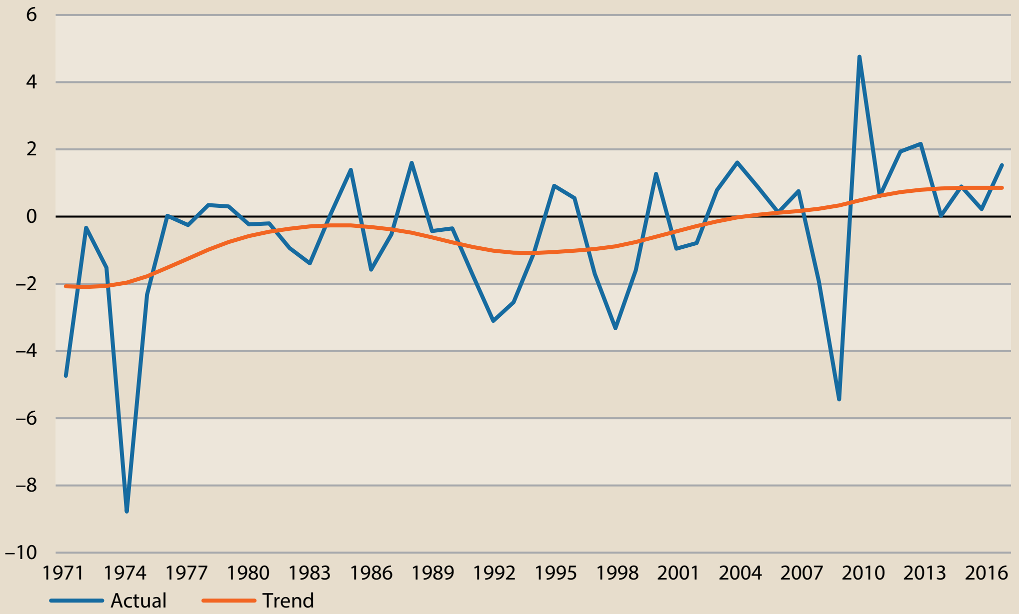


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

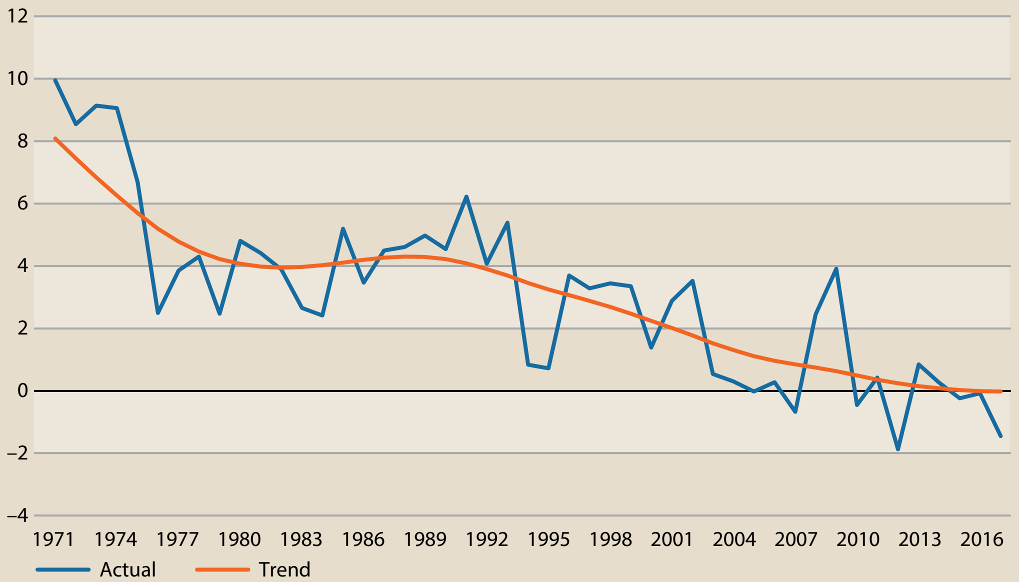


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

sectors due to lower competitive pressure and continued bank lending [3]. Caballero, Hoshi, and Kashyap [5] reveal that the early 1990s assets bubble crash triggered a widespread misdirection of bank lending to 'zombie' insolvent borrowers; and show that the subsequent increase in zombie firms 'depressed the investment and employment growth of non-zombies and widened the productivity gap between zombies and non-zombies'. Liu and Westelius [6] find that changes in the working-age-population distribution, primarily the shrinking share of the 40–49 group, which is the most productive, depressed annual TFP growth by about 0.7–0.9 percentage points between 1990 and 2007. Strong annual average LP growth rates in the 1970s and 1980s of around 4% dwindled to less than 1% a year in the 2010s (see Figure 3) as capital deepening drifted towards capital shallowing (see Figure 6). While output growth accelerated from the 2000s to the 2010s, the acceleration in hours-worked growth was larger, resulting in a drop in LP growth rates in the 2010s. The slowdown in LP growth is consistent with trends in Hong Kong, the Republic of Korea (ROK), and the ROC. Liu and Westelius [6] find an inverted U-shaped productivity pattern in Japan, whereby young workers have better health, faster processing speed, greater flexibility to sudden technology changes, and entrepreneurial activity, while workers aged 40–49 who have the highest productivity benefit from accrued professional experiences. They also note the sectoral shift in demand towards (health) services, a more labor-intensive sector with lower productivity growth [6], caused by the ageing population.

Colacelli and Hong [7] find that sluggish productivity growth in small- and medium-sized enterprises (SMEs), which employ about 70% of the total workforce, has dragged down overall productivity growth, and point to a number of factors weighing on SME productivity. First, the generous SME credit guarantee system helps unproductive SMEs to survive and prevents the allocation of resources to more productive existing or new firms (annual firm exit rates were below 4% in 2016, i.e., below the 10% target for Japan's Revitalization Strategy) [7]. The scheme also discourages small firms from expanding to achieve economies of scale, because they lose benefits of the SME status once surpassing a certain capital threshold [8]. Equally, financing constraints, estimated to affect a third of Japanese SMEs and dim economic demand prospects, have constrained investment opportunities and incentives [7].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Levels of capital intensity in Japan have fallen slightly since 2010, although its fourth position among APO countries has remained stable (see Table 4). The contributions of both capital deepening and IT capital deepening to LP growth have fallen since 2010.

Japan has very high levels of human capital, ranking third among APO countries for the education, skills, and training of the current workforce by the World Economic Forum (WEF). The labor quality's contribution to LP growth over the past decade has, however, been low (see Table 4). Japan's ranking in the WEF Entrepreneurial Culture measurement was just above average among APO countries in 2017, though rankings for attitudes towards entrepreneurial risk were particularly low in the global WEF report [9].

Japan is one of the most technologically connected and advanced countries in the APO group, ranking second for both the NRI People pillar, which measures technological integration of individuals, businesses and the government; and the NRI Technology pillar, which measures access to technological infrastructure and advancements. Japan ranked number one for the availability of the latest technology, and indeed, is an important developer of new technology [10].

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	5.8 (2010)	5	5.4 (2017)	5
Capital deepening (pp)	Open	–0.6 (2017)	18	–0.1 (average of 2010–17)	18
IT capital deepening (pp)	Open	–0.05 (2017)	17	0.03 (average of 2010–17)	18
Human capital					
Labor quality contribution to LP growth	Open	0.2 (2017)	15	0.2 (average of 2010–17)	19
WEF Current Workforce	0–100	73.5 (2019)	3	2.6 points behind APO leader	
WEF Entrepreneurial Culture	0–100	56.9 (2019)	8	13.5 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	6.3 (2018)	1	0 points behind APO leader	
NRI Technology Pillar	0–100	72.9 (2019)	2	5.6 points behind APO leader	
NRI People Pillar	0–100	74.2 (2019)	2	2.2 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	1.2 (2017 GDP)	18	3.8 (2017 employment)	18
Manufacturing share (%)	Open	20.8 (2017 GDP)	5	15.2 (2017 employment)	11
Medium- and high-tech share of manufacturing (%)	Open	56 (2010)	4	57 (2018)	4
Exports/GDP (%)	Open	15.0 (2010)	18	17.8 (2017)	17
Imports/GDP (%)	Open	13.6 (2010)	20	16.8 (2017)	19

Source: Appendix G.
Note: * Supplementary indicator.

Assessment of Japan's performance on the products and markets indicators reveals the important contribution of manufacturing, which is the fifth highest among APO countries and makes up 21% of the Japanese GDP. However, manufacturing is a less important segment of employment, suggesting a highly productive manufacturing sector (although it is substantially behind Singapore). Japan has one of the highest medium- and high-tech shares of manufacturing at 56%. While the ratios of exports and imports to GDP are some of the lowest in the APO group, there has been a slight increase in these ratios since 2010.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Japan performs very well on all these indicators, particularly in the motivation index (see Table 5). Japan scores 87 and ranks third in the overall Productivity Readiness Index, though it comes behind Singapore's score of 100 and Hong Kong's score of 95.

TABLE 5

VALUES OF OVERARCHING INDICES FOR JAPAN.

Index	Value	Rank
Motivation	90	3
Capabilities	83	3
Efficiency of markets	84	3
Stability	85	3
Productivity Readiness Index	87	3

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

As a highly developed and productive economy, with labor productivity levels being fourth highest in APO group, Japan performs well and ranks highly for most of the underlying determinant indicators (see Table 6). Nonetheless, harnessing productivity growth to boost the economy requires targeting some areas for improvement. This is important given that trend LP growth and TFP growth have both declined over the past three decades (see Figures 3 and 4).

Japan has high-quality transport and utility infrastructure, ranking third for the WEF Infrastructure indicator, which has particularly high correlation with LP levels across APO countries. Road connectivity is, however, an area that could be improved, with Japan ranking 60th in the world in the WEF 2019 Global Competitiveness Report.

Japan ranked among the top four APO countries for the WEF, IMF, and The Heritage Foundation (THF) financial system indicators, thereby indicating a large, deep, and stable financial sector. This is likely aided by Japan's number-one ranking for the IMF Financial Institutions indicator measuring the depth, access, and efficiency of financial institutions.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.4	7	1.4
Quality of primary education*	1–7	5.4 (2017)	2	0.7
WEF Skills/Future Workforce	0–100	73 (2019)	7	8.4
Education expenditure/GDP* (%)	Open	3.2 (2016)	12	2
Innovation system				
WEF Innovation Capability	0–100	78.3 (2019)	3	1.9
KOF Informational Globalisation, de facto	0–100	96.2 (2017)	4	3.5
Infrastructure				
WEF Infrastructure	0–100	93.2 (2019)	3	2.2
Business environment				
THF Business Freedom	0–100	81.4 (2019)	7	14.8
WEF Administrative Requirements	0–100	93.1 (2019)	1	0
WEF Domestic Competition	0–100	72 (2019)	3	2.8
THF Tax Burden	0–100	68.3 (2019)	19	24.7
WB WGI Regulatory Quality	−2.5 to 2.5	1.34 (2018)	4	0.89
WEF Labor Market	0–100	71.5 (2019)	4	9.7
THF Labour Freedom	0–100	78.7 (2019)	3	12.2
NRI Governance	0–100	80.1 (2019)	2	8.1
Financial system				
WEF Financial System	0–100	85.9 (2019)	4	5.5
IMF Financial Markets	0–1	0.82 (2018)	1	0
THF Financial Freedom	0–100	60 (2019)	= 4	30
Health system				
Life expectancy at birth (years)	Open	84.5 (2018)	2	0.2
Infant mortality* (deaths/1000 live births)	Open	2.5 (2018)	1	0

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment:				
KOF Financial Globalisation	0–100	77.3 (2017)	3	14.2
KOF Financial Globalisation, de jure	0–100	78.6 (2017)	3	7.3
FDI Stock/GDP (%)	Open	4.4 (2019)	19	502.2
THF Investment freedom	0–100	70 (2019)	= 3	15
Trade:				
WEF Trade openness	0–100	68.8 (2019)	3	19.9
THF Trade freedom	0–100	80 (2019)	= 9	15
Services Trade Restrictions Index*	0–100	27.4	1/14	0
KOF Trade Globalisation	0–100	56.0 (2017)	11	40.4
KOF Trade Globalisation, de jure	0–100	82.3 (2017)	3	11.4
Demand				
WEF Macroeconomic Stability	0–100	94.9 (2019)	6	5.1
THF Monetary Freedom	0–100	84.4 (2019)	2	1.2
Savings				
Gross savings (% of GDP)	Open	27.8 (2018)	10	20.4
Institutions				
WEF Institutions	0–100	71.7 (2019)	3	8.7
IMF Financial institutions	0–1	0.93 (2018)	1	0
WB WGI Political Stability	−2.5 to 2.5	1.06 (2018)	2	0.43
WB WGI Rule of Law	−2.5 to 2.5	1.53 (2018)	3	0.31
WB WGI Control of Corruption	−2.5 to 2.5	1.42 (2018)	3	0.75
WB WGI Government Effectiveness	−2.5 to 2.5	1.68 (2018)	3	0.55
Social capital				
WEF Social Capital	0–100	46.9 (2019)	15	16.3
WB WGI Voice & Accountability	−2.5 to 2.5	1.02 (2018)	1	0

Source: Appendix G.
Note: * Supplementary indicator.

Japan has excellent scores for the indicators measuring the overall strength of institutions, ranking not more than third for the six institutional indicators provided in Table 6. The WEF Global Competitiveness Report highlights Japan as a global leader; in particular, for property rights protections, judicial independence and the efficiency of the legal system in settling disputes, and security. The WEF report also identifies several areas that could be improved. Japan ranks 98th for social capital (15th among APO countries), which assesses social cohesion and engagement, community and family networks, and political participation and institutional trust. Equally, freedom of the press, shareholder rights in corporate governance, and the burden of government regulation are other indicators that could be improved.

Japan ranks relatively highly in almost all business environment indicators. It is placed fourth for the World Bank Regulatory Quality indicator and third for the WEF Domestic Competition indicator. However, Japan ranks 19th for THF Tax Burden indicator, given that Japan's tax burden increased at the beginning of the 2000s, and today equals 30.6% of total domestic income [11]. The 2019 WEF Global Competitiveness Report has also suggested that the business environment in Japan is undermined by rigidities in the labor market, particularly a lack of hiring-and-firing flexibility, low female labor participation, a rigid corporate culture, and low workforce diversity. Equally, Japan ranked seventh in the APO for the Business Freedom indicator, and its score in this area has declined substantially since 2007.

Japan performs well for the WEF Trade Openness indicator as well as the KOF Trade Globalisation de jure indicator, and has the least restrictions on trade in services in the APO. Indeed, in Japan, the portion of exports that were services increased 10 percentage points from 2009 to 23% of exports in 2019, with travel services accounting for a fifth of services exports and over 70% of the Japanese economy devoted to services. The WEF [9] has identified the complexity of tariffs as a limitation on the openness and simplicity of trade.

As a whole, the Japanese economy is relatively open to foreign investment, ranking third in the APO for indicators on financial globalization and investment freedom. The Japanese government offers subsidies, tax credits, and other incentives to entice foreign investment [11]. Japan, however, ranked 19th in the APO for the stock of FDI as a proportion of GDP. Equally, in May 2019, the number of business activities for which foreign investments are subject to prior notification requirements, was expanded [11].

The quality of primary education is rated highly in Japan, ranking second among APO countries. Japan ranks relatively well on indicators for the future workforce and quality of the overall education system. However, the WEF [9] identifies limited critical thinking in teaching (ranked 87th in the world), as an inadequacy in teaching methods that could be fueling the skills gap in Japan for which it ranks 54th in the world. The quality of Japan's education system has clearly underpinned its high innovation capability, ranking third and fourth in the APO for both innovation indicators. However, continued investment in education will be necessary for continued productivity improvements, which are essential for supporting the high proportion of dependents in the population. This is important, given that the labor-quality-growth's contribution to labor productivity growth has fallen over the past several decades.

Challenges Ahead

Productivity growth is key for Japan to maintain economic prosperity and progress its living standards for future generations as the country ages. Japan's relatively short post-War baby boom, world-leading life expectancy since the late 1970s, and limited foreign labor inflows created a sharp ageing trend [12]. Demographic headwinds are projected to depress productivity growth, due to increased demand for services (i.e., a low productivity sector) and ageing of the workforce out of the most productive 40–49-year-old age group [6]. The IMF has projected that the level of real GDP will be more than 25% lower in 40 years due to the demographics under current policy settings, relative to a projection where productivity and population grow at recent paces [1].

Colacelli and Fernandez–Corugedo [1] find that the implementation of a structural reform program that boosts productivity could partially offset the adverse effects of ageing on real GDP. However, they also find that the ability to stabilize public debt depends on the credibility of the program. A productivity growth boosting the structural-reform agenda should address Japan's high tax burden, labor market rigidities, corporate governance issues, and low SME productivity; and boost education investment.

Japan has a very high tax burden when compared to the APO group, ranking 19th in the APO for THF Tax Burden indicator. Tax reform needs to balance the need for sufficient revenues to reduce debt and remain fiscally sustainable to meet the social security expenditure needs, while supporting reflation, growth, and productivity incentives.

The labor market rigidities identified in the 2019 WEF Global Competitiveness Report could be addressed to promote higher productivity growth, particularly a lack of hiring-and-firing flexibility, low female labor force participation, a rigid corporate culture, and low workforce diversity. Labor market reforms to boost labor productivity growth are also critical. Various 'work style reforms,' including those that encourage managerial practices that incentivize productivity or those that improve the training and career prospects of a growing share of nonregular workers, especially by transitioning them to intermediate contracts, would significantly boost LP growth [4]. While a cap on overtime of 100 hours per month has been in place for large firms since April 2019, the lack of productivity results suggests the cap is relatively high and should be lowered [4].

Several corporate governance reforms could be deployed to boost productivity. Colacelli and Fernandez–Corugedo [1] suggest deploying excessive cash holdings into investment. Similarly, the WEF Global Competitiveness Report highlights shareholder rights as an area in which Japan ranks relatively lowly.

SMEs have been found to drag down productivity growth in Japan [7]. The IMF [4] highlights the importance of facilitating the exit of nonviable SMEs and entry of stronger potential firms, via further reduced coverage of the credit guarantee system; encouraging more diverse SME financing sources, such as venture capital and asset-based lending; initiatives to encourage SMEs for R&D investments; and supporting a smoother succession process, with the median age at Japanese SMEs going up from 47 years to 66 years over the past two decades [7].

Finally, boosting investment in education, particularly given that Japan ranks 12th in the APO for education expenditure as a proportion of GDP, will be essential for boosting the LP of the future workforce. This is critical given the declining contribution of labor quality's growth to LP growth.

Boosting migration and labor force participation of women and older citizens will be important for GDP growth. Intergenerational inequity is of concern due to the growing income and wealth inequality between younger generations facing the burden of financing the rising social security costs and older generations who primarily benefit from the redistribution [12].

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REPUBLIC OF KOREA

The Republic of Korea (ROK) is a mid-sized APO member country, with slow overall growth and an aging population. The share of the population that is employed has decreased over the last decade. Earlier, as an Asian Tiger, the ROK's economy grew at a rapid pace for decades, making it one of the most prosperous nations in the region (see Figure 1). Growth in both GDP and GDP per capita have weakened in the 2010s (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	51.4 (2017)	10	0.5 (growth rate in 2010–17)	16
Rural population proportion (%)	18.1 (2010)	17	18.5 (2017)	17
GDP (USD billion at PPP, % per year)	2034.9 (2017)	4	3.0 (growth rate in 2010–17)	16
GDP per capita (USD at PPP, % per year)	39,550 (2017)	5	1.4 (growth rate in 2010–17)	19
Employment rate (%)	36.9 (2010)	17	36.8 (2017)	20
Age dependency ratio (%)	58.4 (2010)	5	55.2 (2017)	6
Old-age dependency ratio (%)	14.8 (2010)	3	18.8 (2017)	4

Source: Appendix G.

Productivity Performance

The ROK's level of labor productivity has been one of the highest among APO countries since 2010. Labor productivity growth and TFP growth were solid during the 2000s but have slowed in the last decade (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	27.1 (2010)	6	31.8 (2017)	6
Labor productivity growth (% per year)	4.4 (2000–10)	6	2.3 (2010–17)	14
TFP growth (% per year)	1.0 (2000–10)	12	0.5 (2010–17)	15

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	5.2	6.6	5.8	4.4	2.3	1.6	4.0
TFP growth	2.7	3.0	2.1	1.0	0.5	0.2	1.5
Capital productivity growth	0.72	1.7	–0.03	–0.6	–0.3	–0.4	–0.04
Output growth	8.5	9.3	6.7	4.4	2.9	2.9	2.8
Combined inputs growth	5.8	6.4	4.6	3.4	2.3	2.8	1.3
Capital growth	7.7	7.6	6.7	5.1	3.2	3.3	2.9
IT capital growth	25.5	20.4	17.4	6.1	2.7	2.8	2.5
Hours worked growth	3.3	2.7	0.9	0.1	0.6	1.3	–1.1
Labor quality growth	0.7	2.7	2.1	1.9	1.0	1.0	1.0
Capital deepening	2.2	2.1	2.5	2.3	1.2	1.0	1.9

Source: Author's estimates based on data from APO Productivity Database 2019.

The ROK is one of the fast-growing Asian Tigers, with its GDP per capita increasing from USD2,740 in the 1970s to USD39,600 by 2017 [1]. State-guided industrialization, as well as export expansion in the 1960s and 1970s, brought decades of exponential growth [2].

The ROK experienced strong output growth in the 1970s through the early 1990s (see Figure 2), albeit with some volatility, with its underlying rate of growth approaching 10% a year. From there, however, the ROK has seen a general decline in output growth, hovering at around 3% a year for the last one decade. Slowing output growth has been linked to a deteriorating export growth, as a result of trade tension and PR China's growth slowdown [3].

Also notable are the brief downturns, first of which was in 1980, when worldwide oil price spikes hurt the ROK's growing and increasingly industrialized economy [4]. Next, the Asian financial crisis in 1997–98 manifested in the ROK primarily as a liquidity crisis, slowing the country's economic expansion after decades of growth [5]. In 2009, during the global financial crisis, the ROK experienced its largest export decline. However, the government moved quickly to stabilize the economy [6].

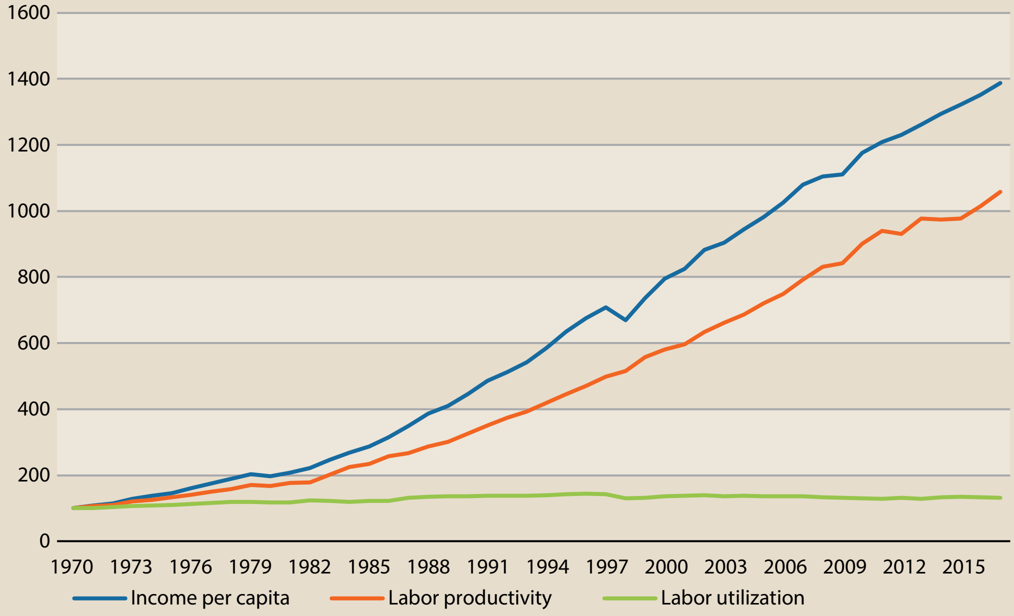
Labor productivity (LP) growth has slowed since the 1980s (see Figure 3) from a peak of 12.2% in 1983 to 4.2% in 2017. The rate of growth in trend LP averaged a little under 6% through the 1970s, 1980s, and 1990s. It was still very strong in the 2000s but dropped to a much weaker 2.3% a year in the 2010s (till 2017). Analysis by the Bank of Korea shows that significant declines in labor productivity in the manufacturing industry after the global recession were largely responsible [7].

Capital deepening and TFP both made strong contributions to the LP growth (see Table 3). The rate of capital deepening held ground until the 2010s, contributing between 2.1 and 2.5 percentage points to LP growth. Its contributions fell down to 1.2 percentage points in the 2010s, as shown in the declining capital–labor ratio in Figure 6.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

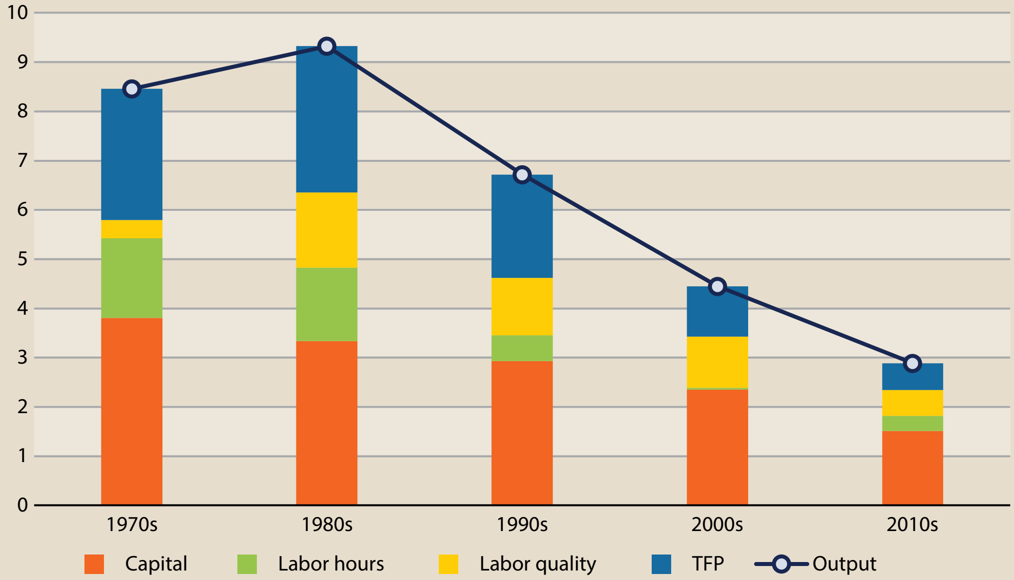


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

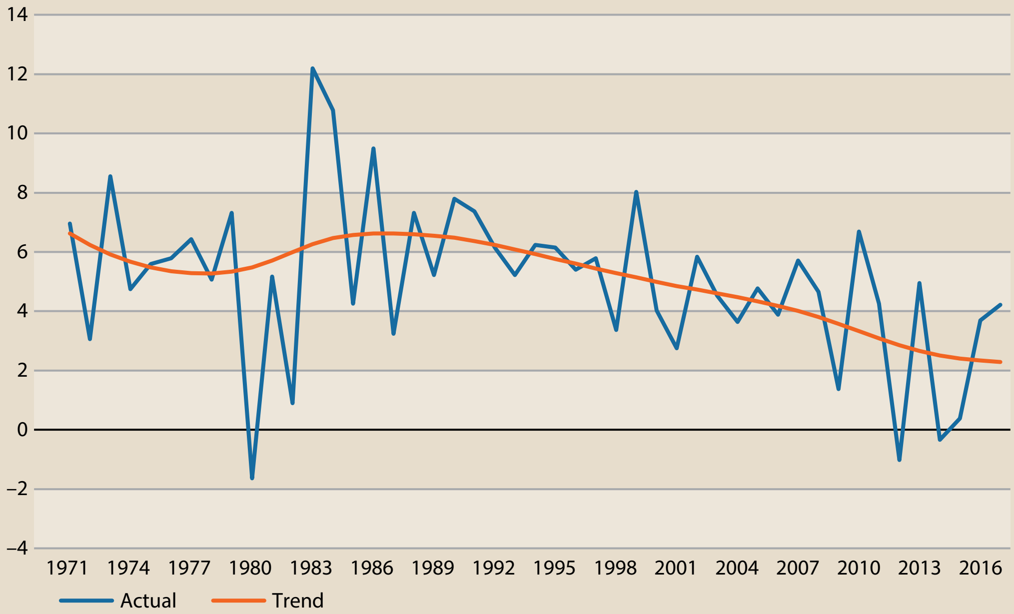


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

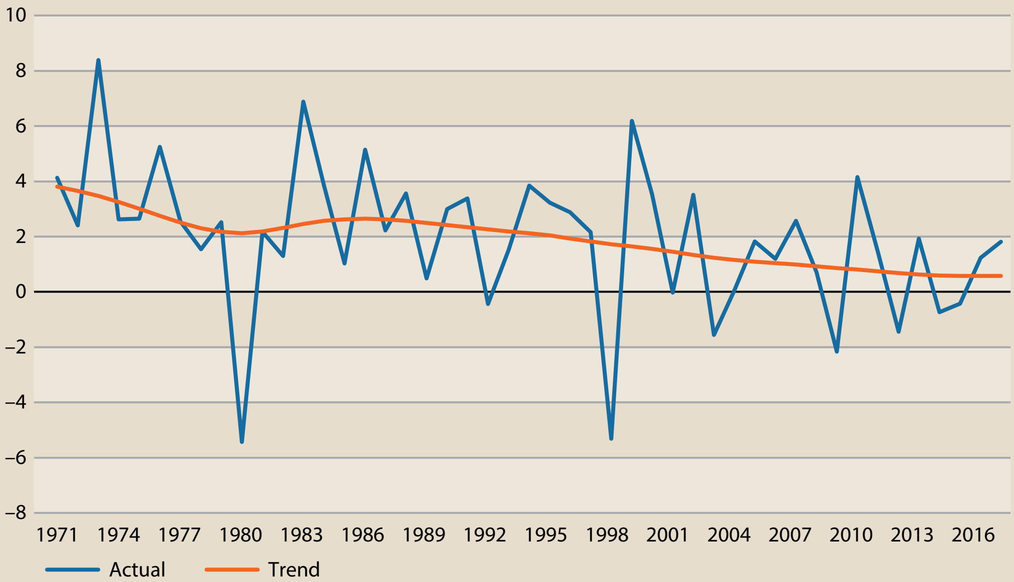


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

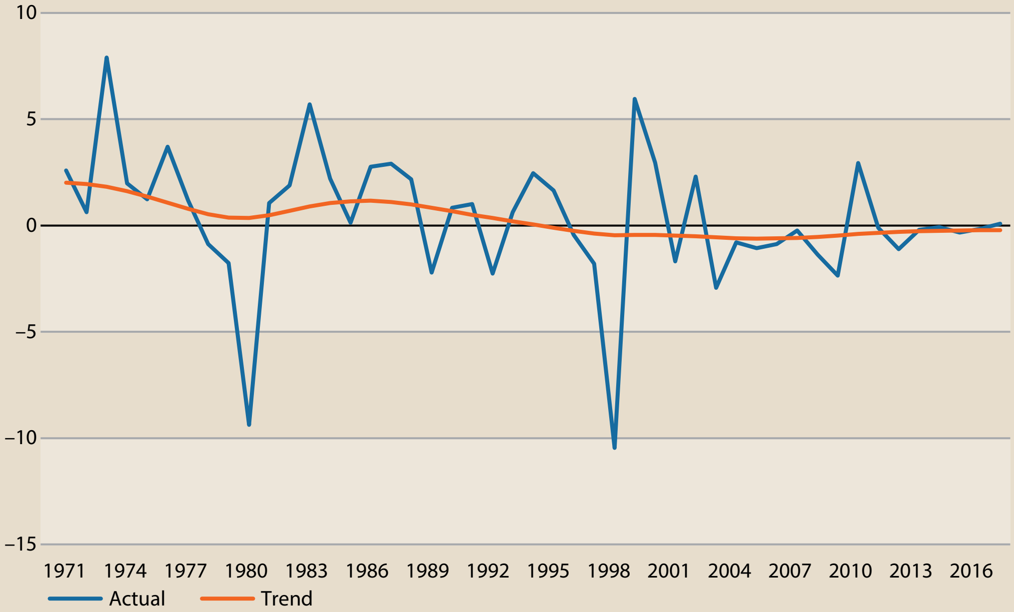


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

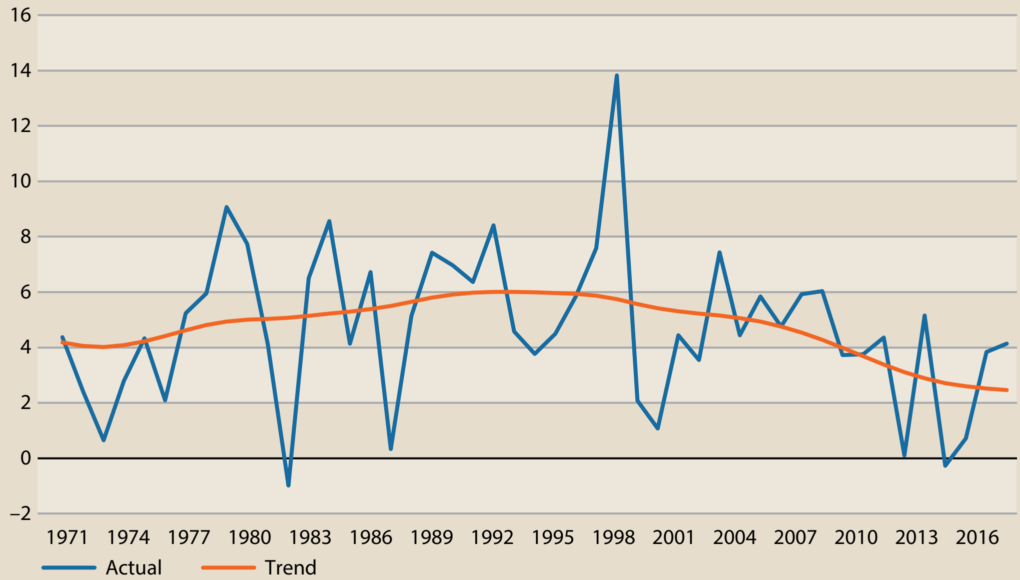


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Capital productivity has stayed relatively constant (see Figure 5). It was mildly positive in the 1970s and 1980s, which would have contributed to TFP growth (see Figure 4). After 1990, however, the trend was steady with around zero growth. The spike-down in capital productivity in 1980 was associated with a rapid fall in output, whereas the spike-down in 1998 was associated more with a rapid drop in labor input.

TFP growth has been volatile around a strong underlying rate, at least up until 2000 (Figure 4). The 2.8% annual average rate until 1990 and the average of 2.1% in the 1990s were high by international standards. The average rate dropped markedly to 1% a year in the 2000s and to 0.5% a year in the 2010s.

The Bank of Korea attributes these most recent declines in productivity growth to a lack of innovation and an inefficient allocation of inputs in the ROK's manufacturing sector [7]. The OECD notes that the concentration of manufacturing output in the hands of few powerful firms 'appears to stifle entrepreneurship and firm creation' [8]. In the service sector, a strict regulatory environment and a lack of capital has kept productivity improvements low.

Although the ROK adopted reforms encouraging foreign investment after 2008 [9], foreign direct investment (FDI) in relation to GDP is among the lowest for OECD countries [10]. Overall investment has weakened in recent years [11].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

The ROK's scores on immediate determinants are set out in Table 4.

The ROK's levels of capital intensity have diminished slightly over the last decade, though the ROK's capital/GDP ratio is still third among APO countries. Both capital deepening and IT capital deepening have slowed since 2010.

The country's human capital indicators are solid, though labor quality's contribution to LP growth has decreased over the last decade. Entrepreneurial culture in the ROK is measured at an average level, though the workforce is in the top quintile of APO group in terms of skills and education.

The ROK is among the most technologically advanced APO countries, with the most connected population (NRI People pillar) of the group. Indicators representing the availability of technology as well as the country's adoption and pursuit of technology are significantly above average.

The products and markets indicators show a country that has embraced its manufacturing sector. Manufacturing, especially medium- and high-tech manufacturing, represents a major portion of GDP and employs a sizable share of the population. Levels of imports and exports are nearly average of APO countries and have decreased over the last ten years.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	6.9 (2010)	2	7.0 (2017)	4
Capital deepening (pp)	Open	1.8 (2017)	9	2.0 (average of 2010–17)	10
IT capital deepening (pp)	Open	0.1 (2017)	11	0.06 (average of 2010–17)	15
Human capital					
Labor quality contribution to LP growth	Open	0.4 (2017)	10	0.5 (average of 2010–17)	13
WEF Current Workforce	0–100	71.8 (2019)	4	4.3 points behind APO leader	
WEF Entrepreneurial Culture	0–100	52.1 (2019)	10	18.3 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	5.8 (2018)	3	0.5 points behind APO leader	
NRI Technology Pillar	0–100	67.9 (2019)	4	10.5 points behind APO leader	
NRI People Pillar	0–100	76.4 (2019)	1	0 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	2.2 (2017 GDP)	16	4.8 (2017 employment)	17
Manufacturing share (%)	Open	30.4 (2017 GDP)	2	17.1 (2017 employment)	4
Medium- and high-tech share of manufacturing (%)	Open	61 (2010)	3	64 (2018)	3
Exports/GDP (%)	Open	49.4 (2010)	9	43.1 (2017)	10
Imports/GDP (%)	Open	46.2 (2010)	11	37.7 (2017)	13

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. These indicators give broad indications of where the countries stand on productivity determinants and their overall productivity readiness.

The ROK performs well on these indices. In particular, it performs a little better on motivation than on the others (see Table 5). The score on the overall Productivity Readiness Index is high by APO standards, giving the ROK a rank of 4. However, the score is also well behind Singapore's score of 100. It suggests that more can be done to improve the ROK's realization of productivity growth opportunities.

TABLE 5

VALUES OF OVERARCHING INDICES FOR ROK.

Index	Value	Rank
Motivation	76	4
Capabilities	71	5
Efficiency of markets	71	= 4
Stability	72	4
Productivity Readiness Index	74	4

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

The values of the ROK's indicators of underlying determinants are shown in Table 6.

The ROK ranks at or near the top in many key areas, including infrastructure and institutions. Indicators for the ROK's business environment are more mixed, suggesting that despite strong regulatory quality and a generally small administrative burden, areas for improvement remain.

According to the WEF Global Competitiveness Report 2019, the ROK ranked sixth globally in terms of infrastructural strength. While the ROK's transport infrastructure is especially strong, in terms of its utility infrastructure, the country still suffers from an unreliable water supply. The ROK is also ranked first in ICT adoption, with the highest number of fiber internet subscriptions per 100 people in the world.

Business environment indicators for the ROK are mixed, with the country performing well in administrative requirements and business freedom, but poorly in labor freedom and tax burden. The ROK has a strong regulatory framework supporting its business environment as denoted by its above-average NRI governance, WB WGI Regulatory Quality, and WEF Administrative Requirements scores. Indicators denoting labor market performance are more average. Korean laws surrounding employment make it difficult to fire permanent employees, thereby incentivizing the mass hiring of temporary workers [12].

The ROK's dual labor market of permanent and contract workers has led to decreased wages and high turnover rates among contract workers, resulting in increased income inequality [12]. Corporate taxes biased against start-ups further constrain new growth [11] and the cost of starting a new business is well below average globally.

Indicators of the strength of the ROK's financial system are above average among APO countries. The ROK's scores denoting the depth and efficiency of its financial markets, as well as government regulations for them, are near the top among APO countries.

Though not ranked at the top for absolute levels of foreign investment, The ROK has a comparatively welcoming foreign investment climate. For indicators representing financial globalization and investment freedom for foreign investors, the ROK is among the top APO countries. The ROK does not perform as well for indicators representing trade openness. Although by no means underperforming in this category, the ROK has a comparatively more complex system of tariffs as measured by the WEF Trade Openness and THF Trade Freedom scores. The ROK ranks in the top quartile among APO countries for openness of trade in services, as well as for absolute levels of trade.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.5 (2017)	15	2.3
Quality of primary education*	1–7	4.6 (2017)	6	1.5
WEF Skills/Future Workforce	0–100	76.2 (2019)	5	5.2
Education expenditure/GDP* (%)	Open	4.6 (2017)	2	0.6
Innovation system				
WEF Innovation Capability	0–100	79.1 (2019)	2	1.1
KOF Informational Globalisation, de facto	0–100	97.2 (2017)	3	2.5
Infrastructure				
WEF Infrastructure	0–100	92.1 (2019)	4	3.3
Business environment				
THF Business Freedom	0–100	90.5 (2019)	4	5.7
WEF Administrative Requirements	0–100	88.8 (2019)	2	4.3
WEF Domestic Competition	0–100	53.5 (2019)	10	21.3
THF Tax Burden	0–100	63.9 (2019)	20	29.1
WB WGI Regulatory Quality	−2.5 to 2.5	1.1 (2018)	5	1.13
WEF Labour Market	0–100	62.9 (2019)	9	18.3
THF Labour Freedom	0–100	56.2 (2019)	15	34.7
NRI Governance	0–100	77.1 (2019)	4	11.1
Financial system				
WEF Financial System	0–100	84.4 (2019)	7	7
IMF Financial Markets	0–1	0.77 (2018)	= 2	0.05
THF Financial Freedom	0–100	70 (2019)	3	20
Health system				
Life expectancy at birth (years)	Open	82.8 (2018)	4	1.9
Infant mortality* (deaths/1000 live births)	Open	3.2 (2018)	3	0.7

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	61.4 (2017)	7	30.2
KOF Financial Globalisation, de jure	0–100	67.4 (2017)	4	18.5
FDI Stock/GDP (%)	Open	14.3 (2019)	14	492.2
THF Investment Freedom	0–100	70 (2019)	= 3	15
Trade				
WEF Trade Openness	0–100	58.6 (2019)	10	30.1
THF Trade Freedom	0–100	80 (2019)	= 9	15
Services Trade Restrictions Index*	0–100	37.8 (2016)	4/14	10.4
KOF Trade Globalisation	0–100	67.1 (2017)	5	29.3
KOF Trade Globalisation, de jure	0–100	71.6 (2017)	5	22.1
Demand				
WEF Macroeconomic Stability	0–100	100 (2019)	= 1	0
THF Monetary Freedom	0–100	82.1 (2019)	4	3.5
Savings				
Gross savings (% of GDP)	Open	37.4 (2019)	4	10.8
Institutions				
WEF Institutions	0–100	65.8 (2019)	6	14.6
IMF Financial Institutions	0–1	0.82 (2018)	2	0.11
WB WGI Political Stability	−2.5 to 2.5	0.6 (2018)	7	0.89
WB WGI Rule of Law	−2.5 to 2.5	1.24 (2018)	4	0.6
WB WGI Control of Corruption	−2.5 to 2.5	0.6 (2018)	5	1.57
WB WGI Government Effectiveness	−2.5 to 2.5	1.18 (2018)	5	1.05
Social capital				
WEF Social Capital	0–100	49.2 (2019)	11	14
WB WGI Voice & Accountability	−2.5 to 2.5	0.8 (2018)	3	0.22

Source: Appendix G.
Note: * Supplementary indicator.

The ROK, along with three other APO countries, garnered perfect scores for macroeconomic stability. A high monetary freedom indicator suggests that the government does not extensively manipulate prices and that inflation has remained steady for the last three years.

The Korean government drove industrialization as the country developed economically, lending an authoritarian past to an increasingly resilient democracy. While the ROK has experienced major political reforms since major reforms began in the late 1980s, vestiges of corruption have appeared from time to time. According to experts, the most impressive aspect of Korean democracy is not a lack of institutional failings but ‘the informal engagement of its citizens’ [13], which is also shown in the country’s high voice and accountability score. Improvements to Korean democracy continue, and so the ROK’s institutional indicators are not as high as other categories.

The ROK’s primary education system and the training of its future workforce are also ranked among the highest in the APO group. Perhaps because of its world-class education system, the ROK is also ranked highly among APO countries for innovation capability. The ROK’s number of patents, high Internet bandwidth, diversity of the workforce, and robustness of the research sector all contribute to the ROK’s high score for the indicators denoting innovation capability.

Challenges Ahead

The ROK’s recipe for rapid growth over the last few decades, i.e., simply investing more capital into manufacturing, can no longer provide large gains in GDP. The IMF has recommended some deregulation of the economy to improve resource efficiency and increase competition [11].

Despite strengths in some areas, weaknesses remain in the ROK’s business environment. The ROK has one of the least flexible labor markets in the world, with high redundancy costs and low cooperation between employers and workers [14]. Further, the ROK’s tax burden is biased in favor of established firms and against startups [11]. Reforms in labor markets and taxation policy could boost future economic growth.

In 2020, the ROK acted quickly to stop the spread of COVID-19 by implementing large-scale testing, mandatory isolation of detected cases, and widespread use of technology for contact tracing. However, domestic mobility and business activity were never widely restricted in the ROK, so that GDP dropped only by 5.5%, compared with PR China’s 36.6% [15]. The ROK’s model offers lessons about ‘how to keep case numbers low without limiting activity’ [16].

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LAO PDR

Lao PDR is a small country with a young, mostly low-skilled workforce. Much of the population remains rural-based and dependent on income from farming. However, value added from mining and production of hydroelectric power now accounts for a large share of GDP. Lao PDR's urban population is small, though growing rapidly, comprising 34% of the country's total population in 2017. Average income levels have risen (see Figure 1) with labor productivity (LP) gains. GDP per capita increased by a factor of almost six from 1970 to 2017 (see Table 1). However, inequality has also increased, and poverty remains widespread.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	7.0 (2017)	17	1.5 (growth rate in 2010–17)	6
Rural population proportion (%)	69.9 (2010)	4	65.6 (2017)	5
GDP (USD billion at PPP, % per year)	49.3 (2017)	18	7.40 (growth rate in 2010–17)	2
GDP per capita (USD at PPP, % per year)	7,100 (2017)	15	5.7 (growth rate in 2010–17)	3
Employment rate (%)	49.7 (2010)	6	50.6 (2017)	8
Age dependency ratio (%)	70.4 (2010)	1	63.8 (2017)	3
Old-age dependency ratio (%)	6.4 (2010)	19	6.8 (2017)	19

Source: Appendix G.

Productivity Performance

LP in Lao PDR is among the bottom five countries in the APO, but higher than neighboring Cambodia and Vietnam. Strong growth in total factor productivity (TFP) and rapid capital accumulation contributed to large LP gains in the 2010s (see Table 2), exceeded by only three other APO countries.

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	4.0 (2010)	16	5.8 (2017)	16
Labor productivity growth (% per year)	4.4 (2000–10)	4	5.4 (2010–17)	4
TFP growth (% per year)	2.5 (2000–10)	1	1.9 (2010–17)	3

Source: Data and calculations from APO Productivity Database 2019.

Lao PDR has maintained high rates of economic growth after the structural reforms in the late 1980s encouraged private businesses and opened the country to trade and foreign investments [1]. This process, which began with the New Economic Mechanism (NEM) in 1986, enabled an isolated and poor country to develop new export industries, capitalizing on its rich natural resources in water, forests, and mining and agricultural commodities.

By 2017, Lao PDR's economy had expanded to be more than six times its size in 1990. Average real GDP growth of 7.1% a year in the 2000s was bettered by 7.4% annual growth in the 2010s. Cambodia was the only APO country to achieve a faster rate of growth since 2000. Agriculture's share of economic activity declined from 62% in 1990 to 23% in 2017, while value added from mining and electricity, gas, and water rose from 1% to 21%.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.
(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	2.8	3.3	3.1	4.4	5.5	5.6	5.2
TFP growth	0.4	0.8	−0.4	2.5	1.9	2.0	1.6
Capital productivity growth	−1.0	−0.4	−2.6	1.5	−0.9	−0.6	−1.5
Output growth	3.5	5.8	6.0	7.1	7.4	7.6	6.9
Combined inputs growth	3.1	5.0	6.4	4.6	5.4	5.5	5.2
Capital growth	4.6	6.3	8.6	5.6	8.2	8.2	8.4
IT capital growth	10.1	15.9	14.0	16.3	16.9	21.3	5.9
Hours worked growth	0.7	2.5	2.9	2.7	1.9	2.0	1.7
Labor quality growth	0.4	0.5	0.7	1.0	0.7	0.9	0.1
Capital deepening	2.3	2.3	3.2	1.4	3.2	3.1	3.5

Source: Author's estimates based on data from APO Productivity Database 2019.

Fast economic growth, well in excess of the population growth, saw the per capita GDP increase significantly (see Figure 1). While average incomes have continued to rise over the past twenty years, inequality has also risen [2]. Poverty too is still widespread, while gender gaps remain in education and official employment [3]. Consistent with underutilization of a small, low-skilled and slowly ageing workforce, almost all recorded improvement in per-capita GDP is due to rising LP (see Table 3), with hours worked per person little changed from the early 1990s.

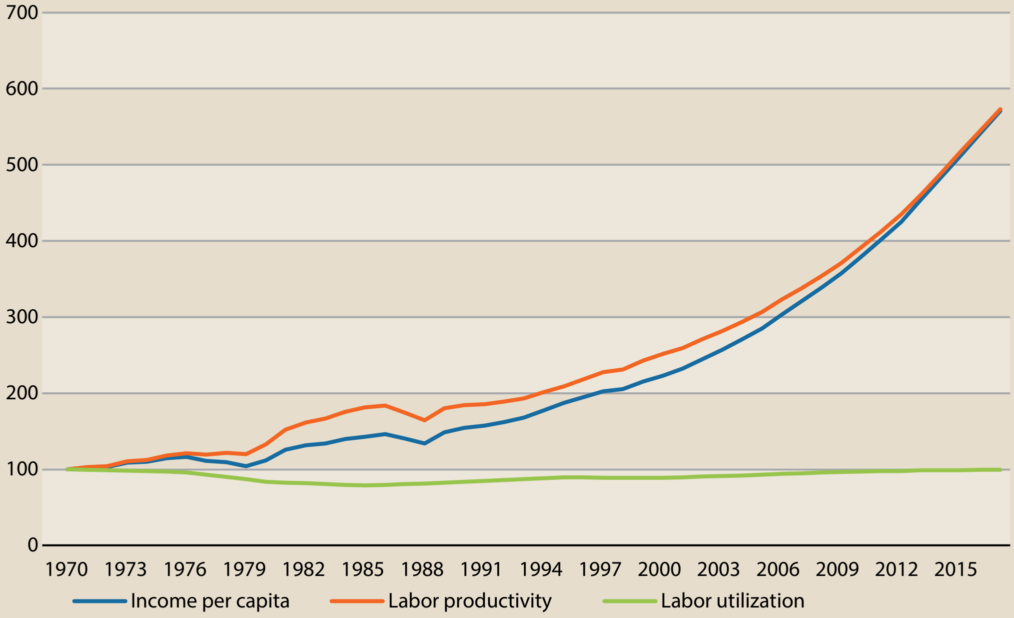
Rapid capital accumulation in the 1980s and 1990s contributed to strong LP growth, following the years of war and economic mismanagement. Real GDP per hour worked grew 3.3% a year in the 1980s and 3.1% per year in the 1990s. Labor productivity growth (see Figure 3) then strengthened to 4.4% in the 2000s even as the pace of capital deepening moderated. The improvement in LP was instead enabled by gains in TFP (see Figure 4).

After declining in the 1990s, TFP grew 2.5% a year, on average, in the 2000s and 1.9% annually from 2010 to 2017, slower only than in Pakistan (2.4%) and Mongolia (2.0%) among APO countries. Capital accumulation sped up again in the 2010s, growing 4% a year on average as the electricity sector expanded, new infrastructure was developed [4], and construction activities increased as a share of GDP from 5% to 9%. The resulting acceleration in LP, while impressive next to economies at similar stages of development, still left Lao PDR trailing other countries at less than half the APO average GDP per hour worked in 2017.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

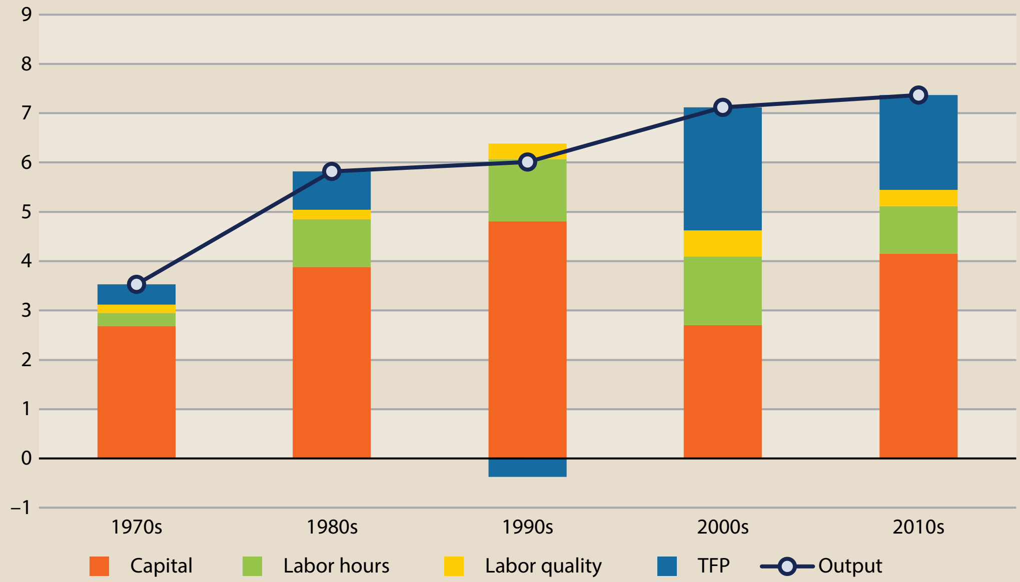


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

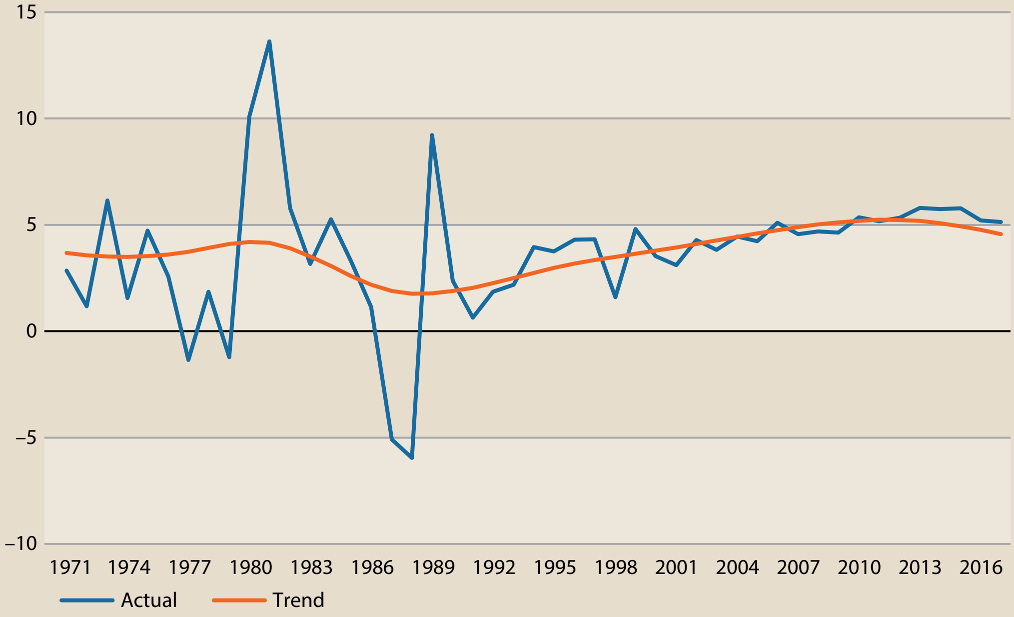


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

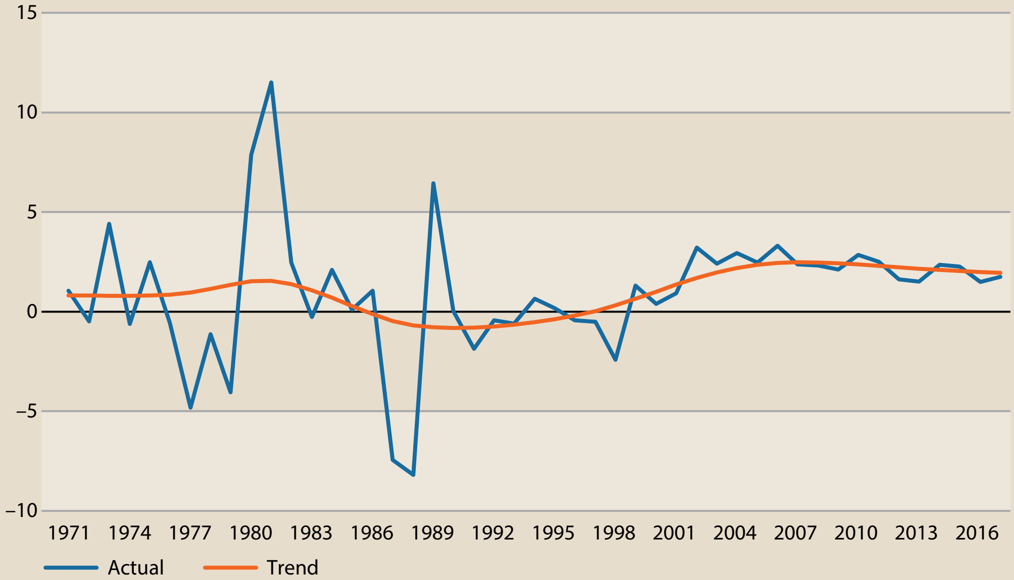


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

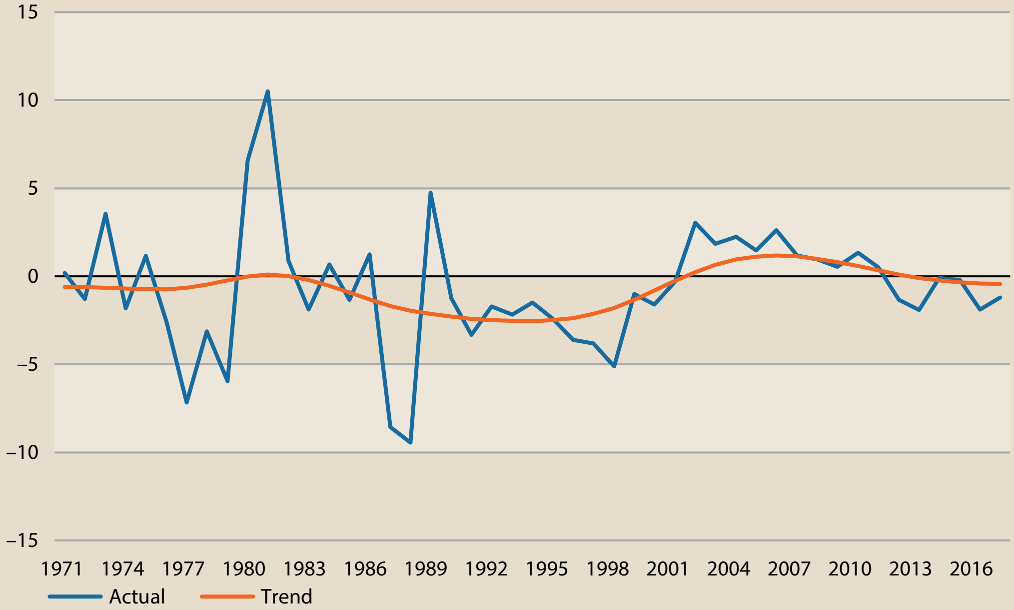


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

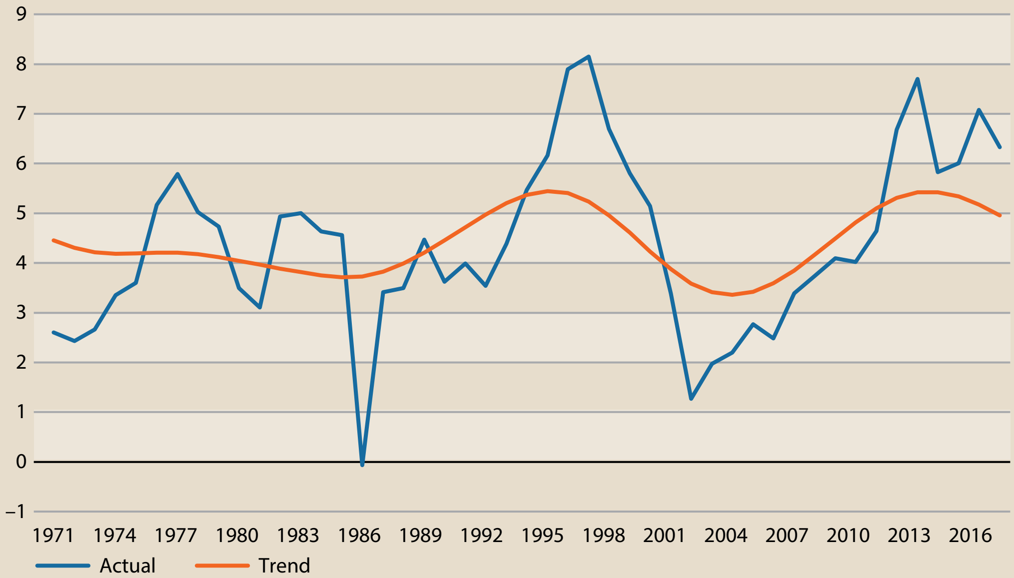


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Investment in IT capital has increased significantly over time but remains small compared with additions to the non-IT capital stock. IT capital growth contributed 0.5 percentage points to output growth (see Figure 2) from 2010 to 2017, while non-IT capital growth added 3.6 points. Measured capital productivity rose in the 2000s (see Figure 5) as capital accumulation slowed. Capital productivity then declined slightly from 2010 to 2017 as the rate of investment increased.

The reform of what was a centrally planned economy at the start of the 1980s saw Lao PDR remove price controls, introduce property right protections, and pass laws promoting investment and enabling foreign ownership [1]. FDI followed, supporting the development of hydroelectric power, now Lao PDR's most important merchandise export [4]. FDI inflows accelerated from 2005 and have continued to increase in recent years. While Lao PDR has been successful in enticing foreign investment, the stock of inbound FDI (39% of GDP in 2015) is small next to those of Vietnam (53%) and Cambodia (82%).

The expansion of new export industries was aided by Lao PDR's integration in regional and global trade networks, with tariff reductions preceding entry to ASEAN in 1997 and the WTO in 2013.

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that add a more complete picture in certain areas. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Lao PDR's capital-to-GDP ratio increased in the 2010s amidst expansion in hydroelectric power capacity and a rise in GDP share of the construction industry. Capital deepening contributed 3.2 percentage points a year to LP growth (see Table 4), of which IT capital deepening accounted for 0.5 percentage points (second in the APO during this period).

Workers' skills increased from 2010 to 2017. Lao PDR ranks 15th among APO economies on the World Economic Forum (WEF) Current workforce indicator, which tracks years of schooling as well as the training and skills of the workforce. Lao PDR's performance on this indicator is better than some other lower-middle-income APO economies, but well behind the Philippines and Sri Lanka.

Manufacturing accounts for a small share of GDP (8% in 2017) with little production of medium- and high-technology goods (4% of total manufacturing). Low skilled workers comprise the bulk of Lao PDR's workforce, with the country scoring relatively poorly on the NRI People pillar, which tracks ICT skills along with broader measures of educational attainment. Access to technology is lower than in APO countries with more advanced manufacturing industries.

Agriculture's share of GDP has declined, but still represents almost a quarter of economic activity. Exports of resources have increased significantly following the expansion of hydroelectric power generation in the 2010s. Total exports represented 34% of GDP in 2017, lower than the corresponding percentages in neighboring Vietnam and Cambodia, both open economies with larger manufacturing industries.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.2 (2010)	18	2.6 (2017)	14
Capital deepening (pp)	Open	3.3 (2017)	7	3.2 (average of 2010–17)	6
IT capital deepening (pp)	Open	0.1 (2017)	9	0.5 (average of 2010–17)	2
Human capital					
Labor quality contribution to LP growth	Open	0.0 (2017)	16	0.3 (average of 2010–17)	17
WEF Current Workforce	0–100	44.2 (2019)	15	31.9 points behind APO leader	
WEF Entrepreneurial Culture	0–100	49.4 (2019)	15	21.0 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	3.9 (2018)	16	2.4 points behind APO leader	
NRI Technology Pillar	0–100	28.2 (2019)	16	50.3 points behind APO leader	
NRI People Pillar	0–100	25.2 (2019)	14	51.2 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	23.7 (2017 GDP)	4	70.5 (2017 employment)	1
Manufacturing share (%)	Open	8.1 (2017 GDP)	18	3.5 (2017 employment)	19
Medium- and high-tech share of manufacturing (%)	Open	4 (2010)	18	4 (2018)	19
Exports/GDP (%)	Open	33.9 (2010)	12	33.6 (2017)	11
Imports/GDP (%)	Open	47.3 (2010)	10	40.6 (2017)	12

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, stability, and an overall Productivity Readiness Index (PRI). These indices give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Sufficient data were not available to calculate the PRI and associated indices for Lao PDR.

Underlying Determinants: Specific Strengths and Weaknesses

Lao PDR has made progress in opening its economy to trade and foreign investment, with greater political stability in recent years helping improve business conditions. In contrast, burdensome administrative requirements, an unfavorable regulatory environment, and public sector's ineffectiveness pose challenges for the investment climate (see Table 5). More work remains to be done to develop Lao PDR's institutions, address corruption, and lift health and educational outcomes.

TABLE 5

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.0 (2017)	9	1.8
Quality of primary education*	1–7	3.5 (2017)	14	2.6
WEF Skills/Future Workforce	0–100	58.4 (2019)	15	23
Education expenditure/GDP* (%)	Open	2.9 (2014)	13	2.2
Innovation system				
WEF Innovation Capability	0–100	28 (2019)	19	52.2
KOF Informational Globalisation, de facto	0–100	71.1 (2017)	15	28.7
Infrastructure				
WEF Infrastructure	0–100	59.2 (2019)	13	36.2
Business environment				
THF Business Freedom	0–100	54.3 (2019)	18	41.9
WEF Administrative Requirements	0–100	24.2 (2019)	19	68.9
WEF Domestic Competition	0–100	48.3 (2019)	13	26.5
THF Tax Burden	0–100	87 (2019)	5	6
WB WGI Regulatory Quality	−2.5 to 2.5	−0.78 (2018)	18	3.01
WEF Labour Market	0–100	57 (2019)	13	24.2
THF Labour Freedom	0–100	58.6 (2019)	= 12	32.3
NRI Governance	0–100	26.3 (2019)	18	61.9
Financial system				
WEF Financial System	0–100	55.2 (2019)	15	36.2
IMF Financial Markets	0–1	0.11 (2018)	16	0.71
THF Financial Freedom	0–100	20 (2019)	19	70
Health system				
Life expectancy at birth (years)	Open	67.6 (2018)	17	17.1
Infant mortality* (deaths/1000 live births)	Open	47.3 (2018)	17	44.8

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	48.3 (2017)	12	43.3
KOF Financial Globalisation, de jure	0–100	35.8 (2017)	16	50.1
FDI Stock/GDP (%)	Open	52.7 (2019)	7	453.9
THF Investment Freedom	0–100	35 (2019)	18	50
Trade				
WEF Trade Openness	0–100	60 (2019)	8	28.7
THF Trade Freedom	0–100	82 (2019)	= 5	13
Services Trade Restrictions Index*	0–100	NA	NA	NA
KOF Trade Globalisation	0–100	50.2 (2017)	12	46.2
KOF Trade Globalisation, de jure	0–100	59.9 (2017)	7	33.7
Demand				
WEF Macroeconomic Stability	0–100	69.7 (2019)	15	30.3
THF Monetary Freedom	0–100	76.8 (2019)	8	8.8
Savings				
Gross savings (% of GDP)	Open	17.6 (2016)	18	30.6
Institutions				
WEF Institutions	0–100	42.8 (2019)	17	37.6
IMF Financial Institutions	0–1	0.25 (2018)	19	0.68
WB WGI Political Stability	−2.5 to 2.5	0.42 (2018)	8	1.07
WB WGI Rule of Law	−2.5 to 2.5	−0.84 (2018)	19	2.68
WB WGI Control of Corruption	−2.5 to 2.5	−0.98 (2018)	19	3.15
WB WGI Government Effectiveness	−2.5 to 2.5	−0.67 (2018)	18	2.90
Social capital				
WEF Social Capital	0–100	40.4 (2019)	19	22.8
WB WGI Voice & Accountability	−2.5 to 2.5	−1.74 (2018)	20	2.76

Source: Appendix G.
Note: * Supplementary indicator.

Despite decent spending on education, Lao PDR ranks below other countries at similar income levels on forward-looking indicators of workforce skills, such as the WEF Skills/Future workforce indicator. The quality of primary education, in particular, lags the better-performing countries in Lao PDR's income group, such as Sri Lanka and India. More needs to be done to improve health outcomes. Life expectancy is lower than most other countries in the region, and infant mortality is high.

Lao PDR ranks 13th among 19 APO economies on the WEF Infrastructure indicator. While better than some countries in the same income group, road connectivity is relatively poor and 6% of the population is without access to electricity. With a low-skilled workforce and little production of medium- and high-skilled manufactured goods, Lao PDR scores relatively poorly on indicators of its innovation system.

On the other hand, success in controlling inflation and improved political stability is providing a foundation for better business conditions. Moreover, Lao PDR has encouraged foreign investment while removing tariff and nontariff barriers to trade. However, there remain some significant barriers to investment. These include burdensome administrative requirements and ineffectiveness in the provision of government services, which are reflected in the long time to start a business. Compared with other lower-middle-income APO economies, Lao PDR performs relatively poorly on indicators of administrative requirements, regulatory quality, governance, and government effectiveness.

Underlying these challenges is the need for stronger institutions. Corruption is a problem, while Lao PDR ranks below most other countries on indicators of the rule of law, property right protection, incidence of violent crimes. and public-sector performance. This is reflected in a relatively weak performance on the WEF Institutions indicator.

Challenges Ahead

Further reform of Lao PDR's institutions would remove an important obstacle to sustained growth in productivity. Corruption remains a problem, despite laws passed to address it, while a lack of capacity in the public sector exacerbates inefficiencies in public investment and the provisioning of public services [3]. At the same time, policy uncertainty and a lack of transport infrastructure complicate the business environment [2]. Improving the regulatory environment and alleviating administrative burdens on businesses will also be critical to build further on the progress made in encouraging trade and investment.

Greater investment in Lao PDR's human capital would also support productivity growth. The skill level of the workforce is low by regional standards, notwithstanding improvements in labor quality in the 2000s and 2010s. The World Bank and other development partners have urged reforms to improve health and education outcomes, especially for women. Success in these areas would lift both wellbeing and productive capacity and reduce inequality [5]. Other vulnerabilities are associated with Lao PDR's still narrow, resources-heavy export base, which exposes the country to commodity price shocks and strains the natural environment.

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MALAYSIA

Malaysia is a rapidly urbanizing country of over 30 million people. Agriculture, which 40 years ago accounted for almost a quarter of the country's gross domestic product, now represents less than a tenth of its economic activity. Output from Malaysia's manufacturing industry, in contrast, comprises over a fifth of the total value added, while services represent approximately half of the total economic activity. At 46.5%, Malaysia's employment rate in 2017 (see Table 1) was low relative to the five high-income APO economies (Japan, Singapore, Hong Kong, the Republic of China, and the Republic of Korea) but higher than what it was at the start of the decade. Improved labor utilization in recent years and continued growth in labor productivity (LP) have helped lift average incomes (see Figure 1). In 2017, GDP per capita was almost seven times its level in 1970, enabling Malaysia to close ground on higher-income countries.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	32.0 (2017)	11	1.6 (growth rate in 2010–17)	4
Rural population proportion (%)	29.1 (2010)	16	24.6 (2017)	16
GDP (USD billion at PPP, % per year)	933.3 (2017)	9	5.1 (growth rate in 2010–17)	10
GDP per capita (USD at PPP, % per year)	29,100 (2017)	6	3.3 (growth rate in 2010–17)	10
Employment rate (%)	42.7 (2010)	11	46.5 (2017)	11
Age dependency ratio (%)	47.8 (2010)	12	44.3 (2017)	13
Old-age dependency ratio (%)	7.4 (2010)	14	9.1 (2017)	11

Source: Appendix G.

Productivity Performance

Malaysia's LP in 2017 was second to Islamic Republic of Iran's among the APO's upper-middle-income economies and seventh overall. Average LP growth of 2.5% a year in the 2010s ranked the country 13th among APO economies. Productivity growth was slower than in APO countries at earlier stages of development but faster than all high-income APO countries apart from Hong Kong. TFP growth slowed in the 2010s (see Tables 2 and 3), partially offsetting an increase in the rate of capital deepening.

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	23.0 (2010)	7	27.3 (2017)	7
Labor productivity growth (% per year)	2.7 (2000–10)	14	2.5 (2010–17)	13
TFP growth (% per year)	1.1 (2000–10)	11	0.5 (2010–17)	16

Source: Data and calculations from APO Productivity Database 2019.

Malaysia's economy diversified in the decades following independence in 1957. Once dependent on rubber plantations and tin-ore mines, Malaysia's growth is now driven by a strong manufacturing industry; valuable exports of oil, gas, and agricultural commodities; and an expanding services sector.

Real GDP expanded at the rate of 6% a year on average from 1990 to 2017, supported by strong growth in LP (see Figure 3). GDP per hour worked grew 3.8% per year, on average, in the 1990s; and 2.7% per year in the 2000s. Average annual growth in productivity slowed only slightly from 2010 to 2017, to 2.5%. This recent performance, while not as strong as those of neighboring Vietnam, Thailand, or Indonesia, has enabled a continued growth in living standards. Poverty has been reduced to very low levels, while inequality has gradually declined [1].

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	4.8	2.7	3.8	2.7	2.5	2.3	2.9
TFP growth	0.9	–0.6	–0.6	1.1	0.5	0.3	0.8
Capital productivity growth	–0.3	–1.4	–1.6	1.3	–0.2	–0.2	–0.1
Output growth	8.0	6.0	7.1	5.1	5.1	5.2	4.9
Combined inputs growth	7.0	6.6	7.7	4.0	4.6	4.8	4.1
Capital growth	8.3	7.3	8.7	3.8	5.3	5.4	5.1
IT capital growth	15.8	19.8	22.7	15.9	5.8	7.9	0.7
Hours worked growth	3.2	3.3	3.3	2.4	2.7	2.9	2.0
Labor quality growth	1.7	2.0	2.5	2.0	0.9	1.0	0.6
Capital deepening	3.2	2.5	3.5	0.9	1.7	1.6	1.9

Source: Author's estimates based on data from APO Productivity Database 2019.

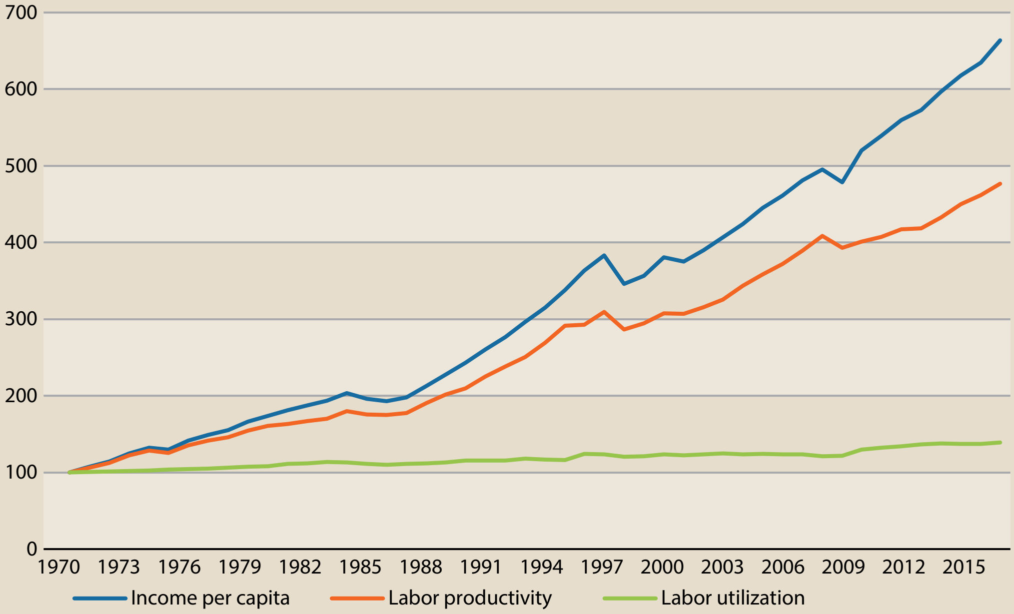
Malaysia's productivity gains in the 1980s and 1990s were driven mostly by rapid capital accumulation, which accompanied the development of a strong industrial base and the urbanization of the population. After accounting for more than 90% of LP growth in the 1990s, capital deepening slowed in the 2000s and picked up only slightly from 2010 to 2017 (see Table 3 and Figure 6).

The growth contribution of IT capital accumulation remains modest relative to the effect of significant non-IT investment, including construction. From a small base, investment in IT capital

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

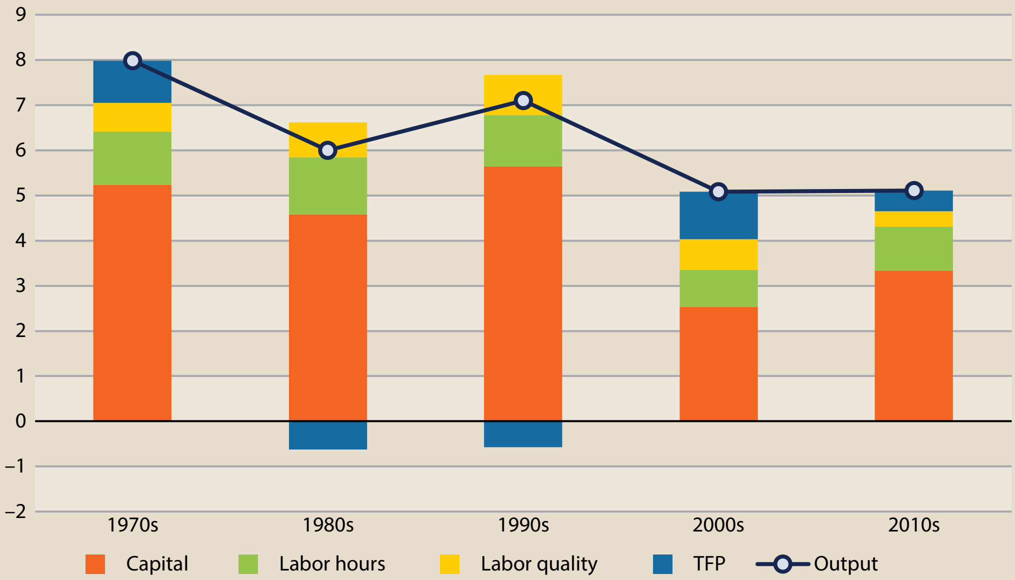


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

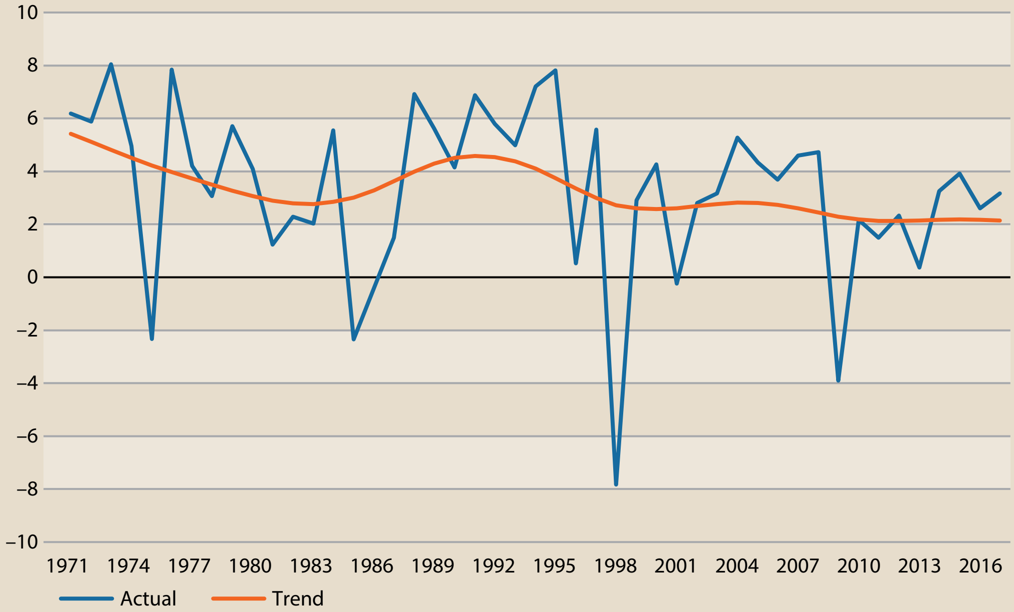


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

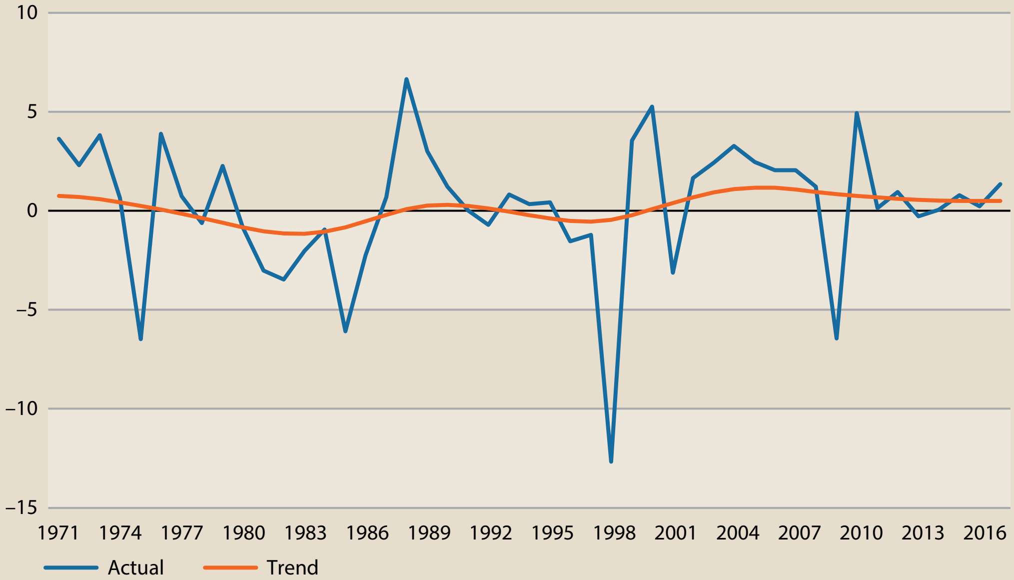


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

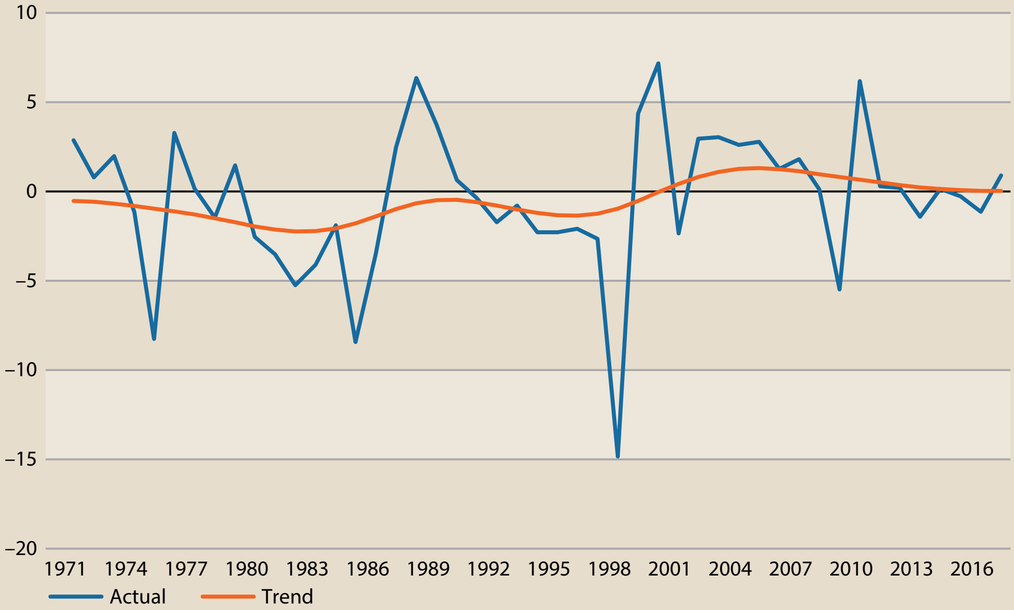


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

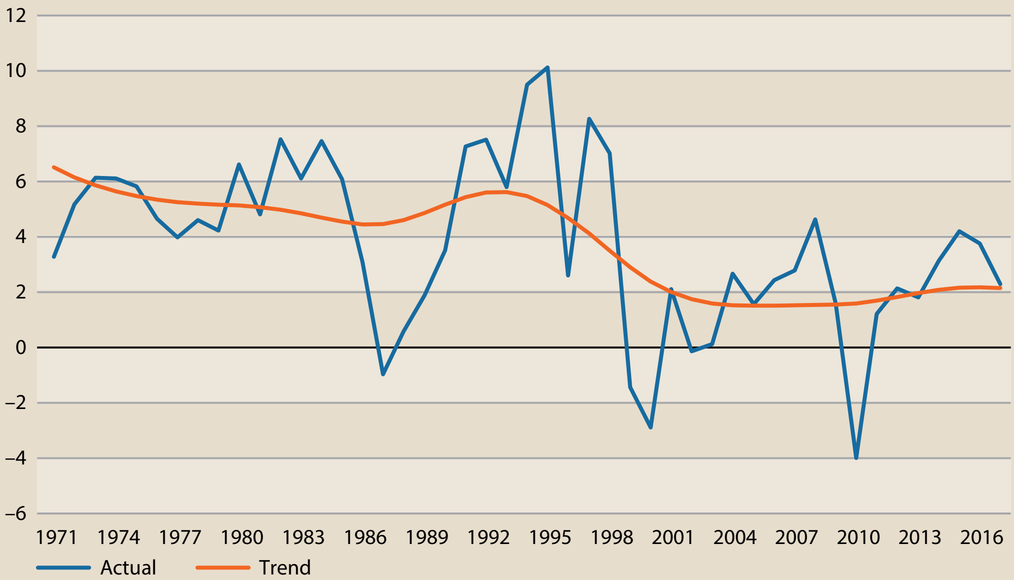


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

grew strongly in the 1980s and 1990s. IT capital accumulation then slowed in the late 1990s. It gradually increased in subsequent years, even as the rate of overall capital deepening moderated. From 2014 to 2017, the IT capital stock expanded at a faster rate than non-IT capital, reversing a trend dating back to the early 1970s.

Foreign direct investment (FDI) supported the development of Malaysia's manufacturing industry, increasing productive capacity for exports including semiconductors, computers, and electrical equipment as well as rubber and wood products. Despite taking steps to relax FDI regulation, Malaysia's share of FDI inflows to ASEAN countries has shrunk amidst heightened competition from its fast-growing neighbors [2]. Yet, Malaysia remains an extremely open economy, with the combined value of exports and imports exceeding 130% of gross domestic product.

Declines in total factor productivity (TFP) in the 1980s and 1990s (see Figure 4) partially offset the effect of significant capital deepening on LP growth. TFP improved in the 2000s, growing at an average of 1% per year. Subsequent gains have been more modest, particularly when compared with the achievements of economies at earlier stages of development in the same region.

Increases in the skill levels of the workforce contributed to the economic growth in the 1990s and the 2000s. Labor quality continued to improve from 2010 to 2017, albeit at a slower rate than in the previous two decades. Hours worked per person also increased.

Trends in the productivity of capital have reversed in recent years. The Asian and global financial crises each caused capital productivity to decline. These losses have since been pared back and capital productivity was relatively stable from 2010 to 2017 (see Figure 5).

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Malaysia's capital-to-GDP ratio increased from 2010 to 2017 to rank ninth among APO economies (see Table 4), behind the group's high-income economies as well as Thailand, Indonesia, and Nepal. A pickup in the rate of capital deepening contributed an average 1.7 percentage points to the rate of LP growth in the 2010s, with a smaller contribution from the accumulation of IT capital.

With further increases in educational attainment in the 2010s, Malaysia is now not far behind the APO's high-income countries on measures of workforce skills. It also ranks first among APO economies on the World Economic Forum's (WEF's) Entrepreneurial Culture indicator, which tracks attitudes to risk, willingness to delegate authority, and growth of innovative companies.

In keeping with the size of its advanced-manufacturing capacity, Malaysia is well ahead of the APO's other upper-middle-income member economies on indicators of availability and access to the latest technologies (fifth in the APO). It is not far behind Hong Kong and is well clear of the other countries in its own income group in the Portulans Institute's NRI People pillar, which is an indicator of sophistication of ICT skills and ICT use.

Medium- and high-technology manufacturing, a category that includes electronic goods, makes up a large share of total manufacturing value added, which itself accounts for over a fifth of Malaysia's GDP. Trade represented 136% of GDP in 2017, consistent with Malaysia's participation in global value chains for electronic goods.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.7 (2010)	11	3.5 (2017)	9
Capital deepening (pp)	Open	1.4 (2017)	14	1.7 (average of 2010–17)	11
IT capital deepening (pp)	Open	−0.1 (2017)	20	0.1 (average of 2010–17)	12
Human capital					
Labor quality contribution to LP growth	Open	0.4 (2017)	11	0.3 (average of 2010–17)	16
WEF Current Workforce	0–100	68.6 (2019)	6	7.5 points behind APO leader	
WEF Entrepreneurial Culture	0–100	70.4 (2019)	1	0.0 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	5.5 (2018)	5	0.8 points behind APO leader	
NRI Technology Pillar	0–100	59.5 (2019)	5	19.0 points behind APO leader	
NRI People Pillar	0–100	55.6 (2019)	5	20.8 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	9.0 (2017 GDP)	12	10.7 (2017 employment)	14
Manufacturing share (%)	Open	22.7 (2017 GDP)	4	16.9 (2017 employment)	5
Medium- and high-tech share of manufacturing (%)	Open	43 (2010)	8	44 (2018)	6
Exports/GDP (%)	Open	86.9 (2010)	3	71.4 (2017)	4
Imports/GDP (%)	Open	71.0 (2010)	4	64.4 (2017)	4

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices (see Table 5) representing motivation, capabilities, efficiency of markets, stability, and the Productivity Readiness Index (PRI). These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Malaysia's estimated PRI value of 70 ranks it fifth among 16 APO economies in the database and makes it the best-performing upper-middle-income country in the group (see Table 5). High scores for capabilities and efficiency of markets indices place Malaysia among the APO's high-income countries, a group it could soon join if it can keep productivity growth near recent rates. It also scores highly on motivation and stability, ranking fifth among the APO economies in the database. While it scores very well, the comparison with Singapore's scores of around 100 suggests there is more that could be done to make Malaysia even more productivity ready.

TABLE 5

VALUES OF OVERARCHING INDICES FOR MALAYSIA.

Index	Value	Rank
Motivation	71	5
Capabilities	75	4
Efficiency of markets	71	4
Stability	58	5
Productivity Readiness Index	70	5

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Indicators of underlying determinants of productivity show Malaysia's success in reducing barriers to investment and trade, developing effective institutions, and investing in education and infrastructure (see Table 6). There remain, however, some important obstacles to productivity growth.

With an effective education system and good teachers, Malaysia ranks fourth among APO economies on the WEF Skills/Future Workforce indicator. In contrast, Malaysia is further behind the APO's high-income countries on health indicators. The infant mortality rate is more than three times that in Japan. Life expectancy (76 years as of 2018) is more than seven years shorter than in Singapore, Japan, and Hong Kong, i.e., the high-income countries that are either completely urbanized (Singapore and Hong Kong) or have proportionally much smaller rural populations than Malaysia (Japan).

Malaysia has well-developed utilities and transport infrastructures, reflected in its strong performance on the WEF Infrastructure pillar (sixth among APO economies). Electricity reaches 98.2% of the population, despite a quarter of its residents living in rural areas. Roads are of a high quality, and rail, air, and seaport services are reasonably efficient. Malaysia's innovation system also ranks highly among APO economies on the WEF Innovation Capability indicator. This reflects a relatively high level of R&D expenditure; well-developed clusters of firms, suppliers, and specialized institutions; and a high degree of collaboration between companies and universities on R&D.

Malaysia is relatively open to trade and investment. Its stock of FDI was equivalent to 46% of the value of GDP in 2019 (ninth in the APO). The country also ranks fifth among APO economies on The Heritage Foundation (THF) Investment Freedom indicator, which tracks restrictions on foreign investment and land ownership as well as foreign exchange controls and expropriation of investments without compensation. In contrast, its tariff regime is relatively complex. This, more than the level of tariffs themselves, drags down Malaysia's performance on the WEF Trade Openness indicator, where it ranks seventh among APO economies, behind Mongolia and the Philippines as well as four of the group's high-income economies.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	5.2 (2017)	2	0.6
Quality of primary education*	1–7	5.1 (2017)	5	1.0
WEF Skills/Future Workforce	0–100	76.5 (2019)	4	4.9
Education expenditure/GDP (%)*	Open	4.5 (2018)	3	0.6
Innovation system				
WEF Innovation Capability	0–100	55 (2019)	6	25.2
KOF Informational Globalisation, de facto	0–100	93.3 (2017)	5	6.4
Infrastructure				
WEF Infrastructure	0–100	78 (2019)	6	17.4
Business environment				
THF Business Freedom	0–100	87.8 (2019)	5	8.4
WEF Administrative Requirements	0–100	78.9 (2019)	7	14.2
WEF Domestic Competition	0–100	68.8 (2019)	4	6
THF Tax Burden	0–100	85.7 (2019)	6	7.3
WB WGI Regulatory Quality	−2.5 to 2.5	0.7 (2018)	6	1.53
WEF Labour Market	0–100	70.2 (2019)	5	11
THF Labour Freedom	0–100	74.5 (2019)	6	16.4
NRI Governance	0–100	75.9 (2019)	5	12.3
Financial system				
WEF Financial System	0–100	85.3 (2019)	5	6.1
IMF Financial Markets	0–1	0.61 (2018)	6	0.21
THF Financial Freedom	0–100	50 (2019)	= 10	40
Health system				
Life expectancy at birth (years)	Open	76 (2018)	8	8.7
Infant mortality (deaths/1000 live births)*	Open	7.8 (2018)	5	5.3

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	71.0 (2017)	5	20.6
KOF Financial Globalisation, de jure	0–100	63.8 (2017)	6	22.1
FDI Stock/GDP (%)	Open	46.1 (2019)	9	460.5
THF Investment Freedom	0–100	60 (2019)	= 5	25
Trade				
WEF Trade Openness	0–100	60.7 (2019)	7	28
THF Trade Freedom	0–100	82 (2019)	= 5	13
Services Trade Restrictions Index*	0–100	54.2 (2016)	12	26.8
KOF Trade Globalisation	0–100	82.5 (2017)	3	13.9
KOF Trade Globalisation, de jure	0–100	78.7 (2017)	4	14.9
Demand				
WEF Macroeconomic Stability	0–100	100 (2019)	= 1	0
THF Monetary Freedom	0–100	81.6 (2019)	5	4
Savings				
Gross savings (% of GDP)	Open	25.7 (2018)	12	22.5
Institutions				
WEF Institutions	0–100	68.6 (2019)	= 4	11.8
IMF Financial Institutions	0–1	0.67 (2018)	6	0.26
WB WGI Political Stability	−2.5 to 2.5	0.26 (2018)	9	1.23
WB WGI Rule of Law	−2.5 to 2.5	0.62 (2018)	6	1.22
WB WGI Control of Corruption	−2.5 to 2.5	0.31 (2018)	7	1.86
WB WGI Government Effectiveness	−2.5 to 2.5	1.08 (2018)	6	1.15
Social capital				
WEF Social Capital	0–100	56.7 (2019)	4	6.5
WB WGI Voice & Accountability	−2.5 to 2.5	−0.08 (2018)	12	1.1

Source: Appendix G.
Note: * Supplementary indicator.

While nontariff barriers to trade are in general relatively low, some services sectors (transport, in particular) are highly protected (see Appendix F). Malaysia was the only APO economy to increase services trade restrictions, as measured by the World Bank's Services Trade Restrictions Index, over 2008 to 2016. It ranks 12th on this indicator based on data for 2016, indicating that Malaysia maintains greater barriers to services trade than most APO economies.

With a developed banking system, Malaysia performs reasonably well on indicators of the quality of its financial institutions (sixth on the IMF Financial Institutions indicator) and financial system (fifth on the WEF Financial System indicator). Malaysia also performs well on broader indicators of institutional development. It ranks an equal fourth on the WEF Institutions pillar and performs reasonably well on indicators of the rule of law and government effectiveness (sixth on both the World Bank and WGI indicators). It ranks less highly on indicators of the incidence of corruption. Security and political instability have also been destabilizing factors in the past, without which Malaysia would perform stronger on measures of institutional development.

The business environment is favorable, aided by a relatively high-quality regulatory environment. It is relatively easy to hire and fire workers and recruit foreign labor. These factors that enhance Malaysia's competitiveness in global value chains. On the other hand, starting a business is relatively costly and time consuming. This is reflected in Malaysia's performance on the WEF Administrative Requirements index, where it ranks seventh among APO countries, behind Thailand and the five high-income economies.

Challenges Ahead

In recent years, Malaysia has made progress in strengthening its institutions, improving the regulatory environment, and removing barriers to trade. The financial sector was strengthened following the Asian financial crisis. In the 2010s, the country reduced regulation of trade and introduced a new legislation on competition [1, 3].

More can be done, however, to improve underlying determinants of productivity, setting Malaysia up to achieve its goal of joining the world's high-income economies. Despite its general openness to trade, there remain significant barriers to trade in services. Eliminating unnecessary protection of service sectors could reduce firms' input costs and further enhance Malaysia's competitiveness in global value chains.

While its institutions and regulations are, on the whole, highly developed and effective, the time and cost involved in starting businesses is relatively significant for a country with an advanced public sector. Success in reducing the administrative burden involved in running businesses would capitalize on the work already done to enhance the business environment. Transparency could also be improved, building on recent efforts to address corruption [4].

Improving education and skills has been vital to Malaysia's productivity performance over the past fifty years. Growth in skill levels slowed, however, in the 2010s, despite strong investment in education. While its education system is of high quality, the country still has a gap to close with the APO's leading high-income economies in terms of years of schooling.

Other important works remain to be done to bring public health into line with standards common to high-income countries. The World Bank has urged Malaysia to focus on nutrition to reduce childhood stunting. Better health and education outcomes will enable Malaysia to build its human capital, contributing to higher productivity [5].

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[2] OECD. OECD Economic Surveys: Malaysia; 2019. doi: 10.1787/eaaa4190-en. Accessed on 30 March 2021.

[3] WTO. Trade Policy Review of Malaysia; 2017. doi: 10.1017/CBO9781107415324.004. Accessed on 24 March 2021.

[4] IMF. Malaysia, Staff Report for the 2020 Article IV Consultation; 2020.

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MONGOLIA

Mongolia is a lower-middle-income economy that began its transition in the early 1990s from a socialist economy toward a market-oriented democracy. It has since achieved substantial development results, and its average income has increased four-fold since 1970. In 2017, Mongolia had the fastest growing GDP and GDP per capita among APO countries. The Mongolian population is the second smallest among APO economies, but it is growing at the second-fastest rate. Unlike many other economies in the APO that are facing serious challenges due to ageing populations, Mongolia has the lowest old-age dependency ratio in the APO. The relatively low employment rate, likely due to high informal employment particularly in the large agricultural sector, has improved slightly since 2010 (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	3.1 (2017)	19	1.8 (growth rate in 2010–17)	2
Rural population proportion (%)	29.1 (2010)	16	31.7 (2017)	13
GDP (USD billion at PPP, % per year)	40.1 (2017)	19	7.9 (growth rate in 2010–17)	1
GDP per capita (USD at PPP, % per year)	12,800 (2017)	9	6.9 (growth rate in 2010–17)	1
Employment rate (%)	37.5 (2010)	17	39.6 (2017)	13
Age dependency ratio (%)	45.9 (2010)	13	50.3 (2017)	9
Old-age dependency ratio (%)	5.8 (2010)	20	6.0 (2017)	20

Source: Appendix G.

Productivity Performance

Labor productivity (LP) levels in Mongolia were ninth highest among APO countries in 2017. LP growth has been relatively high for the last two decades, improving from 3.9% a year in the 2000s to 5.3% in the 2010s. Similarly, average annual total factor productivity (TFP) growth was the second highest in the APO (see Table 2) at 2.4% a year in the 2000s and 2% in the 2010s.

The Mongolian economy has benefitted from an abundance of mineral resources that has attracted significant foreign direct investment (FDI); an educated population; and proximity to two large economies, namely, PR China and Russia [1]. Since Mongolia began its transition to a market-oriented economy, all measures of productivity growth have improved substantially (see Figure 5). However, major risks to sustained productivity growth include an uncertain business environment and irregular treatment of FDI; corruption; and bottlenecks caused by underdeveloped transport infrastructure in what is the most sparsely populated country in the world [1].

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	0.3 (2010)	10	15.0 (2017)	9
Labor productivity growth (% per year)	3.9 (2000–10)	7	5.3 (2010–17)	5
TFP growth (% per year)	2.4 (2000–10)	2	2.0 (2010–17)	2

Source: Data and calculations from APO Productivity Database 2019.

Substantial gains in living standards have accelerated since the early 2000s (see Figure 1). Income per capita has increased four-fold since 1970, with the 2019 World Economic Outlook data placing Mongolia at 95th position in the world and ninth among APO countries [2]. Life expectancy has increased from 60 to 69 since the early 1990s but remains lower than comparable countries [1]. Inadequate housing, the rise in non-communicable diseases, and air pollution have been identified as undermining public health [1].

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	4.1	1.6	0.6	3.9	5.3	7.6	−0.4
TFP growth	−1.2	−0.7	1.5	2.4	2.0	2.4	1.2
Capital productivity growth	−1.9	−1.3	0.8	2.4	2.3	2.1	2.9
Output growth	6.0	5.2	0.9	6.3	7.9	9.8	3.3
Combined inputs growth	7.2	5.9	−0.6	3.9	5.9	7.4	2.1
Capital growth	7.8	6.5	0.1	4.0	5.6	7.7	0.4
IT capital growth	26.1	13.6	8.6	17.8	7.4	11.2	−2.0
Hours worked growth	1.8	3.6	0.3	2.5	2.6	2.2	3.7
Labor quality growth	4.3	1.2	−2.8	1.8	3.8	4.6	1.8
Capital deepening	3.7	2.0	−0.2	1.1	2.1	3.8	−2.2

Source: Author's estimates based on data from APO Productivity Database 2019.

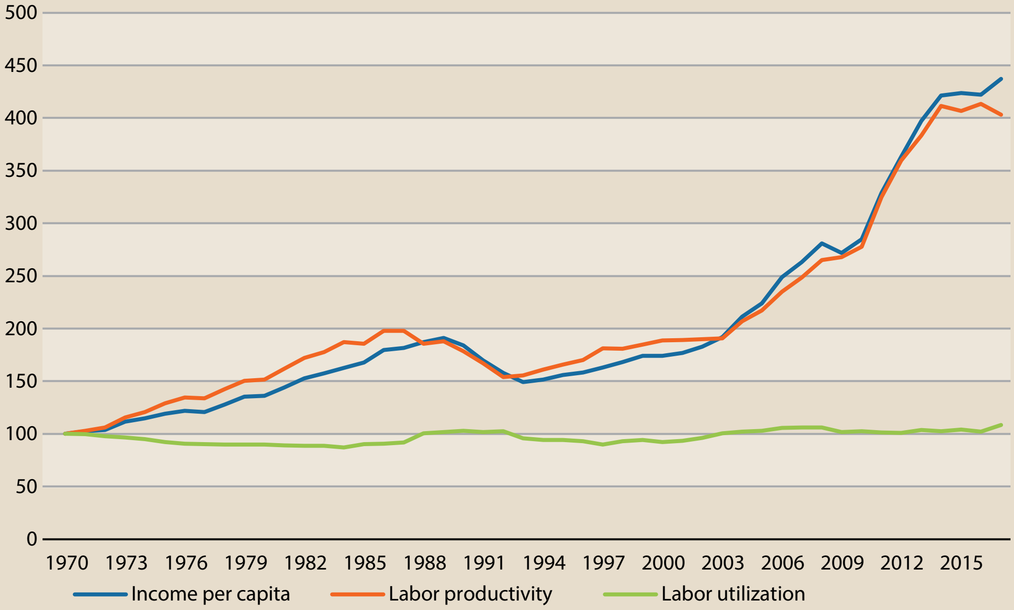
While Mongolia experienced a recession in the early 1990s, the IMF has described Mongolia's speed of recovery as moderately fast when compared with other transition economies [3]. Privatization of state-owned enterprises in the 1990s increased the private sector's share of GDP from about 4% in 1990 [3] to approximately 80% by 2019. The private sector also had 75% share of employment by 2019 [4]. Output growth rebounded to high average annual growth rates of 6.3% in the 2000s and 7.9% in the 2010s (see Table 3 and Figure 2). However, Mongolia remains highly vulnerable to external shocks in commodity prices and demand, particularly from PR China, given that 80% of Mongolian exports are minerals; 90% of exports go to PR China; and half of the FDI inflows are directed to a single mining project [5].

Capital accumulation, as in many other transition economies, was the most important source of output growth prior to transition, with negative contributions of TFP growth in the 1980s and 1990s (see Figure 4) [3]. However, after the 1990s, TFP growth accounted for almost the entirety

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

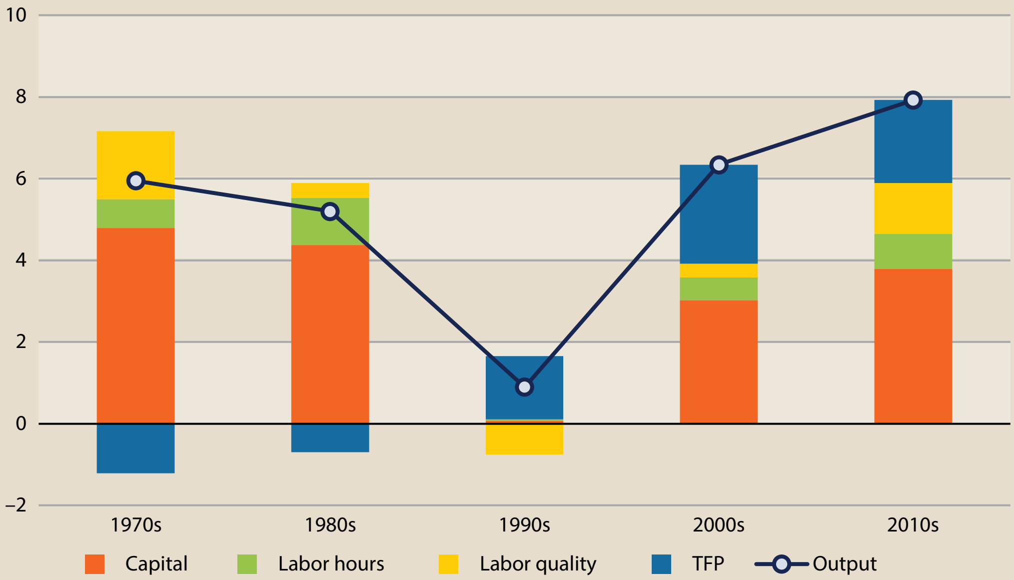


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines are formed from a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

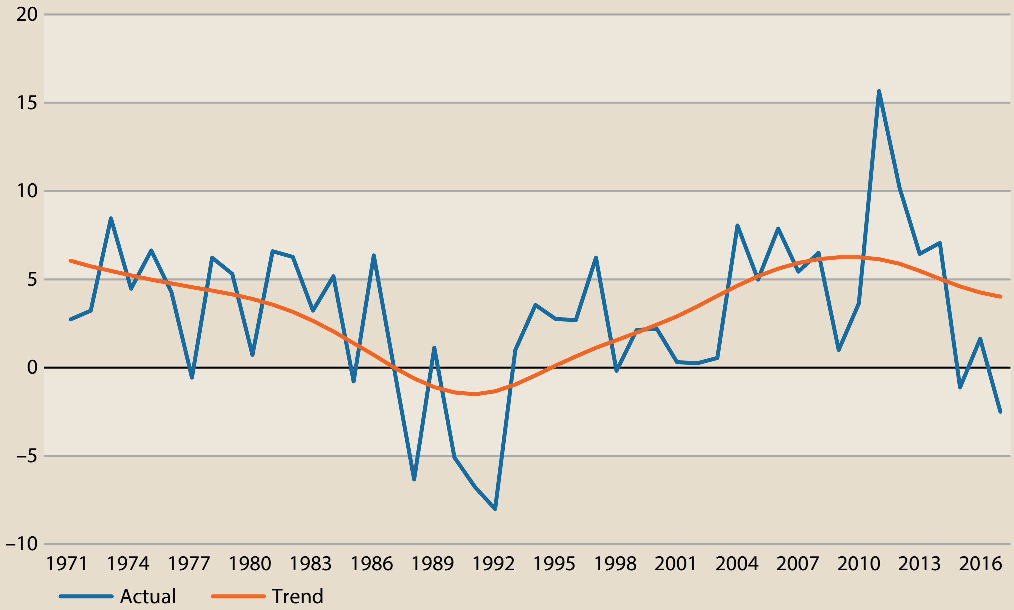


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines are formed from a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

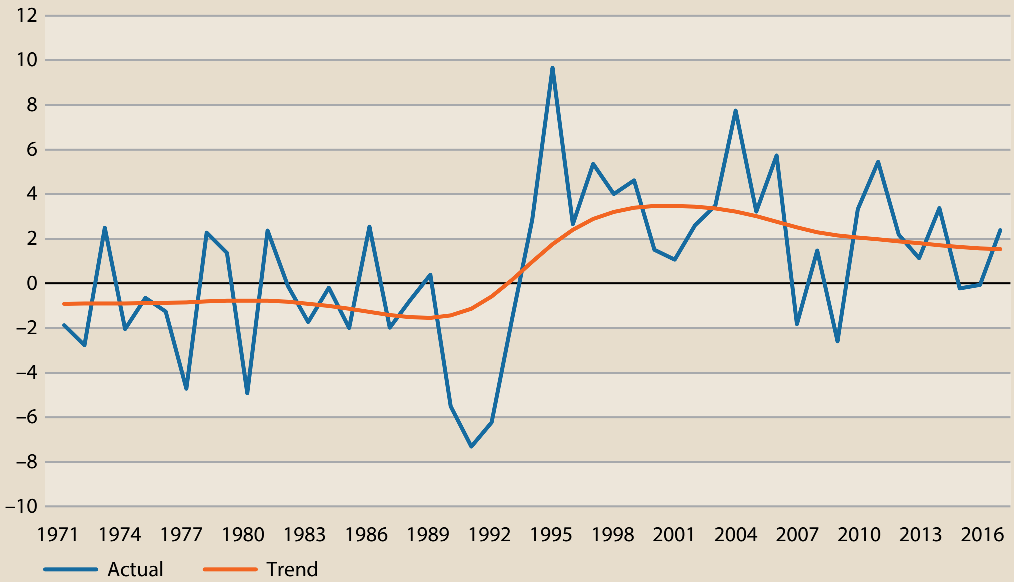


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines are formed from a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

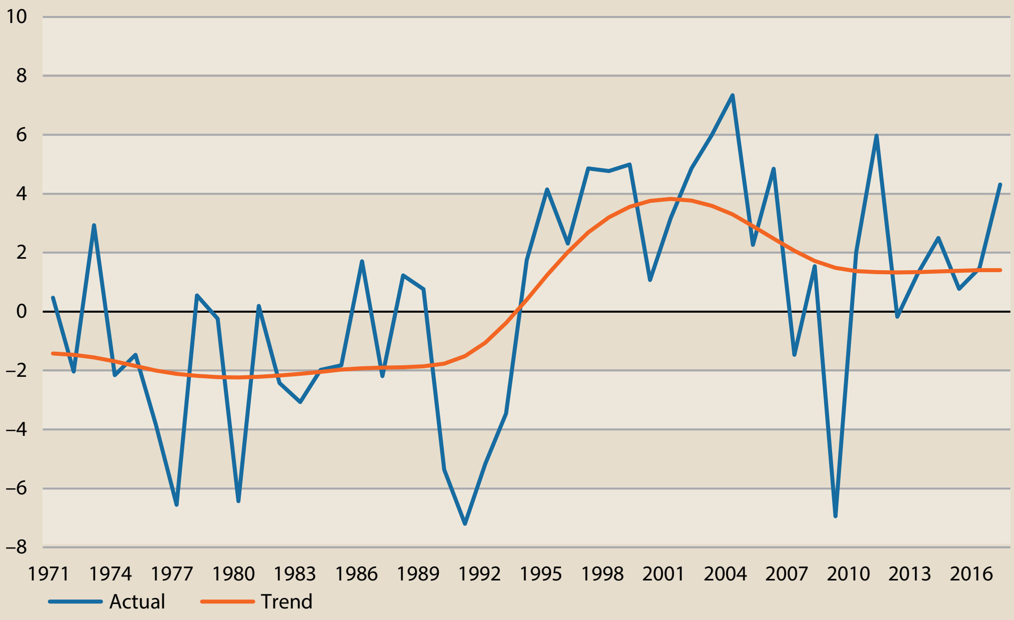


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines are formed from a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

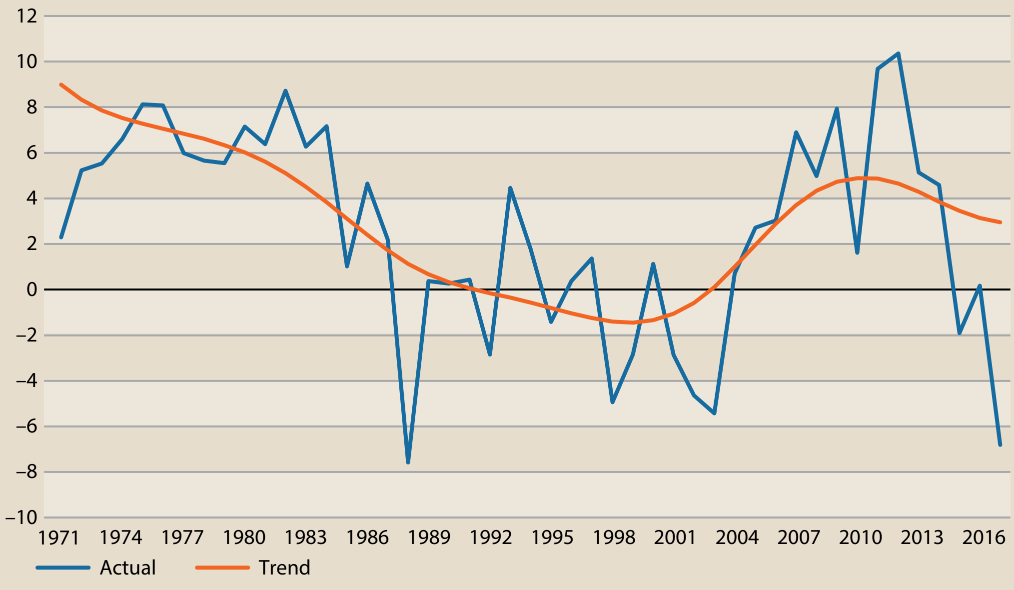


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines are formed from a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines are formed from a Hodrick–Prescott filter.

of output growth, maintaining high contributions of around 60% of output growth in the 2000s and 40% in the 2010s. Capital growth returned to account for almost half of output growth in the 2000s and 2010s, although IT capital made only very small contributions to this capital growth. Labor-quality growth's contributions were negative in the 1990s because the collapse of the erstwhile Soviet Union meant the evaporation of its generous education subsidies, with education spending plummeting in the early 1990s [6]. Although expected years of school fell from 10 years in 1989 to 7.7 years in 1994, it then doubled to 14.3 years by 2010 [6]. This improvement in educational outcomes corresponded with an improvement in the contribution of labor quality to output growth (16% in the 2010s), as seen in Figure 2.

Mongolia has experienced negative TFP growth in the 1970s and 1980s, indicative of misallocated resources in a centrally planned economy [3]. Following its 1990s market transition, it has experienced robust TFP growth of 1.5% in the 1990s, 2.4% in the 2000s, and 2% in the 2010s (see Figure 4).

Capital productivity growth grew substantially from the mid-1990s, reaching an average of 2.4% a year in the 2000s (see Figure 5). While it has subsequently fallen, the sustained positive capital productivity growth suggests there could be an underinvestment in capital. The World Bank has attributed below-potential capital accumulation to 'irregular treatment of FDI and an unpredictable investment climate.' Indeed, there has been little mobilization of local savings into productive investment, with most capital investment funded by foreign savings [1]. Limited access to finance for the local corporate sector and SMEs has also been identified as a constraint [1]. The Investments Act (2013) was introduced to incentivize FDI inflows by guaranteeing stabilization of taxes for foreign investors and remove certain FDI restrictions [7].

LP growth fell in the 1990s before rising in the 2000s to a trend peak of 6.3% by 2010, followed by an easing in the 2010s to a trend growth rate of 4% in 2017 (see Figure 3). The rise in LP growth over the 2000s can be attributed to increased capital deepening, seen in the dramatic rise in the capital–labor ratio's growth over the 2000s (see Figure 6), as well as the return to positive labor quality growth and the improvement in TFP growth. Despite improved overall labor quality, the World Bank has identified skill mismatches of recent graduates, particularly from tertiary institutions as a factor behind stagnating productivity in high value-added jobs as the economy becomes more complex [1].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Levels of capital intensity have stayed relatively stable since 2010, seeing Mongolia's ranking fall from 14th to 19th in the APO (see Table 4). While capital deepening has been moderate on an average over the past decade, it fell to negative levels in 2017. IT capital deepening was one of the lowest in the APO in 2017.

The contribution of labor quality to LP growth was one of the highest over the 2010s, before plummeting to the lowest level of –0.4% in 2017. Mongolian human capital is moderately high, ranking 11th in the APO as measured by the education and training of the current workforce by the

World Economic Forum (WEF). Mongolia, however, has one of the lowest rankings under the WEF Entrepreneurial Culture indicator.

Mongolia lags APO leaders in technological integration and advancements, ranking in the bottom half of APO countries for the availability of the latest technologies as well as the NRI Technology and People pillars.

Agriculture remains an important industry in Mongolia, making up almost 30% of employment in 2017 despite accounting for just over 10% of GDP. Mongolia has one of the lowest shares of manufacturing, including medium- and high-tech manufacturing, in GDP and employment. Mongolia's export/GDP ratio has increased by over 13 percentage points since 2010, showing the importance of trade, particularly in minerals, for the economy.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.6 (2010)	15	2.5 (2017)	19
Capital deepening (pp)	Open	−4.5 (2017)	20	2.1 (average of 2010–17)	9
IT capital deepening (pp)	Open	−0.1 (2017)	19	0.12 (average of 2010–17)	11
Human capital					
Labor quality contribution to LP growth	Open	−0.4 (2017)	20	1.2 (average of 2010–17)	3
WEF Current Workforce	0–100	52.4 (2019)	11	23.7 points behind APO leader	
WEF Entrepreneurial Culture	0–100	44.7 (2019)	= 16	25.7 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.3 (2018)	13	2.0 points behind APO leader	
NRI Technology Pillar	0–100	31.9 (2019)	15	46.6 points behind APO leader	
NRI People Pillar	0–100	35.8 (2019)	11	40.6 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	11.4 (2017 GDP)	10	28.9 (2017 employment)	10
Manufacturing share (%)	Open	10 (2017 GDP)	17	7.5 (2017 employment)	17
Medium- and high-tech share of manufacturing (%)	Open	2 (2010)	19	5 (2018)	18
Exports/GDP (%)	Open	46.6 (2010)	10	59.9 (2017)	7
Imports/GDP (%)	Open	56.5 (2010)	9	57.5 (2017)	6

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100 and give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Mongolia's performance across these four indices is relatively consistent, ranking in the bottom half of the APO (see Table 5). Its overall Productivity Readiness Index has a value of 40, giving it a ranking of 12. It is, however, a long way from the leader, Singapore, which has a score of 100, suggesting there is a lot of reform that could be implemented.

TABLE 5

VALUES OF OVERARCHING INDICES FOR MONGOLIA.

Index	Value	Rank
Motivation	38	12
Capabilities	36	11
Efficiency of markets	42	10
Stability	42	11
Productivity Readiness Index	40	12

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Mongolia has achieved substantial TFP and LP improvements over the last two decades as a result of foreign investment-funded capital deepening; investment in education; and significant privatization of state-owned enterprises since its transition to a market-oriented economy. Analysis of the underlying determinants reveal important areas of improvement for Mongolia's high-productivity growth moving forward.

Infrastructure, an important productivity determinant, is underdeveloped in Mongolia, with the country ranking 15th among APO members for the WEF Infrastructure indicator (see Table 6). Road connectivity, the quality of road infrastructure, efficiency of air transport services, and electricity access are the elements identified in the WEF global rankings as requiring particular attention.

Mongolia has a relatively low ranking for the WEF Financial System and IMF Financial Markets indicators, with ranks of 18 and equal 14, respectively, among APO members. Limited access to finance, particularly for small and medium enterprises (SMEs), is a critical financial-sector constraint [8]. Other relatively low scoring areas in the WEF report include Mongolia's relatively high insurance premiums and the soundness of Mongolian banks. However, it has a high ranking (fourth) for The Heritage Foundation (THF) Financial Freedom indicator, a score it has improved upon since 2006.

Mongolia has varying performance rankings when measuring the strength of institutions. It ranks relatively highly on the IMF Financial Institutions indicators and the World Bank WGI Political Stability indicators, at seventh and equal fourth, respectively, among APO countries. Mongolia also ranked relatively well among APO countries for indicators measuring social capital and citizens' freedom of political participation and communication. However, Mongolia ranks in the bottom half of the APO group for the overall WEF Institutions indicator, and the World Bank WGI indicators for Rule of Law, Control of Corruption, and Government Effectiveness.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	NA	NA	NA
Quality of primary education*	1–7	3.8 (2017)	13	2.4
WEF Skills/Future Workforce	0–100	60.7 (2019)	14	20.7
Education expenditure/GDP* (%)	Open	4.1 (2017)	6	1.1
Innovation system:				
WEF Innovation Capability	0–100	32.3 (2019)	15	47.9
KOF Informational Globalisation, de facto	0–100	81.4 (2017)	9	18.3
Infrastructure				
WEF Infrastructure	0–100	56.6 (2019)	15	38.8
Business environment				
THF Business Freedom	0–100	63.6 (2019)	12	32.6
WEF Administrative Requirements	0–100	61.9 (2019)	15	31.2
WEF Domestic Competition	0–100	38.3 (2019)	19	36.5
THF Tax Burden	0–100	87.4 (2019)	4	5.6
WB WGI Regulatory Quality	−2.5 to 2.5	0.03 (2018)	9	2.2
WEF Labour Market	0–100	64 (2019)	7	17.2
THF Labour Freedom	0–100	75.7 (2019)	5	15.2
NRI Governance	0–100	53.8 (2019)	12	34.4
Financial system				
WEF Financial System	0–100	50.5 (2019)	18	40.9
IMF Financial Markets	0–1	0.15 (2018)	=14	0.67
THF Financial Freedom	0–100	60 (2019)	=4	30
Health system				
Life expectancy at birth (years)	Open	69.7 (2018)	14	15.0
Infant mortality* (deaths/1000 live births)	Open	16.3 (2018)	8	13.8

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	71.3 (2017)	4	20.3
KOF Financial Globalisation, de jure	0–100	58.2 (2017)	7	27.7
FDI Stock/GDP (%)	Open	166.0 (2019)	3	340.5
THF Investment Freedom	0–100	50 (2019)	=11	35
Trade				
WEF Trade Openness	0–100	61.8 (2019)	6	26.9
THF Trade Freedom	0–100	74 (2019)	12	21
Services Trade Restrictions Index*	0–100	NA	NA	NA
KOF Trade Globalisation	0–100	59.9 (2017)	9	36.5
KOF Trade Globalisation, de jure	0–100	51.4 (2017)	11	42.2
Demand				
WEF Macroeconomic Stability	0–100	66.7 (2019)	18	33.3
THF Monetary Freedom	0–100	74.2 (2019)	10	11.4
Savings				
Gross savings (% of GDP)	Open	22.9 (2019)	15	25.3
Institutions				
WEF Institutions	0–100	49.8 (2019)	=12	30.6
IMF Financial Institutions	0–1	0.64 (2018)	7	0.29
WB WGI Political Stability	−2.5 to 2.5	0.84 (2018)	5	0.65
WB WGI Rule of Law	−2.5 to 2.5	−0.27 (2018)	12	2.11
WB WGI Control of Corruption	−2.5 to 2.5	−0.43 (2018)	12	2.6
WB WGI Government Effectiveness	−2.5 to 2.5	−0.23 (2018)	13	2.46
Social capital				
WEF Social Capital	0–100	55.9 (2019)	7	7.3
WB WGI Voice & Accountability	−2.5 to 2.5	0.26 (2018)	6	0.76

Source: Appendix G.
Note: * Supplementary indicator.

The WEF Global Competitiveness Report highlights several institutional weaknesses, including judicial independence, the burden of government regulation, the efficiency of the legal framework in settling disputes, property rights, and the future orientation of government. Mongolia performed relatively well in the WEF institutions indicator for conflict-of-interest regulation and shareholder governance from a corporate governance perspective, as well as budget transparency measures [8]. One quarter of Mongolian firms surveyed by the World Bank reported experiencing at least one bribe payment request and 35% identified corruption as a major constraint [9]. Positively, Mongolia's global percentile rank scores for World Bank WGI Control of Corruption and Government Effectiveness have indicators improved by over ten percentile points in the decade from 2009 onward.

The main strengths of the Mongolian business environment lie in its low tax burden and relatively free labor market, ranking fourth and fifth, respectively, among APO countries, as measured by THF [10]. The overall tax burden is just 23.2% of total domestic income, and Mongolia has lowered its tax burden significantly over the last two decades [10]. Primary weaknesses arise out of relatively high administrative requirements, particularly in the time to start a business and a weak insolvency regulatory framework and recovery rate. Mongolia also has one of the lowest scores for domestic competition in the world, with the domestic market considered to be dominated by a few business groups, a highly distortive effect of taxes and subsidies on competition, and low competition in services [8].

Mongolia has average scores among the APO for all four indicators measuring trade openness. THF Trade Freedom score for Mongolia has changed very little over the past two decades. The WEF [8] reports that Mongolia has one of the least complex tariff systems in the world (ranking fifth globally), but border clearance inefficiencies and the very high prevalence of nontariff barriers reduce the openness of trade.

Mongolia's current foreign investment regime is considered to be quite open, with the country's vast mineral resources attracting significant FDI inflows. Mongolia has the third highest FDI stock-to-GDP ratio in the APO. It opened a 'One Stop Service Center' (OSSC) for foreign investors in 2019 to promote and facilitate foreign investment. Other regulatory and legislative inroads, such as the Investments Act (2013), have also been made to encourage FDI inflows.

Challenges Ahead

Mongolia has pursued significant transformations to create a more open and free economy. There remain, however, significant reforms to the underlying infrastructure and institutional foundations so that the country can continue on its path of economic development in the long term. Sustaining high productivity growth in Mongolia is a core part of the solutions to three challenges identified by the World Bank moving forward. These include (1) pursuing a stable and diversified growth strategy; (2) regaining its poverty reduction trend; and (3) strengthening sustainability to reverse environmental stress, particularly given the low productivity of its livestock sector [1].

Mongolia is one the most macroeconomically volatile countries in the APO, only ahead of IR Iran, according to the WEF Macroeconomic Stability indicator. High inflation and concerning debt dynamics identified in the WEF report [8], as well as high exposure to global commodity price and demand shocks, given that mining made up 26% of GDP and 80% of exports in 2017 [5], all contribute to instability. A diversified growth strategy that aims to improve productivity growth in other important sectors like livestock, agribusiness, and tourism may reduce the external exposure of the economy [5].

Upgrading the infrastructure would strengthen the attractiveness of the tradable sector for investment [5]. In particular, improving road infrastructure and connectivity, the efficiency of air transport, and electricity access across the country are priorities identified by the WEF [8].

Beyond this, the IMF has identified improved governance, transparency, and anticorruption efforts as essential for attracting greater foreign investment. In particular, improving the integrity and independence of the judiciary, enhancing income and asset declaration of people involved in political activities to reduce rent seeking, speeding up the transfer of all tender processes to the e-procurement system, and transparency around allocation of mining licenses are important [11]. Equally, eliminating laws and regulations discriminating between local and domestic investors would help to boost investment [5].

The World Bank has identified a need to enforce existing regulations on the books, noting an ‘implementation gap’ caused by political volatility and politicized policymaking institutions [1]. Despite its high ranking at equal fourth in the WB WGI Political Stability indicator, political instability was considered to be the biggest obstacle by the largest group of firms (35%) in Mongolia [9]. Constitutional amendments that were entered into force in May 2020 are hoped to improve government stability and independence of the judiciary.

Finally, Mongolia ranks towards the bottom of the APO group for indicators measuring the quality of education. Low levels of critical thinking in teaching and very high pupil-to-teacher ratios in primary education are two areas that may be holding back quality improvements in education despite relatively high education expenditure as a proportion of GDP [8]. This is particularly important in the context of a plummeting contribution of labor quality to LP growth, with negative levels of –0.4% in 2017.

Mongolia was very successful in keeping COVID-19 at bay as of August 2020 through a rapid and systematic public response [12]. The swift and effective public health response has however had deep economic effects, including the shrinking of GDP by 10.7% in the first quarter of the year [13]. Productivity growth will be central to Mongolian economic recovery.

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NEPAL

Nepal is a mid-sized nation in terms of population among APO countries. Its rural population's proportion at nearly 81% in 2017 is the highest among APO countries, as is the size of its agriculture sector. Nepal's average income has increased nearly three times since 1970, though income growth has been low relative to other APO countries over the last decade (see Figure 1). The employment rate in Nepal is low and its age-dependency ratio is high (see Table 1) in the APO group.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	28.4 (2017)	12	1.1 (growth rate in 2010–17)	12
Rural population proportion (%)	83.0 (2010)	1	80.7 (2017)	1
GDP (USD billion at PPP, % per year)	91.7 (2017)	16	4.7 (growth rate in 2010–17)	11
GDP per capita (USD at PPP, % per year)	3,200 (2017)	20	2.6 (growth rate in 2010–17)	14
Employment rate (%)	37.9 (2010)	16	41.0 (2017)	12
Age dependency ratio (%)	68.6 (2010)	2	55.9 (2017)	5
Old-age dependency ratio (%)	8.5 (2010)	9	9.5 (2017)	9

Source: Appendix G.

Productivity Performance

Nepal's level of labor productivity is among the lowest in the APO group. Its rates of labor productivity (LP) growth and TFP growth have been relatively weak (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	3.3 (2010)	18	3.9 (2017)	18
Labor productivity growth (% per year)	2.5 (2000–10)	15	2.1 (2010–17)	16
TFP growth (% per year)	−0.2 (2000–10)	19	0.6 (2010–17)	14

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	−0.1	3.1	2.5	2.5	2.1	1.3	4.1
TFP growth	−1.9	−1.1	−1.0	−0.2	0.6	−0.1	2.2
Capital productivity growth	−3.6	−2.6	−1.3	−1.3	−1.4	−1.8	−0.3
Output growth	3.0	4.5	4.8	3.6	4.4	3.5	6.5
Combined inputs growth	3.4	5.8	3.9	3.9	3.5	3.1	4.4
Capital growth	6.6	7.1	6.2	4.9	5.7	5.3	6.8
IT capital growth	0.1	0.05	0.06	0.08	0.1	0.1	0.2
Hours worked growth	1.7	0.8	1.4	0.6	1.3	1.2	1.3
Labor quality growth	0.2	1.8	2.0	1.0	0.03	0.05	−0.03
Capital deepening	1.5	2.4	1.5	1.7	1.5	1.4	2.0

Source: Author's estimates based on data from APO Productivity Database 2019.

Nepal is a low-income country that depends heavily on agriculture and tourism for its output and income. Its growth has been held back by political instability and regulation. Growth has relied heavily on input accumulation and LP growth has relied on capital deepening. TFP growth has been mostly negative, though it has improved since the mid-2000s (see Table 3).

Output growth has varied over the decades. It reached a rate of around 5% a year in the late 1980s and early 1990s. It then eased from the mid-1990s and stayed at around 4% a year through the 2000s. By 2017, the growth rate had fallen to 3.6%. Nepal's growth has been much lower than that of its neighbors during the last 20 years [1].

Nepal's output growth has been sourced from increases in both capital and labor. The contribution of capital accounted for half to three-quarters of output growth (see Figure 2). Growth in labor hours accounted for around 30% of output growth in the 2010s. The labor quality's contribution, indicating a shift toward greater skills, was very strong in the 1990s, though it petered out by the 2010s.

LP growth has been driven by capital deepening rather than by TFP growth. LP growth has been between 2.0% and 3.3% in trend terms since the 1980s (see Figure 3). Capital deepening has played the major role in supporting LP growth, contributing around 1.6 percentage points to LP growth in the 1990s, 2000s, and 2010s. TFP growth detracted from LP growth in all but the last decade. TFP growth has mostly been negative (see Figure 4) and became positive only after 2005. Trend growth in 2017 was 0.5%.

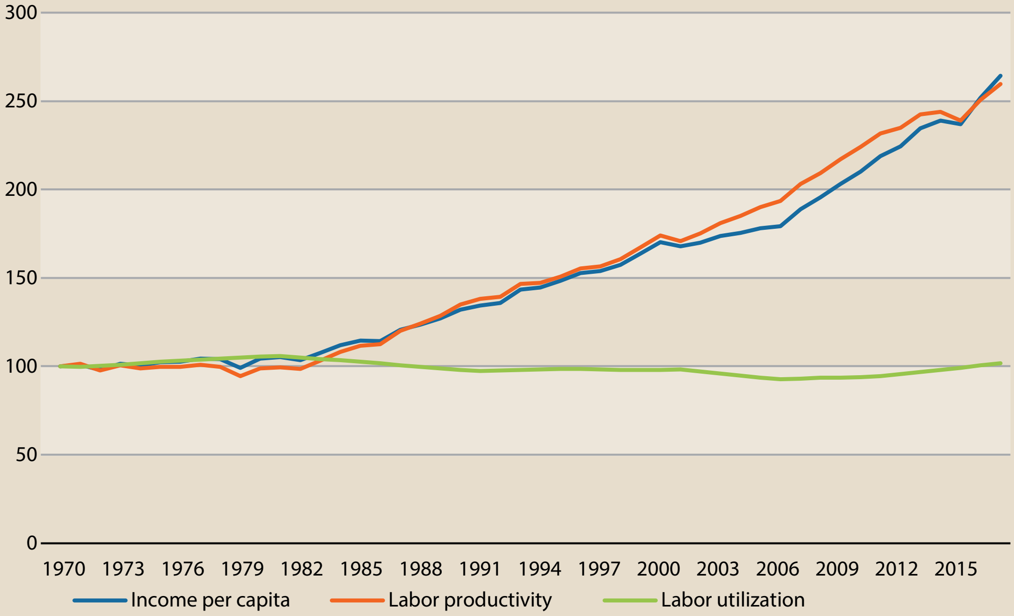
Though capital growth has been persistently high, labor growth has increased as well recently. Less growth in capital accounted for much of the change in the capital–labor ratio (see Figure 6). In 2017, actual growth was very high at 7.2%. Growth in labor input has shown large fluctuations and was on the upswing again in the 2010s, which contributed to the decline in the rate of capital deepening. The actual growth in 2017 was 2.4%, while the trend growth was 1.9%.

Nepal's economic growth has been influenced by various economic reform programs. Between 1970 and 1985, Nepal adopted a series of interventionist and protectionist policies, which resulted in 'a large public sector, dominance of state-owned corporations, and a closed economy' [2]. This period was marked by low levels of investment, low productivity growth, and sluggish output

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

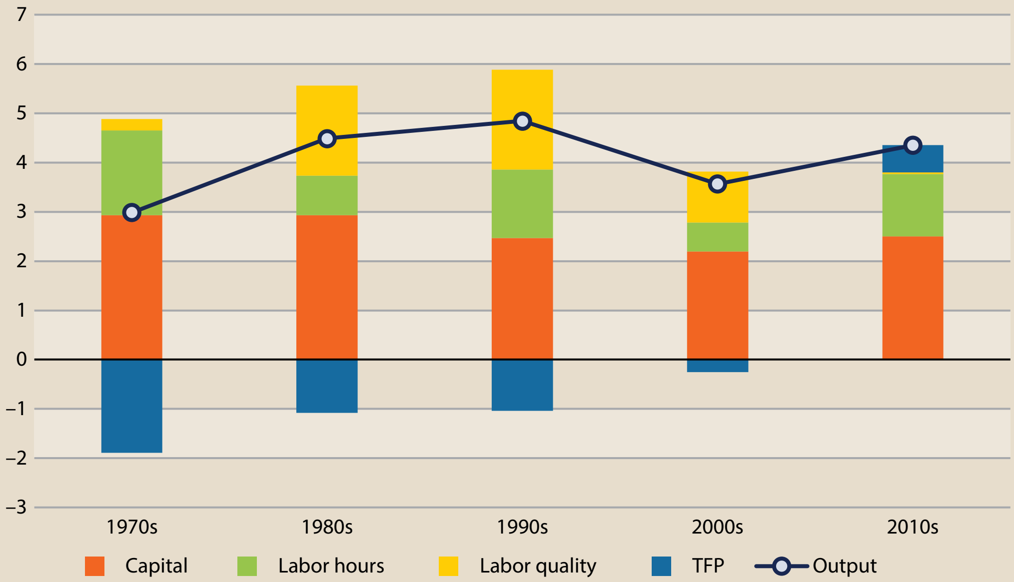


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

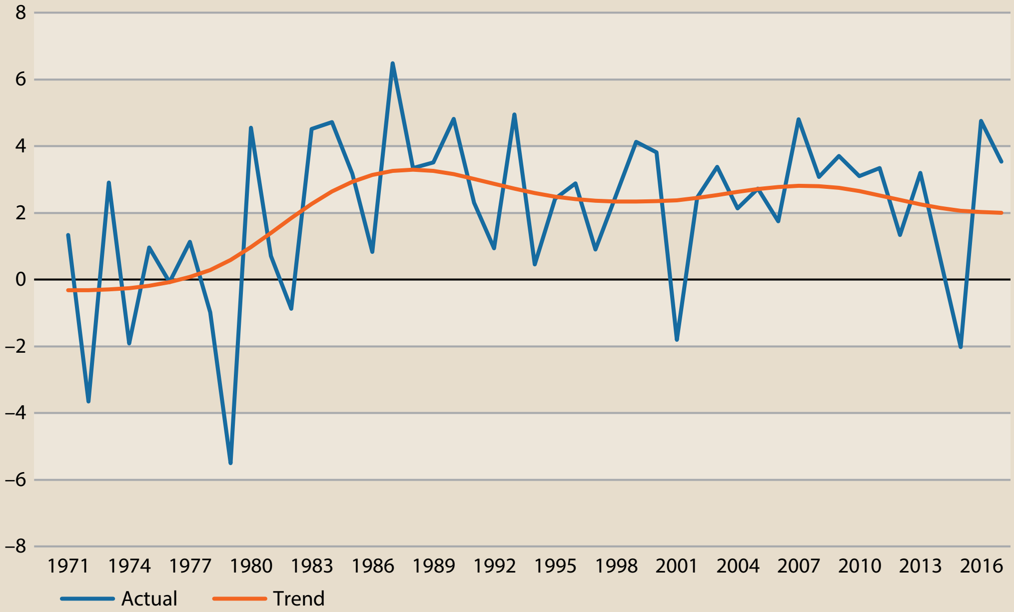


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

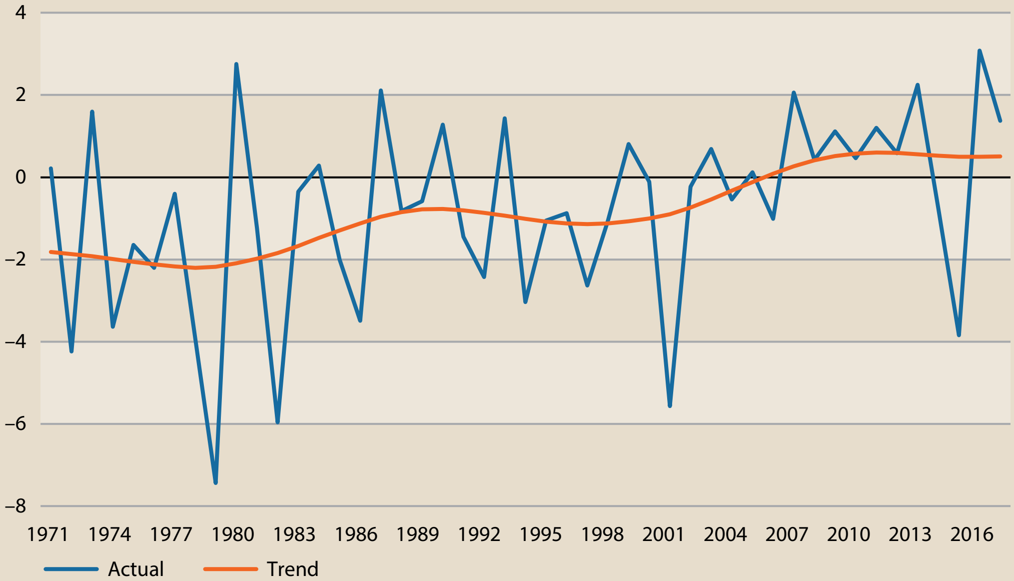


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

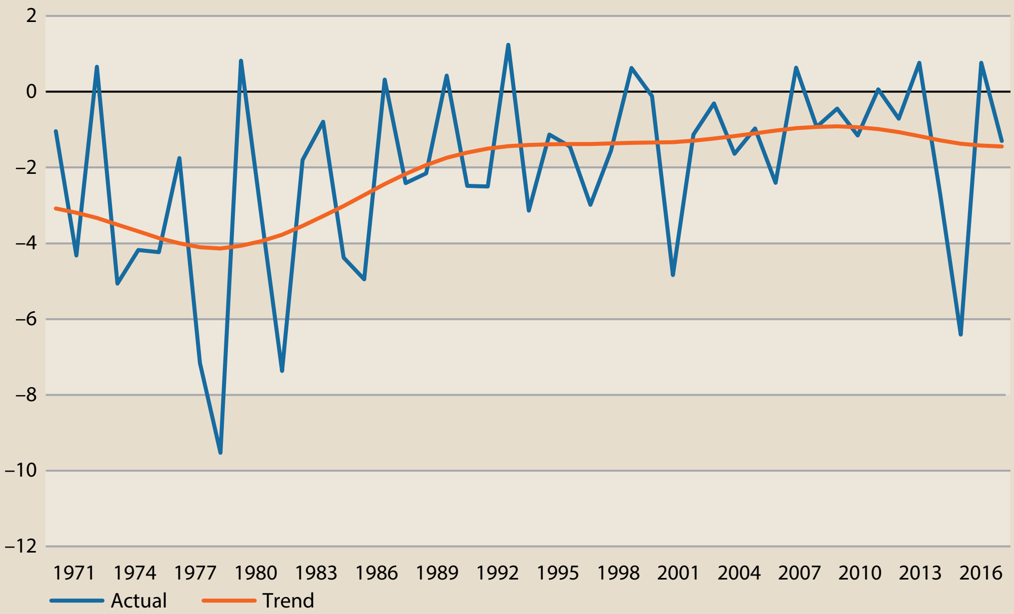


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

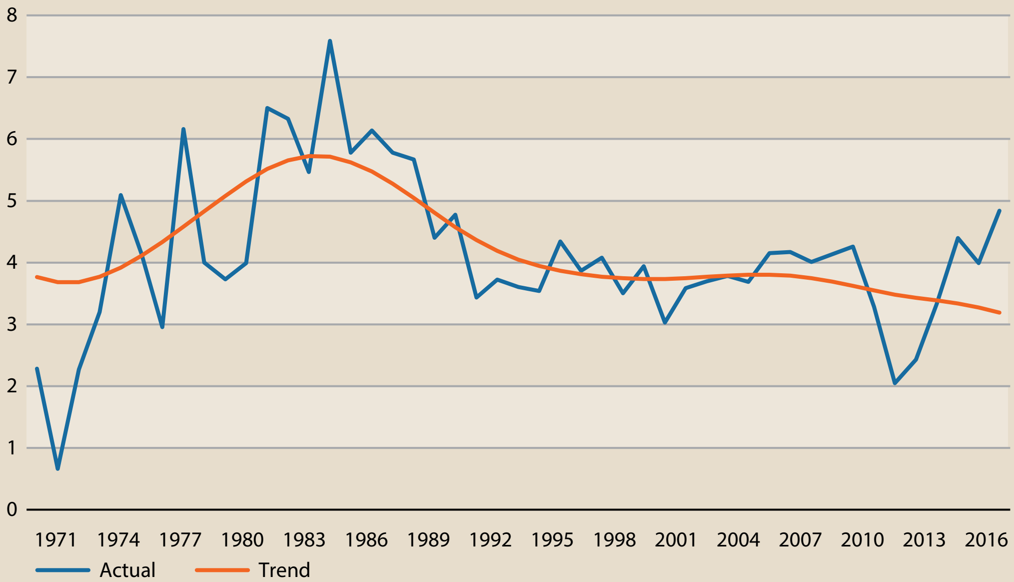


Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's calculations based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick-Prescott filter.

growth. In 1986, the Nepalese government instituted reforms 'aimed at…setting the economy on a sustainable growth path.' Growth during this period averaged 5%, the highest in the country's history. However, beginning in 1996 and up to 2007, a series of unstable coalition and minority governments ruled for short periods, creating political instability and frustrating economic reforms.

Political instability and weak institutions have discouraged infrastructural investments [1]. The poor existing infrastructure has further limited private investment and labor productivity. The same structural issues causing low LP are also believed to be the cause of weak TFP growth [3].

It is suggested that energy shortages, industrial conflict, and political instability have held back manufacturing and some services, thereby retaining workers in low-productivity urban services and agriculture [4]. 'The structure of employment has remained dominated by agriculture and increasingly informal services' [1]. Movement out of agriculture has been into sectors such as urban services, where productivity is declining, making jobs in this sector only marginally better than those in agriculture [2]. According to the World Bank, labor regulations in Nepal have been stifling LP by making it difficult and expensive to fire employees [5]. As a result, firms tend to substitute capital for labor. 'The low productivity of work and underemployment in Nepal mean individuals are substantially more productive when they migrate' [1]. Low income and lack of domestic jobs is given as the primary reason for seeking foreign employment [1].

Although remittances from Nepalese working in other countries have driven private consumption, and thereby welfare growth [1], they take attention away from Nepal's poor business environment. '…Large-scale migration and the ensuing remittances have also contributed to the steady loss of competitiveness…and have enabled the growth of low-productivity services' [2]. These trends have reduced pressure to generate more productive employment at home, furthering weak growth and limiting domestic opportunities. As Nepal exports more workers, the relative cost of production in Nepal has increased as well [1].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Nepal has an above-average capital–GDP ratio, which has only increased over the last decade (see Table 4). IT capital deepening has also increased over the last twenty years, as has overall capital deepening. Nepal is above the average among APO countries on both of these metrics.

On human capital indicators, Nepal is among the lowest in the APO group, though the labor quality's contribution to LP has increased since 2000. The education and skills of the current workforce are low among APO countries. Nepal's entrepreneurial culture indicator, which reveals the country's attitudes toward entrepreneurial risks and describes the growth of innovative Nepalese companies, is slightly better.

Similarly, Nepal's indicators on the knowledge productivity determinant are in keeping with an economy based on agriculture, tourism and mostly low-technology manufacturing.

The Nepalese economy is dominated by agriculture, with agricultural employment as a proportion of total employment being the second largest among APO countries. Nepal's manufacturing sector is small. The country relies heavily on imports but is not a major exporter.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, stability, and the overall Productivity Readiness Index. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Sufficient data were not available to calculate the indices for Nepal.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.9 (2010)	9	3.5 (2017)	8
Capital deepening (pp)	Open	2.2 (2017)	9	1.5 (average 2000–17)	12
IT capital deepening (pp)	Open	0.14 (2017)	8	0.12 (average 2000–17)	9
Human capital					
Labor quality contribution to LP growth	Open	0.0 (2017)	18	0.0 (average 2000–17)	20
WEF Current Workforce	0–100	37.6 (2019)	18	38.5 points behind APO leader	
WEF Entrepreneurial Culture	0–100	44.7 (2019)	= 16	25.7 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	3.8 (2018)	18	2.5 points behind APO leader	
NRI Technology Pillar	0–100	26.1 (2019)	18	52.3 points behind APO leader	
NRI People Pillar	0–100	24.4 (2019)	16	52.1 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	27.6 (2017 GDP)	1	68.6 (2017 employment)	2
Manufacturing share (%)	Open	5.4 (2017 GDP)	19	6.9 (2017 employment)	18
Medium- and high-tech share of manufacturing (%)	Open	8 (2010)	= 16	8 (2018)	15
Exports/GDP (%)	Open	8.8 (2010)	20	8.6 (2017)	19
Imports/GDP (%)	Open	32.4 (2010)	13	44.5 (2017)	10

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Specific Strengths and Weaknesses

Nepal's current indicators suggest that the country lags in areas crucial for furthering economic growth. For Nepal to continue improving its productivity growth, the government should focus on improving the quality of education, building up its infrastructure, and crafting regulation to foster a robust business environment.

The quality of Nepal's infrastructure ranks poorly compared to its global peers, especially its utility infrastructure (see Table 5). While Nepal's airport connectivity performs slightly better, Nepal's road quality, efficiency of air transport services, and efficiency of seaport services are among the lowest in the world. Further, the WEF report shows that Nepal's electricity and water quality rank near the bottom globally [6].

Nepal's institutions have weakened over the last two decades. Except for political stability/absence of violence indicators, Nepal performed worse in 2016 than in 2006 [7]. Metrics scoring Nepal's rule of law, political stability, and government effectiveness place the county in the bottom 20th percentile globally [7].

According to the World Bank, two aspects have contributed to the current institutional weakness: an exclusionary government and the protracted transition during the last decade in which 'the influence of political parties strengthened, and accountability declined.' The current transition to federalism, adopted in the 2015 constitution, provides an opportunity to bridge the gap between an elite ruling class and the rest of the country [7].

While Nepal is below average among APO countries in terms of its business climate, the country has made major investment reforms in recent years [8], including access to credit and contract enforcement. However, the government has increased regulation on starting a business and property registration [8] and the business environment is already heavily saddled with regulation [1].

Additionally, Nepal's financial system faces bottlenecks. Although access to capital has improved recently, there is still a relatively high cost of screening firms for loans, so that 40% of firms in Nepal report access to finance as a major constraint. Despite having generally high income levels, only 8% of migrants can access bank credit. The government has also placed a regulatory cap on the spread of interest rates above the base rate, which reduces the ability of lenders to accurately price credit risks. Finally, most collateral is in the form of land and buildings; those without access to this collateral face restricted access to financing [7]. These structural issues in Nepal's financial systems are visible in the country's indicators, which are below average for the APO group.

Nepal's FDI rates are low compared to its peers. The World Bank states that 'the environment for FDI is not supportive' and cites unclear policies, complex procedures, and inadequate investment facilitation. The same unsupportive attitudes to FDI seem to also apply to trade. Export shares have fallen, and participation in global value chains in low [7]. Nepal's indicators denoting levels of trade and globalization are also among the lowest among APO countries.

Nepal has the highest savings rate among APO countries, in part because of large-scale labor migration. Many of those who go abroad send money back home in the form of remittances. However, the World Bank notes that this income is vulnerable as migrants are concentrated in India and four oil-dependent countries.

TABLE 5

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.7 (2017)	13	2.2
Quality of primary education*	1–7	3.8 (2017)	12	2.4
WEF Skills/Future Workforce	0–100	61 (2019)	13	20.4
Education expenditure/GDP* (%)	Open	5.2 (2017)	1	0
Innovation system				
WEF Innovation capability	0–100	29.4 (2019)	18	50.8
KOF Informational Globalisation, de facto	0–100	62.3 (2017)	19	37.4
Infrastructure				
WEF Infrastructure	0–100	51.8 (2019)	18	43.6
Business environment				
THF Business Freedom	0–100	61.6 (2019)	14	34.6
WEF Administrative Requirements	0–100	66.8 (2019)	12	26.3
WEF Domestic Competition	0–100	43.7 (2019)	17	31.1
THF Tax Burden	0–100	83.4 (2019)	= 8	9.6
WB WGI Regulatory Quality	−2.5 to 2.5	−0.74 (2018)	17	2.97
WEF Labour Market	0–100	49.1 (2019)	18	32.1
THF Labour Freedom	0–100	53.7 (2019)	16	37.2
NRI Governance	0–100	48.2 (2019)	14	40.0
Financial system				
WEF Financial System	0–100	66.4 (2019)	10	25.0
IMF Financial Markets	0–1	0 (2018)	= 17	0.82
THF Financial Freedom	0–100	30 (2019)	= 17	60
Health system				
Life expectancy at birth (years)	Open	70.5 (2018)	13	14.2
Infant mortality* (deaths/1000 live births)	Open	32.2 (2018)	15	29.7

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	25.5 (2017)	19	66.1
KOF Financial Globalisation, de jure	0–100	23.5 (2017)	18	62.4
FDI Stock/GDP (%)	Open	0.6 (2019)	20	505.9
THF Investment Freedom	0–100	10 (2019)	19	75
Trade				
WEF Trade Openness	0–100	42.3 (2019)	16	46.4
THF Trade Freedom	0–100	60.4 (2019)	18	34.6
Services Trade Restrictions Index*	0–100	NA	NA	NA
KOF Trade Globalisation	0–100	38.6 (2017)	16	57.8
KOF Trade Globalisation, de jure	0–100	43.6 (2017)	17	50.0
Demand				
WEF Macroeconomic Stability	0–100	73.9 (2019)	13	26.1
THF Monetary Freedom	0–100	71.2 (2019)	15	14.4
Savings				
Gross savings (% of GDP)	Open	48.2 (2019)	1	0
Institutions				
WEF Institutions	0–100	47.9 (2019)	14	32.5
IMF Financial Institutions	0–1	0.41 (2018)	12	0.52
WB WGI Political Stability	−2.5 to 2.5	−0.60 (2018)	14	2.09
WB WGI Rule of Law	−2.5 to 2.5	−0.48 (2018)	= 14	2.32
WB WGI Control of Corruption	−2.5 to 2.5	−0.67 (2018)	15	2.84
WB WGI Government Effectiveness	−2.5 to 2.5	−0.9 (2018)	20	3.13
Social capital				
WEF Social Capital	0–100	47.9 (2019)	13	15.3
WB WGI Voice & Accountability	−2.5 to 2.5	−0.13 (2018)	13	1.15

Source: Appendix G.
Note: * Supplementary indicator.

According to USAID, Nepal has made considerable progress in expanding learning opportunities for children and adults. While enrolments are high, the quality of education remains low and overall literacy rates hover around 65% [9]. Therefore, the indicator denoting education expenditure is the highest among APO countries, while quality of education and skills among the workforce are about average.

Challenges Ahead

To enhance its productivity growth, Nepal should focus its reforms on improving the quality of its infrastructure and institutions, as well as increasing access to human capital development

After years of political instability, Nepal is transitioning to federalism, which offers an opportunity for political inclusivity and an end to corruption. This transition, if continued smoothly, could diminish the exclusivity and unaccountability of current institutions, allowing for better policy design and more effective institutions. This, in turn, could increase public investment in infrastructure, and strengthen public institutions that support health, education, and access to good jobs [1].

Nepal should also increase opportunities for its population to invest in human capital while also addressing the inequalities among groups that limit access to these opportunities. Increasing human capital will help Nepal to achieve higher LP growth and poverty reduction.

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PAKISTAN

Pakistan is one the most populous APO member countries and has the fastest growing population. It has quite a large rural population, but also has one of the youngest populations among APO countries. Pakistan's average income has increased 3.7 times since 1970 (see Figure 1), but remains low among APO countries. The country has one of the lowest employment rates (see Table 1), though that has slightly increased over the last decade.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	200.3 (2017)	3	2.05 (growth rate in 2010–17)	1
Rural population proportion (%)	63.4 (2010)	8	63.6 (2017)	8
GDP (USD billion at PPP, % per year)	1091.3 (2017)	8	4.4 (growth rate in 2010–17)	12
GDP per capita (USD at PPP, % per year)	5,400 (2017)	17	2.6 (growth rate in 2010–17)	12
Employment rate (%)	30.4 (2010)	19	30.7 (2017)	19
Age dependency ratio (%)	68.4 (2010)	3	64.7 (2017)	2
Old-age dependency ratio (%)	7.4 (2010)	12	7.4 (2017)	18

Source: Appendix G.

Productivity Performance

Pakistan's level of labor productivity (LP) is below-average within the APO group. Its LP growth has picked up markedly over the last decade, and its total factor productivity (TFP) growth (see Table 2) was the highest among APO countries during the same period.

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	7.0 (2010)	14	8.8 (2017)	14
Labor productivity growth (% per year)	1.2 (2000–10)	19	3.3 (2010–17)	11
TFP growth (% per year)	0.9 (2000–10)	13	2.4 (2010–17)	1

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	2.0	5.0	3.3	1.2	3.3	2.9	4.4
TFP growth	0.1	2.7	0.9	0.9	2.4	2.4	2.5
Capital productivity growth	0.1	1.3	−0.2	1.4	3.0	3.0	2.8
Output growth	4.7	7.4	5.2	4.2	4.4	3.9	5.5
Combined inputs growth	1.9	3.7	3.5	−0.2	0.3	−0.2	1.6
Capital growth	4.6	6.1	5.4	2.8	1.4	0.9	2.7
IT capital growth	0.02	0.06	0.03	0.1	0.06	0.05	0.1
Hours worked growth	1.3	1.3	1.0	1.2	0.4	0.4	0.5
Labor quality growth	0.9	0.5	0.7	0.4	0.8	0.7	1.1
Capital deepening	1.0	1.7	1.7	−0.1	0.1	−0.1	0.8

Source: Author's estimates based on data from APO Productivity Database 2019.

Economic conditions in Pakistan have been volatile with rapid and large changes in output, labor and, to a certain extent, in capital. As a result, productivity outcomes have varied. Historically, there has been greater reliance on input accumulation, although stronger TFP growth has been evident in more recent years (see Table 3).

Beneath the volatility, output growth has been quite strong. The rate of GDP growth was 4.7% in the 1970s, increasing to 7.4% in the 1980s, but falling to an average of 5.2% in the 1990s. Actual output growth averaged over 4.2% in the 2000s and the 2010s. In 2017, actual growth was 5.5% (see Figure 2).

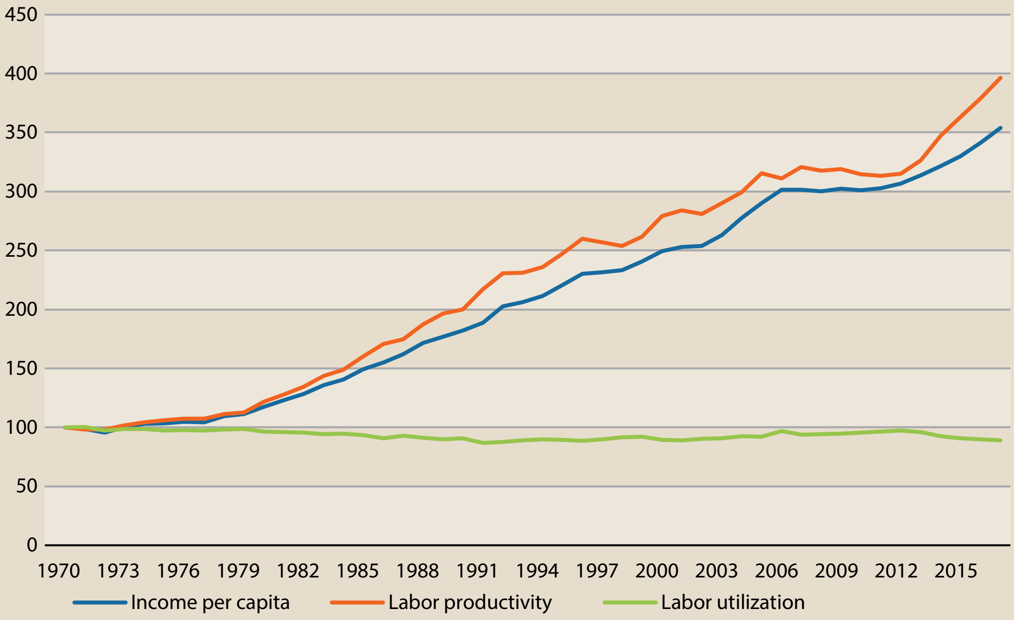
TFP and capital productivity growth have been increasing since the 1990s, but LP growth has only recently improved. LP growth has been weak, following an uneven pattern (see Figure 3). In trend terms, it slid to a low 1.3% in 2009 and then rose to 2.6% in 2017. Actual and trend TFP grew by around 2% in 2017. TFP growth and its contribution to output growth have been strong, especially in the 2010s when the annual rate of increase was 2.4%, accounting for more than half of the output growth in the 2010s. Figure 4 shows volatility around the trend, with high TFP growth in the 1980s, followed by a decline in the 1990s, and an increase in the 2000s and 2010s. Capital productivity growth has also been very volatile, but it has trended further into positive territory in the 2000s and 2010s and was 2.4% in 2017 (see Figure 5).

Weaker capital deepening has been a factor holding back LP growth. This, in turn, has been due to capital growth slowing more than labor growth. Slower growth in the capital–labor ratio (see Figure 6) parallels the slower capital growth from the early 1990s until after 2012. In 2017, the actual growth in capital was, in trend terms, 1.4%. Growth in labor hours also contributed less to output in the 2010s than it did in earlier years, contributing 0.8% to output growth. On the other hand, the rate of upskilling has increased, as indicated by an increase in the rate of labor quality's growth (see Figure 2). Nevertheless, the World Bank notes that in Pakistan '…real wage growth… has been growing by only 1.5% a year…which suggests modest improvement in the quality of jobs' [1].

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

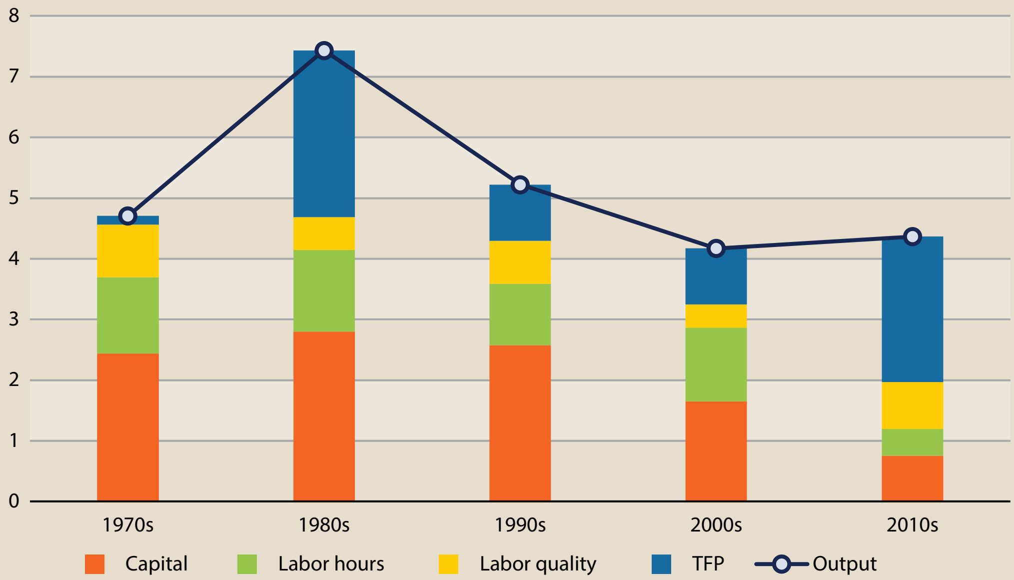


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

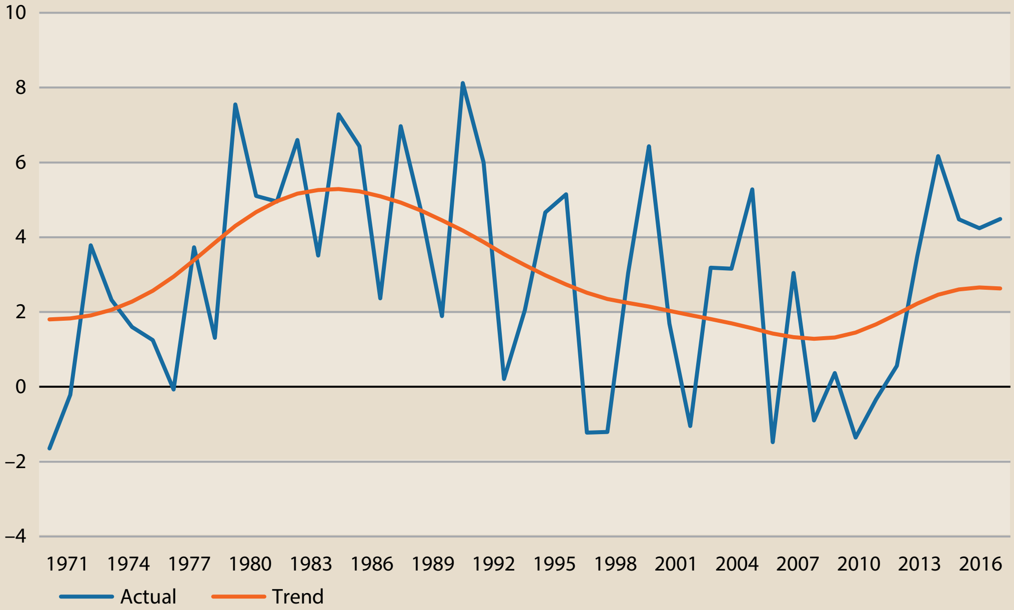


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

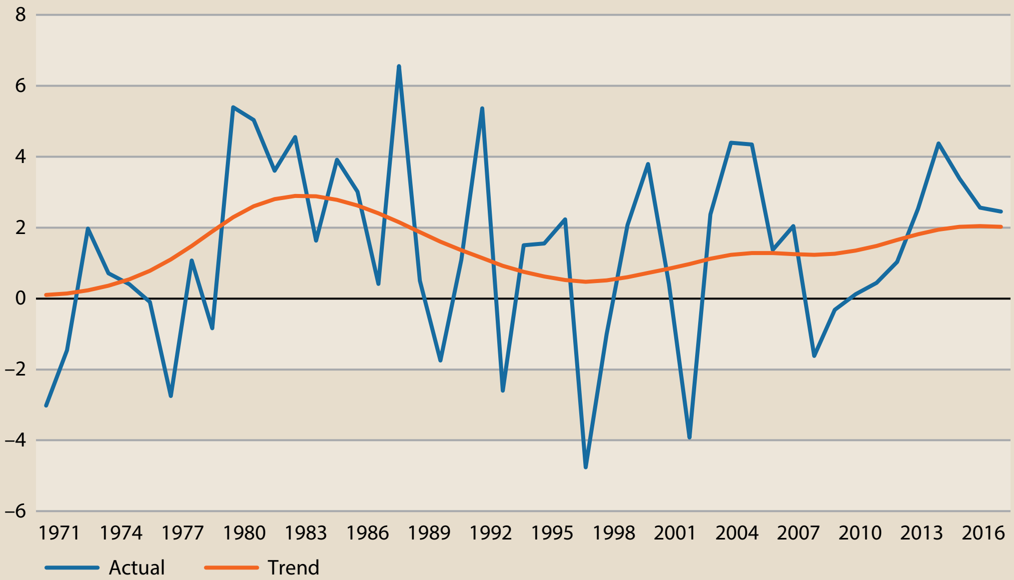


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

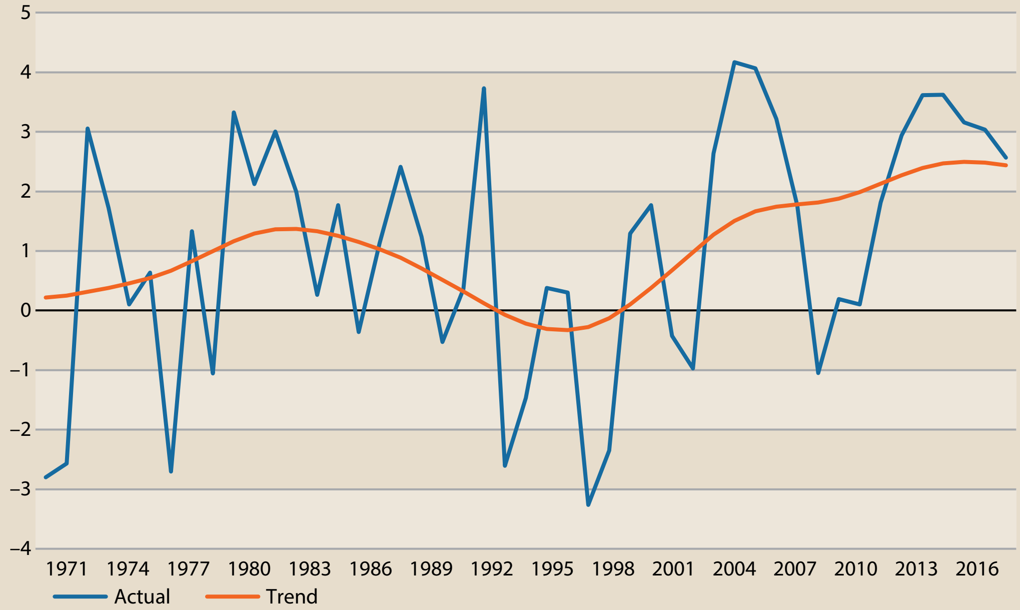


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

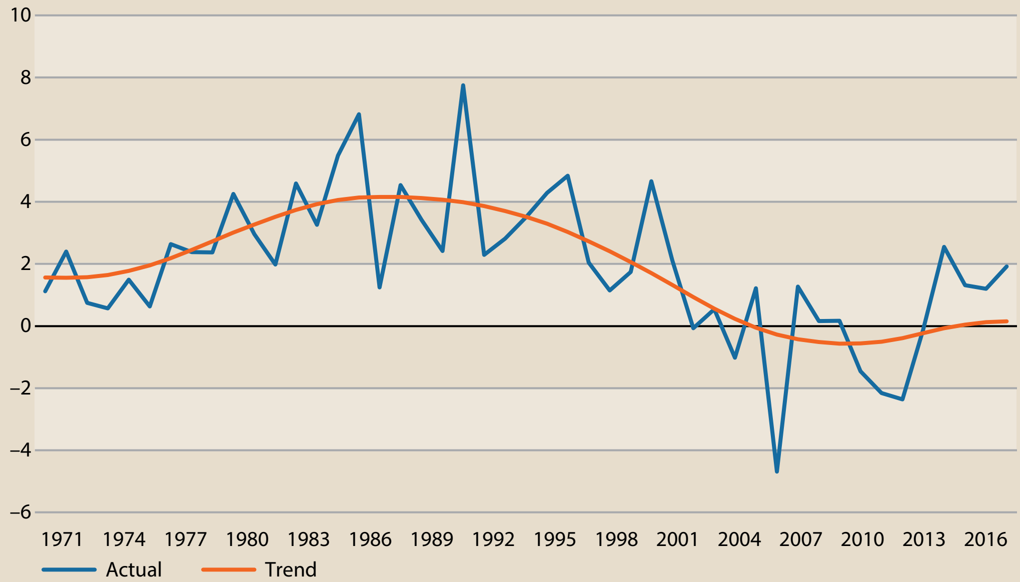


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Pakistan's economic boom–bust cycle has been attributed to the country's turbulent political situation. Growth spurts have tended to be correlated with political stability and an increase in foreign aid [2]. While frequent political disruptions hampered growth in the 1970s and 1990s, economic reform in the 1980s and early 2000s saw increased rates of output growth. In the 1980s and during the exponential growth of the early 2000s, 'improved economic policies and more favorable external factors…. led to an uptick in growth' [3]. However, during the 1970s and 1990s, political disruptions, economic uncertainty, and regional tensions were accompanied by slow economic growth [4].

LP growth has been stagnant in Pakistan because of a shortage of high-productivity jobs and a continued lack of domestic investment. The World Bank attributes some of the decline in LP growth over time to the creation of jobs exclusively in the 'unskilled labor' and 'low productive' agriculture sector [2] in the 2000s. Cho [5] notes that 'transitions out of agriculture into industry and services have been slow, and the growth of productivity within sectors has been negligible.' Though labor productivity has somewhat recovered in recent years, 'lack of investment has held back labor productivity growth' [4]. Indeed, 'Pakistan has remained dependent on foreign saving inflows to sustain its investments' [3]. In past decades, whenever foreign aid 'dried up, economic growth slid back…as domestic saving and investment were never sufficient to sustain the growth momentum' [4]. The World Bank suggests that low domestic savings in Pakistan have contributed to low investment levels. Another author attributed the low investment rate to 'low tax revenues' and an 'inefficient and retrogressive tax regime' [6].

Although labor growth and capital accumulation have slowed, TFP growth in Pakistan has improved over the last two decades as the country has stabilized politically. Although capital accumulation drove labor productivity through the 1990s, '…the contribution of capital accumulation to labor productivity has decreased over time' [4]. TFP growth and labor quality were the sources of LP growth in the 2000s rather than capital deepening (see Figure 6). This pattern coincides with the end of an unstable government in 1999 [7]. 'TFP growth was particularly strong in periods where the macroeconomic environment improved, and political stability ensued' [3]. Finally, Mahmood [8] asserts that capital productivity growth continues as Pakistan has taken steps toward 'utilization of excess capacity in the economy.'

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Pakistan has the lowest capital-to-GDP ratio among APO countries (see Table 4). The country has a low domestic savings rate, as noted above, and its FDI as a percentage of GDP has declined to 0.8% from a peak of 3.7% in the mid-2000s [9].

The labor quality's contribution to LP growth has been one of the highest among APO countries. The WEF report [10] on global competitiveness ranks Pakistan at about average among all countries for its workforce's training and skills. Among APO peers too, Pakistan is at about average on these metrics.

Among the APO group, Pakistan's participation in the digital sphere too has been about average. Pakistan's NRI People pillar, however, shows that the country has been slow to integrate technology into businesses and government institutions. According to the WEF report, Pakistan lags globally in internet and mobile phone subscriptions per capita [10].

The country's economy has a large agriculture sector and a smaller-than-average manufacturing sector. The Pakistani economy is one of the least open, relative both to its APO and global peers. In 2017, Pakistan ranked the last in the APO group for exports as a percentage of GDP, and third-last for imports.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.0 (2010)	20	1.8 (2017)	20
Capital deepening (pp)	Open	1.0 (2017)	16	0.1 (average 2000–17)	17
IT capital deepening (pp)	Open	0.09 (2017)	12	0.05 (average 2000–17)	17
Human capital					
Labor quality contribution to LP growth	Open	1.1 (2017)	3	0.8 (average 2000–17)	6
WEF Current Workforce	0–100	43.1 (2019)	16	33 points behind APO leader	
WEF Entrepreneurial Culture	0–100	51.5 (2019)	11	18.9 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.7 (2018)	8	1.5 points behind APO leader	
NRI Technology Pillar	0–100	32.5 (2019)	14	46.0 points behind APO leader	
NRI People Pillar	0–100	21.1 (2019)	18	55.4 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	24.4 (2017 GDP)	3	39.9 (2017 employment)	7
Manufacturing share (%)	Open	12.8 (2017 GDP)	16	15.9 (2017 employment)	9
Medium- and high-tech share of manufacturing (%)	Open	25 (2010)	=12	25 (2018)	=12
Exports/GDP (%)	Open	13.5 (2010)	19	8.2 (2017)	20
Imports/GDP (%)	Open	19.4 (2010)	18	17.6 (2017)	18

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Pakistan scores low on each of the overarching indices and the overall Productivity Readiness Index (see Table 5). It ranks 14th out of 16 ranked APO countries across the four overarching indices. Particularly when compared with Singapore's scores around 100, this signals that there is plenty of scope for Pakistan to improve its productivity readiness.

TABLE 5

VALUES OF OVERARCHING INDICES FOR PAKISTAN.

Index	Value	Rank
Motivation	30	14
Capabilities	27	14
Efficiency of markets	30	14
Stability	28	14
Productivity Readiness Index	29	14

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Pakistan's infrastructure also lags that of other countries. While Pakistan has relatively widespread access to transportation, much of the country suffers from a lack of water and electricity [10]. Perhaps in some part because of these utility shortages, Pakistan lags globally in terms of its ICT adoption.

Institutions in Pakistan are racked by corruption and ineffectiveness [11]. This institutional failure has led to the lowest levels of political stability in the APO group. While the WEF has found Pakistan's legal system to be among the top one-third globally, terrorism and crime remain rampant [10].

The business environment in Pakistan suffers shortfalls in some areas and performs relatively well in others (see Table 6). On the one hand, according to the WEF report, Pakistan has an above-average entrepreneurial culture compared to its global peers, it is below average compared to its APO peers. Pakistan ranks among the top one-third of countries globally in access to venture capital and administrative requirements to start a business. On the other hand, the country faces high levels of crime and corruption, worsened by a weak regulatory environment [12].

Pakistan also lags its APO peers in terms of FDI inflows. The investment regime 'remains insufficient, impeded by political instability, sectarian conflict, and heavy bureaucracy' [12]. The banking sector is mostly privatized, but 'remains vulnerable to state interference.' Pakistan also has one of the most restrictive trade policies among APO countries. While tariffs are among the highest globally, there are also many nontariff barriers [10].

Pakistan has a young population, and widespread access to education will be crucial to the country's development. However, Pakistan has the highest number of out-of-school children worldwide after Nigeria [13]. Access to education is determined by sex and socioeconomic status, with women and rural populations suffering the most. Further, Pakistan's education system is weakened by dilapidated facilities and widespread corruption.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.8	11	2.1
Quality of primary education*	1–7	3.3 (2017)	17	2.9
WEF Skills/Future Workforce	0–100	38.4 (2019)	19	43
Education expenditure/GDP* (%)	Open	2.9 (2017)	14	2.3
Innovation system				
WEF Innovation Capability	0–100	35.8 (2019)	13	44.4
KOF Informational Globalisation, de facto	0–100	66.4 (2017)	17	33.3
Infrastructure				
WEF Infrastructure	0–100	55.6 (2019)	16	39.8
Business environment				
THF Business Freedom	0–100	54.9 (2019)	17	41.3
WEF Administrative Requirements	0–100	75.1 (2019)	9	18
WEF Domestic Competition	0–100	49.5 (2019)	12	25.3
THF Tax Burden	0–100	80.4 (2019)	13	12.6
WB WGI Regulatory Quality	−2.5 to 2.5	−0.64 (2018)	16	2.87
WEF Labour Market	0–100	51.3 (2019)	16	29.9
THF Labour Freedom	0–100	41.3 (2019)	19	49.6
NRI Governance	0–100	43.4 (2019)	16	44.8
Financial system				
WEF Financial System	0–100	55 (2019)	16	36.4
IMF Financial Markets	0–1	0.16 (2018)	= 12	0.66
THF Financial Freedom	0–100	40 (2019)	= 14	50
Health system				
Life expectancy at birth (years)	Open	67.1 (2018)	19	17.6
Infant mortality* (deaths/1000 live births)	Open	69.3 (2018)	18	66.8

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	33.8 (2017)	16	57.8
KOF Financial Globalisation, de jure	0–100	35.4 (2017)	17	50.5
FDI Stock/GDP (%)	Open	13.5 (2019)	16	493.1
THF Investment Freedom	0–100	40 (2019)	= 14	50
Trade				
WEF Trade Openness	0–100	41.5 (2019)	17	47.2
THF Trade Freedom	0–100	64.8 (2019)	16	30.2
Services Trade Restrictions Index*	0–100	39.2 (2016)	6/14	11.8
KOF Trade Globalisation	0–100	34.2 (2017)	17	62.2
KOF Trade Globalisation, de jure	0–100	44.1 (2017)	16	49.5
Demand				
WEF Macroeconomic Stability	0–100	68.7 (2019)	16	31.3
THF Monetary Freedom	0–100	72.5 (2019)	= 13	13.1
Savings				
Gross savings (% of GDP)	Open	21.1 (2019)	17	27.1
Institutions				
WEF Institutions	0–100	47.7 (2019)	15	32.7
IMF Financial Institutions	0–1	0.31 (2018)	= 16	0.62
WB WGI Political Stability	−2.5 to 2.5	−2.26 (2018)	20	3.75
WB WGI Rule of Law	−2.5 to 2.5	−0.67 (2018)	17	2.51
WB WGI Control of Corruption	−2.5 to 2.5	−0.79 (2018)	16	2.96
WB WGI Government Effectiveness	−2.5 to 2.5	−0.63 (2018)	17	2.86
Social capital				
WEF Social Capital	0–100	46.1 (2019)	17	17.1
WB WGI Voice & Accountability	−2.5 to 2.5	−0.8 (2018)	15	1.82

Source: Appendix G.
Note: * Supplementary indicator.

Challenges Ahead

Pakistan's growth rate and productivity will increase only once anticorruption and probusiness policies are enforced. To address low productivity, the country must create an environment where productivity, and growth, can flourish. '…Pakistan needs to focus on increasing investment by attaining macroeconomic stability…removing infrastructure bottlenecks' and 'simplifying…tax laws…' [4]. Another source states that the most critical problems include 'inadequate infrastructure, inefficient transportation and logistics services, high tariff and non-tariff barriers, and the significant costs that government administrative requirements impose on production and trade' [14]. Lastly, if Pakistan wishes to harness the massive potential of its population, it must increase its investment in human capital. Currently, Pakistan's human capital potential is 'being wasted due to lack of economic mobility, inequality of opportunities, and aspiration gaps' [15]. The education system currently reinforces these inequalities. Expanding educational attainment for female children and those in rural areas could reduce this disparity.

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PHILIPPINES

The Philippines is a country of over 100 million people. Agriculture represents less than 10% of its GDP but accounts for a quarter of the total employment. The Philippines' rural population is large but steadily shrinking as a share of the total, with the creation of city-based jobs in services. In recent years, growth in business services, enabled by the Philippines' large, mostly English-speaking workforce, has helped lift productivity and living standards (see Table 1). GDP per capita in 2017 was almost three times the average income level in 1970. However, the employment rate is low compared with other APO economies and poverty remains relatively high.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	104.2 (2017)	6	1.7 (growth rate in 2010–17)	3
Rural population proportion (%)	54.7 (2010)	10	53.3 (2017)	9
GDP (USD billion at PPP, % per year)	877.2 (2017)	10	6.0 (growth rate in 2010–17)	7
GDP per capita (USD at PPP, % per year)	8,400 (2017)	13	5.8 (growth rate in 2010–17)	2
Employment rate (%)	39 (2010)	12	38.7 (2017)	14
Age dependency ratio (%)	59.6 (2010)	4	56.1 (2017)	4
Old-age dependency ratio (%)	7.7 (2010)	11	8.8 (2017)	14

Source: Appendix G.

Productivity Performance

The Philippines ranks 13th among APO economies in terms of labor productivity (LP), which increased at a relatively modest rate in the 1990s and 2000s but reached an average of 4.1% per year from 2010 to 2017 (see Table 2). Increases in capital per hour worked and solid growth in total factor productivity (TFP) contributed to LP acceleration in the 2010s.

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	7.2 (2010)	13	9.5 (2017)	13
Labor productivity growth (% per year)	2.1 (2000–10)	17	4.1 (2010–17)	9
TFP growth (% per year)	1.1 (2000–10)	10	1.5 (2010–17)	6

Source: Data and calculations from APO Productivity Database 2019.

An acceleration in GDP growth made the Philippines one of the fastest growing economies in Asia in the 2010s. Rising TFP and investment helped lift the economic growth (see Figure 2), with a rapidly expanding services sector increasingly driving the activity. Strong growth in recent years marks a turning point in the country's economic performance, which had lagged the more dynamic economies in the region in the second half of the 20th century.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	1.8	–1.1	1.4	2.1	4.1	4.1	4.1
TFP growth	–0.4	–2.4	–0.7	1.1	1.4	1.9	0.3
Capital productivity growth	–1.0	–1.9	–1.0	1.2	0.7	1.3	–0.7
Output growth	5.8	2.0	3.4	4.7	6.0	5.7	6.6
Combined inputs growth	6.2	4.3	4.1	3.5	4.5	3.8	6.2
Capital growth	6.8	3.8	4.4	3.5	5.3	4.5	7.2
IT capital growth	7.5	9.4	14.9	9.6	10.6	7.5	18.6
Hours worked growth	4.0	3.1	2.0	2.6	1.9	1.7	2.4
Labor quality growth	1.3	2.0	1.6	1.0	1.6	1.3	2.4
Capital deepening	1.6	0.4	1.6	0.6	2.0	1.6	2.8

Source: Author's estimates based on data from APO Productivity Database 2019.

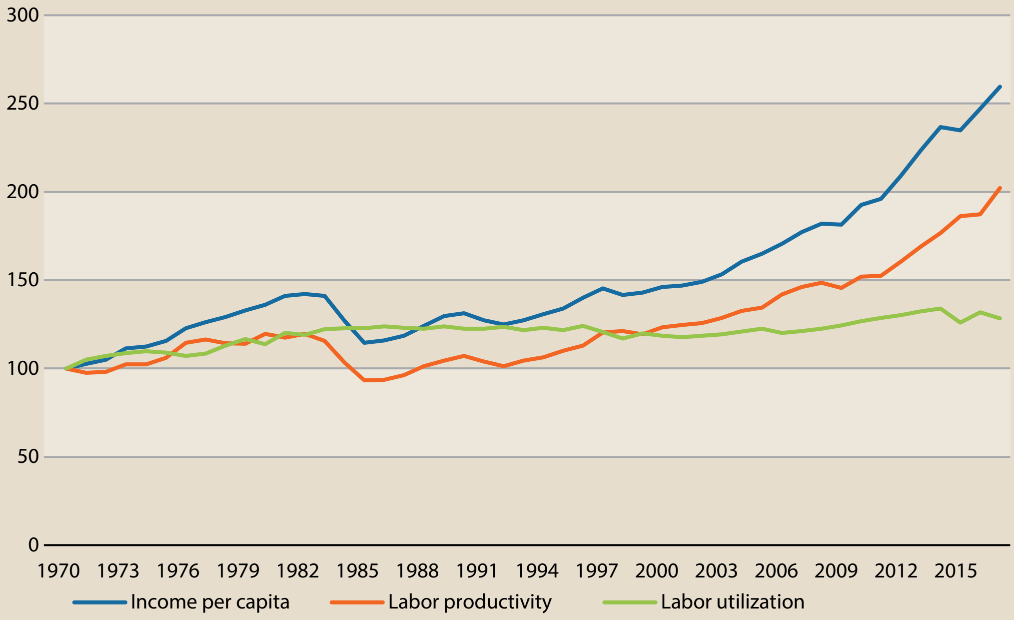
Structural reforms following the restoration of democracy in 1986 facilitated gains in productivity and living standards. Yet progress towards higher average income has not been constant (see Figure 1). Instead, periods of strong growth have been punctuated by years in which political instability, global demand shocks, or natural disasters have caused slower economic growth relative to population growth [1]. Most of the gains in per capita GDP over the past thirty years have occurred since 2000, with faster growth in LP (see Figure 3) supporting a 35% increase in average income over 2010 to 2017. Improved utilization of labor has also contributed to higher living standards. However, these gains have been more modest, with hours per person increasing just 1.3% in total from 2010 to 2017.

As the sectoral composition of GDP and employment has changed over time, so have the drivers of productivity growth. In the 1990s, LP gains reflected movement of workers from the Philippines' low-productivity agriculture industry to higher-productivity services, including financial, real estate, and business services. In the period 2000 to 2017, rising productivity within industries, particularly in manufacturing, contributed to a growth in aggregate LP (see Table 3) [2]. This was partly offset, however, by a decline in employment in manufacturing (a high-productivity industry) relative to other sectors. Manufacturing's share of activity has fallen since the 1980s but still represents one-fifth of total value added, with electronic goods comprising a significant share of the country's merchandise exports. Services, in contrast, have continued to expand. Growth in business process outsourcing, enabled by a large English-speaking workforce, contributed to the growth in services value added in the 2010s [1].

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

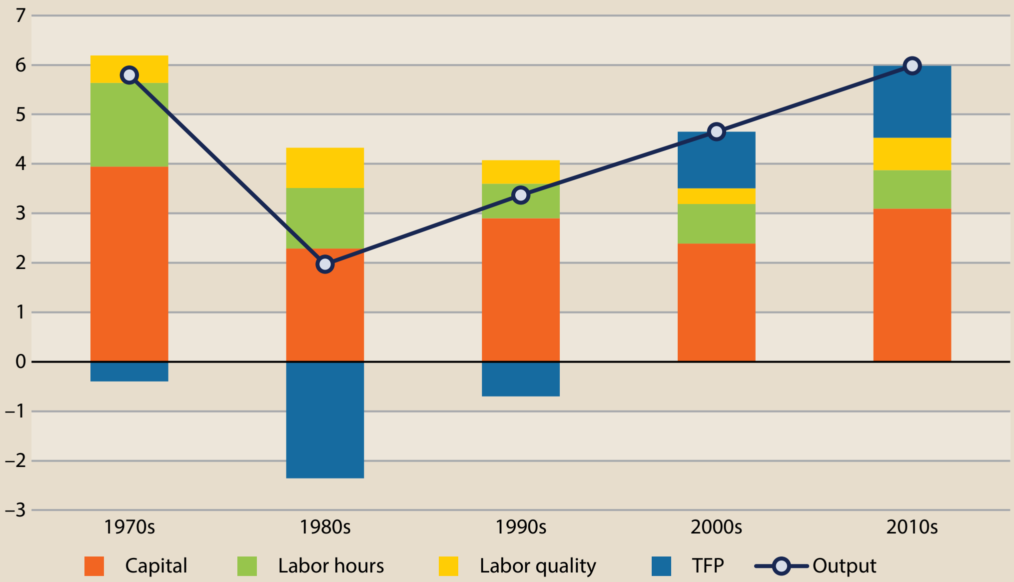


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

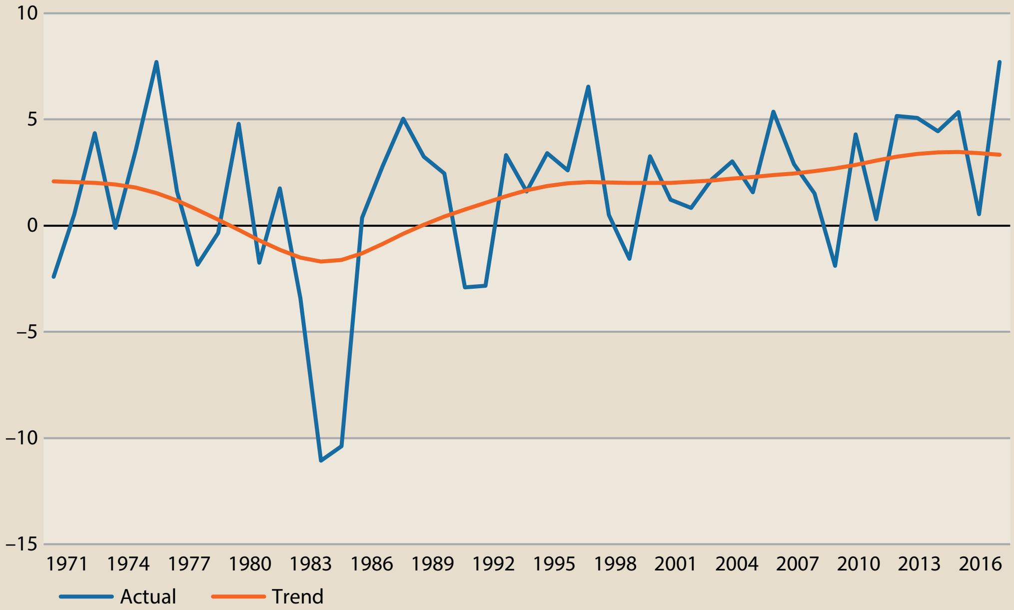


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

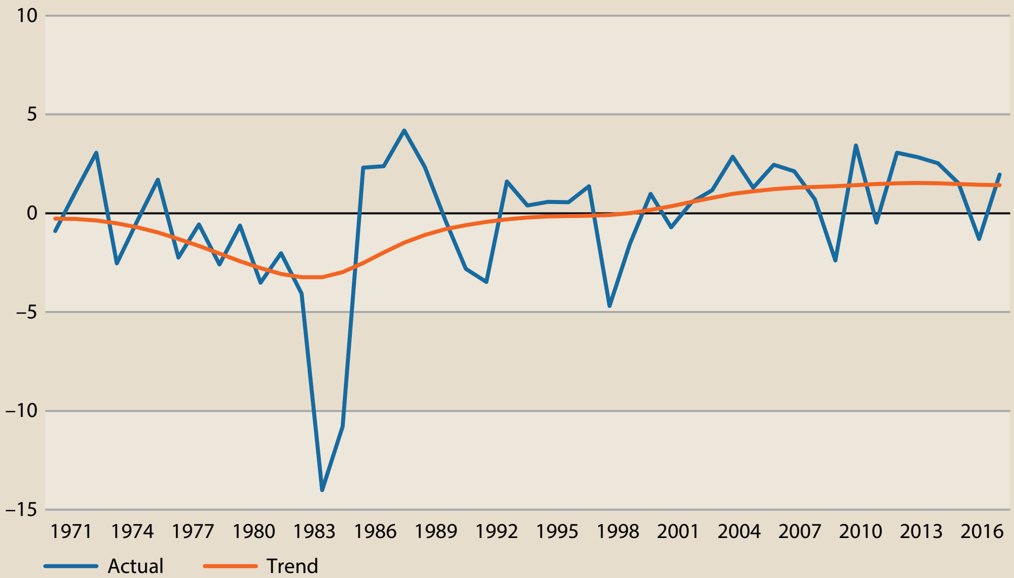


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

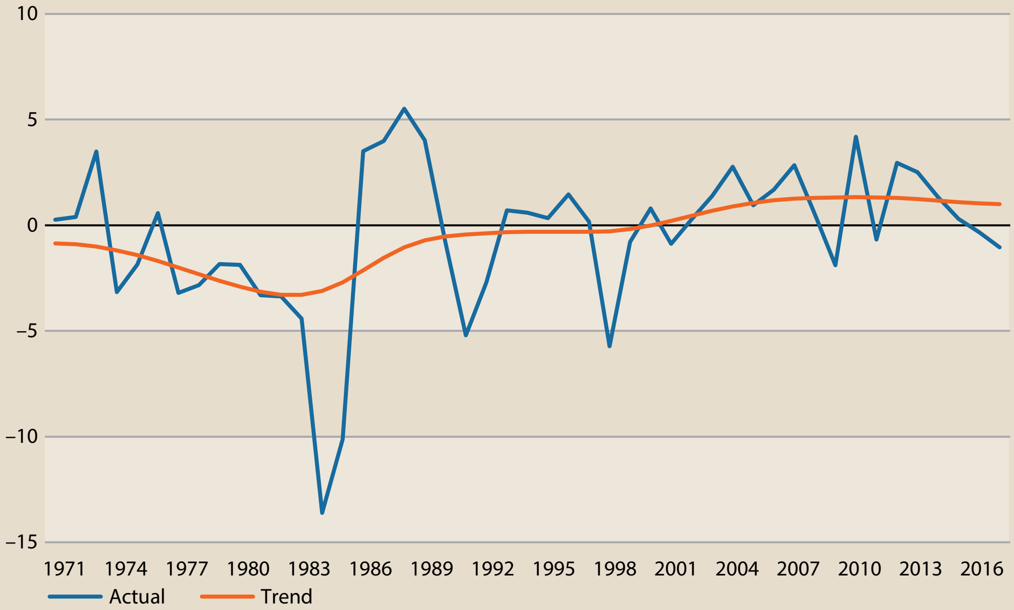


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

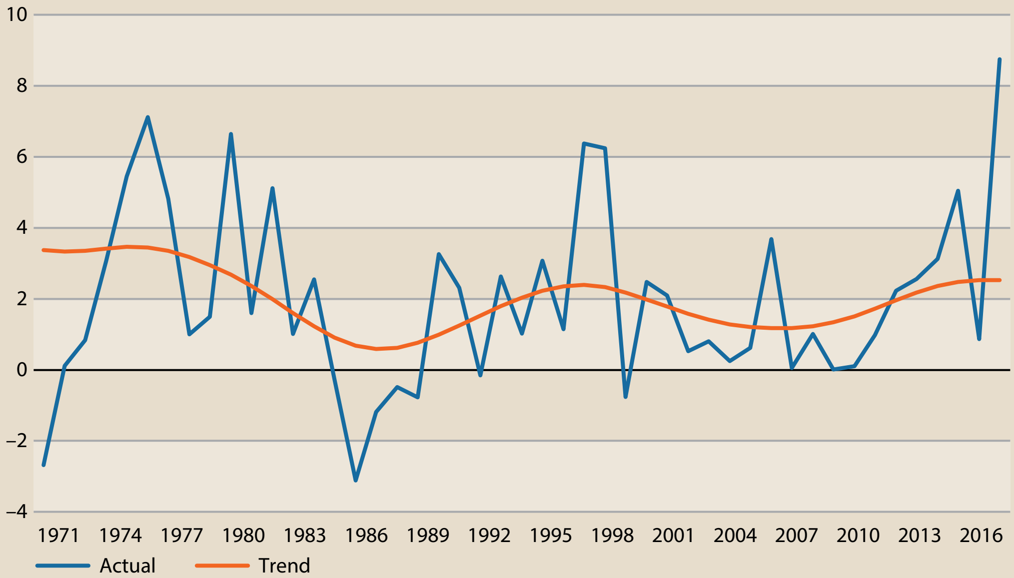


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Capital deepening accounted for roughly half of total growth in LP over 2010 to 2017. After moderating in the 2000s, capital growth picked up in the 2010s with increased public spending on infrastructure [2, 3] (see Figure 6). This is consistent with rapid accumulation of non-IT capital, which grew 5% per year on an average from 2010 to 2017. The stock of IT capital expanded at more than double that rate (11% per year). In contrast, spending on research and development has changed little as a share of GDP since the early 2000s (0.2% in 2017).

Capital productivity fell in 2009 following the global financial crisis (see Figure 5). It has increased in subsequent years.

TFP growth has accelerated since 2000 (see Figure 4), with average annual increases of 1.5% from 2010 to 2017 ranking the Philippines sixth among 20 APO countries. Although its productivity performance started to improve from the 2000s, the skill level of the workforce has risen more consistently over the past 50 years. The growth contribution of labor quality picked up in the 2010s to an average 0.7 percentage points a year. This occurred notwithstanding an ongoing emigration of university-educated workers, a phenomenon which, while supporting rising remittances from abroad, erodes skills available in the local economy.

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

The Philippines' capital-to-GDP ratio rose from 2010 to 2017 and is ranked 11th in size among APO economies, behind most of the group's higher-income members (see Table 4). Capital deepening contributed an average of 2 percentage points per year to growth in LP in the 2010s. The stock of ICT capital also grew at a faster rate than hours worked during this period.

Workers' skills continued to increase in the period from 2010 to 2017, making a solid contribution to gains in LP. The Philippines ranks seventh among APO economies for the World Economic Forum (WEF) Current Workforce indicator, which tracks educational attainment and the training and skills of workforces. This puts the Philippines ahead of all other lower-middle-income APO countries. Indeed, of the APO's upper-middle-income countries, only Malaysia outperforms the Philippines on this indicator, which is consistent with measures of the quality of the country's education system.

Medium- and high-technology goods comprise a large share of locally produced manufactured output as well as imports. This is consistent with the Philippines' participation in cross-border value chains producing ICT goods. The country outperforms most APO economies in its income group on the availability of the latest technologies and ranks 11th on the Portulans Institute's NRI Technology pillar. The Philippines scores particularly high on the NRI People pillar (sixth out of 18 countries), which tracks sophistication of ICT skills and use among broader measures of education and skills. This is consistent with the prominence of ICT in manufacturing but also with the increased production of ICT services brought about by growth in business process outsourcing.

Agriculture and manufacturing together accounted for just under 30% of GDP in 2017 and 34% of the employment. Goods-producing industries remain important to the country's economic performance. However, in recent years, services have been the major growth driver, up from 52% of GDP in 2000 to 60% of GDP by 2017. The combined value of the Philippines' exports and imports was worth 72% of GDP in 2017.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity:					
Capital/GDP ratio	Open	2.8 (2010)	10	2.9 (2017)	11
Capital deepening (pp)	Open	5.1 (2017)	1	2.0 (average of 2010–17)	10
IT capital deepening (pp)	Open	0.44 (2017)	3	0.2 (average of 2010–17)	7
Human capital:					
Labor quality contribution to LP growth	Open	0.7 (2017)	7	0.7 (average of 2010–17)	9
WEF Current Workforce	0–100	64.9 (2019)	7	11.2 points behind APO leader	
WEF Entrepreneurial Culture	0–100	64.1 (2019)	4	6.3 points behind APO leader	
Knowledge:					
Availability of latest technologies*	1–7	4.6 (2018)	10	1.6 points behind APO leader	
NRI Technology Pillar	0–100	38.9 (2019)	11	39.5 points behind APO leader	
NRI People Pillar	0–100	42.2 (2019)	6	34.2 points behind APO leader	
Products and markets:					
Agriculture share (%)	Open	9.7 (2017 GDP)	11	25.9 (2017 employment)	12
Manufacturing share (%)	Open	19.5 (2017 GDP)	8	8.1 (2017 employment)	16
Medium- and high-tech share of manufacturing (%)	Open	46 (2010)	=5	42 (2018)	7
Exports/GDP (%)	Open	34.8 (2010)	11	31.0 (2017)	12
Imports/GDP (%)	Open	36.6 (2010)	12	40.9 (2017)	11

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, stability, and the overall

Productivity Readiness Index (PRI). These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

The Philippines' estimated PRI value of 44 ranks it ninth among 16 APO economies in the database (see Table 5) and second to India among the group of lower-middle-income countries. Reasonable scores for the subindices of motivation, capabilities, and efficiency of markets indices place the Philippines within or just outside the top eight APO economies. In contrast, the country performs less well on the stability subindex, ranking 12th.

TABLE 5

VALUES OF OVERARCHING INDICES FOR PHILIPPINES.

Index	Value	Rank
Motivation	45	9
Capabilities	41	9
Efficiency of markets	46	8
Stability	40	12
Productivity Readiness Index	44	9

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

The Philippines has made good progress in opening its economy to trade and lifting educational outcomes. It also performs well relative to other lower-middle-income APO countries on indicators of the quality of its innovation system, the quality of regulations, and the depth and stability of its financial system. These achievements have been partly undermined by political instability, onerous administrative requirements on starting businesses, and a need for better infrastructure.

The Philippines performs relatively well on forward-looking indicators of workers' skills, such as the WEF Skills/Future workforce index (see Table 6). Especially encouraging is the country's strong performance on the WEF subindex that tracks perceptions of teacher quality, where the Philippines is not far behind the leading APO countries. In contrast, the teacher–student ratio in primary schools is relatively low. While still strong among lower-middle-income APO countries, the Philippines performs slightly less well on indicators of the perceived quality of primary schooling, compared with measures of quality of the overall education system.

Summary indicators of the health of the population are less positive. Life expectancy is lower than that in other countries in the same income group (Sri Lanka, Vietnam, and Bangladesh) and considerably lower than that in high-income APO countries. Infant mortality is relatively high.

The Philippines ranks 14th among APO economies on the WEF Infrastructure indicator. Air and liner-shipping connectivity is reasonably good. In contrast, road quality and connectivity are relatively poor, railroad density is low, and transport service efficiency is low compared with the best-performing countries in its income group. Further, a reasonably large share of the population (12%) is still without access to electricity.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	4.2 (2017)	8	1.6
Quality of primary education*	1–7	4.1 (2017)	10	2.1
WEF Skills/Future Workforce	0–100	62.5 (2019)	11	18.9
Education expenditure/GDP (%)*	Open	2.7 (2009)	16	2.5
Innovation system:				
WEF Innovation Capability	0–100	38 (2019)	= 9	42.2
KOF Informational Globalisation, de facto	0–100	83.1 (2017)	8	16.6
Infrastructure				
WEF Infrastructure	0–100	57.8 (2019)	14	37.6
Business environment				
THF Business Freedom	0–100	59.5 (2019)	15	36.7
WEF Administrative Requirements	0–100	67.4 (2019)	11	25.7
WEF Domestic Competition	0–100	52.1 (2019)	11	22.7
THF Tax Burden	0–100	76.7 (2019)	16	16.3
WB WGI Regulatory Quality	−2.5 to 2.5	0.06 (2018)	8	2.17
WEF Labour Market	0–100	64.9 (2019)	6	16.3
THF Labour Freedom	0–100	57.4 (2019)	14	33.5
NRI Governance	0–100	51.8 (2019)	13	36.4
Financial system				
WEF Financial System	0–100	68.3 (2019)	9	23.1
IMF Financial Markets	0–1	0.34 (2018)	9	0.48
THF Financial Freedom	0–100	60 (2019)	= 4	30
Health system				
Life expectancy at birth (years)	Open	71.1 (2018)	12	13.6
Infant mortality (deaths/1000 live births)*	Open	28.4 (2018)	13	25.9

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	56.5 (2017)	10	35.1
KOF Financial Globalisation, de jure	0–100	58.1 (2017)	8	27.8
FDI Stock/GDP (%)	Open	24.1 (2019)	10	482.4
THF Investment Freedom	0–100	60 (2019)	= 5	25
Trade				
WEF Trade Openness	0–100	63.5 (2019)	5	25.2
THF Trade Freedom	0–100	81.6 (2019)	7	13.4
Services Trade Restrictions Index*	0–100	53.5 (2016)	11	26.1
KOF Trade Globalisation	0–100	58.5 (2017)	10	37.9
KOF Trade Globalisation, de jure	0–100	52.9 (2017)	10	40.7
Demand				
WEF Macroeconomic Stability	0–100	90 (2019)	= 7	10
THF Monetary Freedom	0–100	66.9 (2019)	19	18.7
Savings				
Gross savings (% of GDP)	Open	31.5 (2019)	6	16.7
Institutions				
WEF Institutions	0–100	50 (2019)	11	30.4
IMF Financial Institutions	0–1	0.38 (2018)	= 13	0.55
WB WGI Political Stability	–2.5 to 2.5	–1.08 (2018)	18	2.57
WB WGI Rule of Law	–2.5 to 2.5	–0.48 (2018)	15	2.32
WB WGI Control of Corruption	–2.5 to 2.5	–0.54 (2018)	14	2.71
WB WGI Government Effectiveness	–2.5 to 2.5	0.05 (2018)	11	2.18
Social capital				
WEF Social Capital	0–100	56.1 (2019)	5	7.1
WB WGI Voice & Accountability	–2.5 to 2.5	0.04 (2018)	9	0.98

Source: Appendix G.
Note: * Supplementary indicator.

The Philippines' innovation system ranks second among the APO's lower-middle-income members as measured by the WEF Innovation Capability and KOF Informational Globalisation indicators. This reflects the country's competitiveness in the production of ICT goods and services, which represent a significant share of total exports.

The stock of FDI was worth 24% of GDP in 2019, ranking the Philippines 10th among APO economies, several of which attract foreign investment in significantly greater volumes. In contrast, the Philippines performs very strongly on the WEF Trade openness indicator, ranking fifth in the APO behind four high-income countries. This reflects the relatively low tariff and nontariff barriers to trade and a tariff regime that is less complex than those in place in many other APO countries. Services, on the other hand, remain subject to significant restrictions in some sectors, particularly professional services (see Appendix F). Barriers to trade in services are greater in the Philippines than in the best-performing APO countries in its income group, which include Pakistan, Bangladesh, and Sri Lanka.

The Philippines is close to the middle of the group of lower-middle-income APO countries on proxy measures of institutional quality, such as the World Bank indicators of control of corruption and the rule of law. The Philippines ranks ninth among APO economies on both the IMF Financial Markets and WEF Financial System indicators, i.e., just behind the best-performing countries in its income group. In contrast, the Philippines ranks 18th among APO countries on political stability. This pulls down the country's ranking on broader measures of institutional development such as the WEF Institutions indicator. The Philippines also performs relatively poorly on the WEF Institutions subindices measuring security, judicial independence, and the efficiency of the legal framework for settling disputes.

Despite a relatively high-quality regulatory regime, starting a business is more expensive and time consuming than in other APO economies. This is reflected in the Philippines' performance on the WEF Administrative Requirements index, where it ranks 11th among APO economies.

Challenges Ahead

Reforms since 2010 have improved the business environment in the Philippines by reducing regulations and improving administrative efficiency [1, 3]. Reforms in earlier years are also widely regarded as having laid a foundation for the recent acceleration in TFP growth [4]. This includes steps taken in the 1990s to reduce the burden of regulation, liberalize trade, privatize state-run industries, and eliminate monopolies in key sectors [1]. Liberalization of the financial sector and a commitment to macroeconomic stability have also improved competitiveness [4].

However, more could be done to improve key underlying determinants of productivity, building on efforts to address corruption, promote competition, and alleviate administrative hurdles to starting businesses [1, 3, 4]. Relaxing remaining restrictions on foreign investment and trade, including trade in services, could also facilitate greater knowledge spillovers from other economies [4] and improve the Philippines' competitiveness in global value chains. Work also remains to be done to lift health outcomes and further improve basic education [3].

Beyond navigating the current global health and economic crisis, continued growth in TFP, capital, and skills will be needed to close gaps in productivity with higher-income countries and achieve the government's long-term objective of eliminating poverty.

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SINGAPORE

Singapore developed rapidly through the 1970s and 1980s to become a high-income city-state. There has been more than eight-fold increase in its income per capita from 1970 to 2017 (see Figure 1). Singapore has the highest average income in the APO, which is 50% higher than the next closest average income in Hong Kong. Singapore is the most urbanized economy in the APO, with a relatively small population growing at a moderately high pace. Singapore had the highest employment rate in the APO at 63.3% in 2017. While its total age-dependency ratio is relatively low (ranked 17th in the APO), the population is ageing, and the old-age-dependency ratio is the fifth highest in the APO (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	5.6 (2017)	18	1.4 (growth rate in 2010–17)	7
Rural population proportion (%)	0 (2010)	20	0 (2017)	20
GDP (USD billion at PPP, % per year)	536.0 (2017)	13	4.1 (growth rate in 2010–17)	13
GDP per capita (USD at PPP, % per year)	95,500 (2017)	1	2.6 (growth rate in 2010–17)	13
Employment rate (%)	60.0 (2010)	1	63.3 (2017)	1
Age dependency ratio (%)	35.8 (2010)	19	38.7 (2017)	17
Old-age dependency ratio (%)	12.2 (2010)	6	17.9 (2017)	5

Source: Appendix G.

Productivity Performance

Singapore has the highest labor productivity (LP) level in the APO, leading the second-highest level by more than USD9. Its productivity level is just 9% behind that of the USA (see Chapter 2 in Part A). LP growth has been relatively low over the past two decades (see Figure 3), ranked at 16th in the 2000s and 15th in the 2010s. TFP growth was relatively high in the 2000s (eighth in the APO), but fell to an average of just 0.3% a year in the 2010s (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	53.8 (2010)	1	63.2 (2017)	1
Labor productivity growth (% per year)	2.2 (2000–10)	16	2.3 (2010–17)	15
TFP growth (% per year)	1.2 (2000–10)	8	0.3 (2010–17)	17

Source: Data and calculations from APO Productivity Database 2019.

Rapid industrialization facilitated Singapore's development in the decades after its independence, lifting it from a low-income country to one of the most highly developed economies in the world as a global financial hub and a high value-added producer. About three-quarters of output growth over the decades have been from input accumulation (see Figure 2). While TFP growth has historically made a small contribution to output growth (see Table 3 and Figure 2), there has been a strong government resolve since 2010 for structural reform to raise productivity growth.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	3.7	3.4	3.3	2.2	2.3	1.8	3.6
TFP growth	1.4	0.7	0.2	1.2	0.3	0.1	0.8
Capital productivity growth	0.1	0.1	0.1	1.7	−0.4	−0.3	−0.6
Output growth	8.7	7.4	6.9	5.6	4.1	4.4	3.3
Combined inputs growth	7.2	6.7	6.7	4.4	3.8	4.3	2.5
Capital growth	8.5	7.3	6.8	4.0	4.4	4.6	3.9
IT capital growth	18.1	20.9	13.8	10.1	9.7	9.4	10.5
Hours worked growth	4.9	4.1	3.6	3.4	1.8	2.6	−0.3
Labor quality growth	1.1	2.1	2.9	1.6	1.2	1.2	1.2
Capital deepening	1.8	1.6	1.8	0.3	1.5	1.1	2.3

Source: Author's estimates based on data from APO Productivity Database 2019

The transformation of the Singaporean economy over the past five decades has delivered dramatic improvements in living standards. There has been more than eight-fold increase in income per capita from 1970 to 2017 (see Figure 1). Income per capita in Singapore is fourth highest in the world and the highest among APO countries, according to 2019 World Economic Outlook data [1].

Singapore has experienced rapid output growth for the last five decades, with average annual output growth of 8.1% in the 1970s and 1980s, slowing to 4.1% in the more recent 2010s (see Figure 2). The 1990s, pivoted toward highly cyclical externally oriented industries, had increased output growth volatility [2]. The recent slowing in output growth has been attributed to 'a tightening of global financial conditions, escalation of sustained trade tensions, and deceleration of global growth' [1].

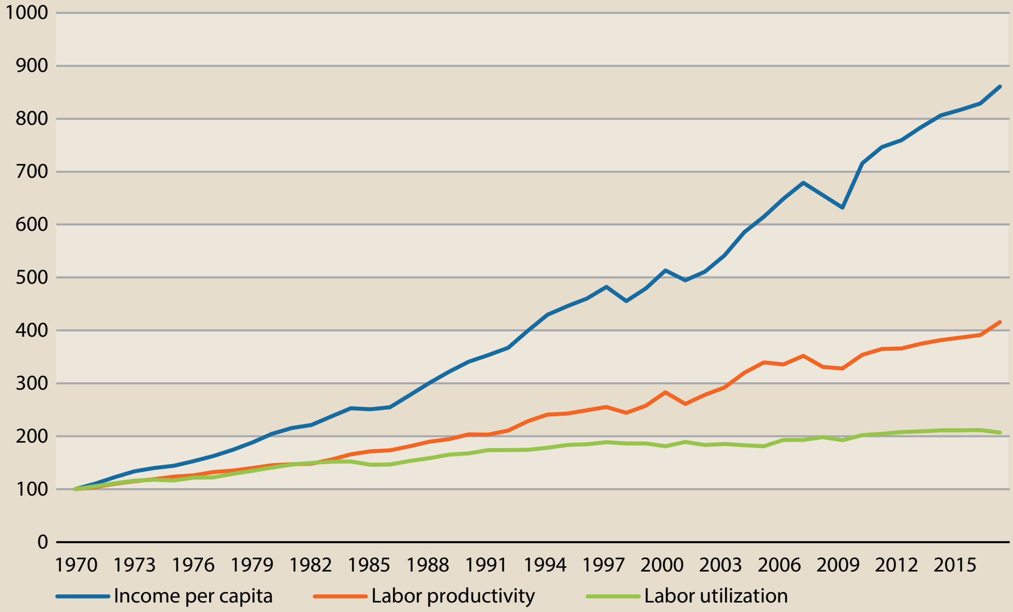
Singapore's development path replaced import-substitution policies in favor of an export-oriented state industrial strategy from the mid-1960s that pursued output growth through input accumulation fueled by foreign investment. Capital growth accounted for about 50% of average annual output growth from 1970 to 2000, dipping to 39% in the 2000s before climbing to 60% in the 2010s. Tax concessions attracted foreign capital investment. Labor hours growth, from rising participation rates and imported foreign labor, which was 38% of the total labor force in 2017 [3], accounted for about one-quarter of average annual output growth since 1970, though this declined to 19% in the 2010s (see Figure 2).

This input accumulation strategy came at the cost of lackluster TFP growth performance (see Figure 4). TFP growth made up 14% of output growth in the 1970s and 1980s, decreasing to just 3% in the 1990s. Increased average annual TFP growth rates from 0.2% in the 1990s to 1.2% in the 2000s temporarily raised the contribution of TFP growth to output growth (see Figure 2), due to a

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

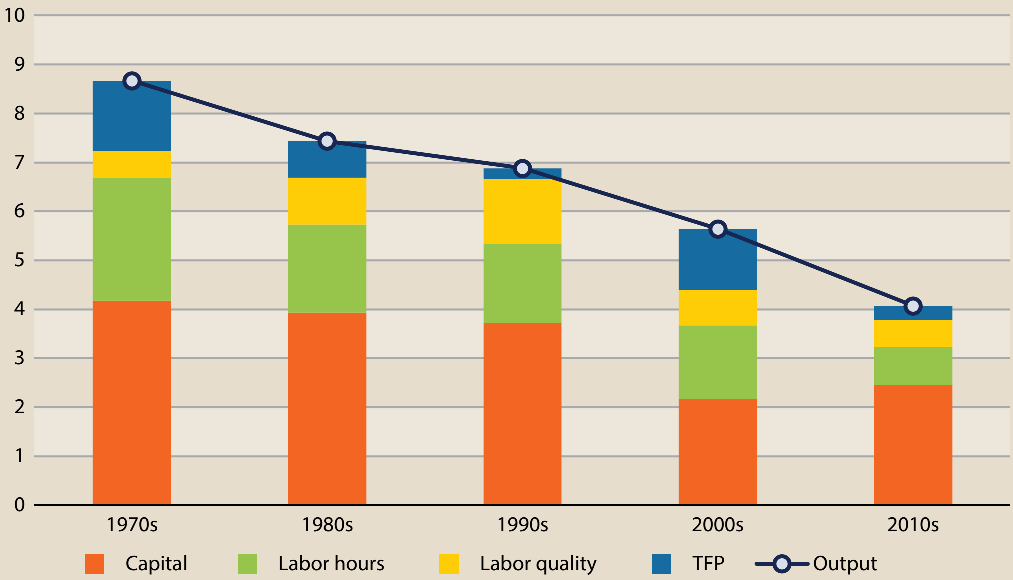


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

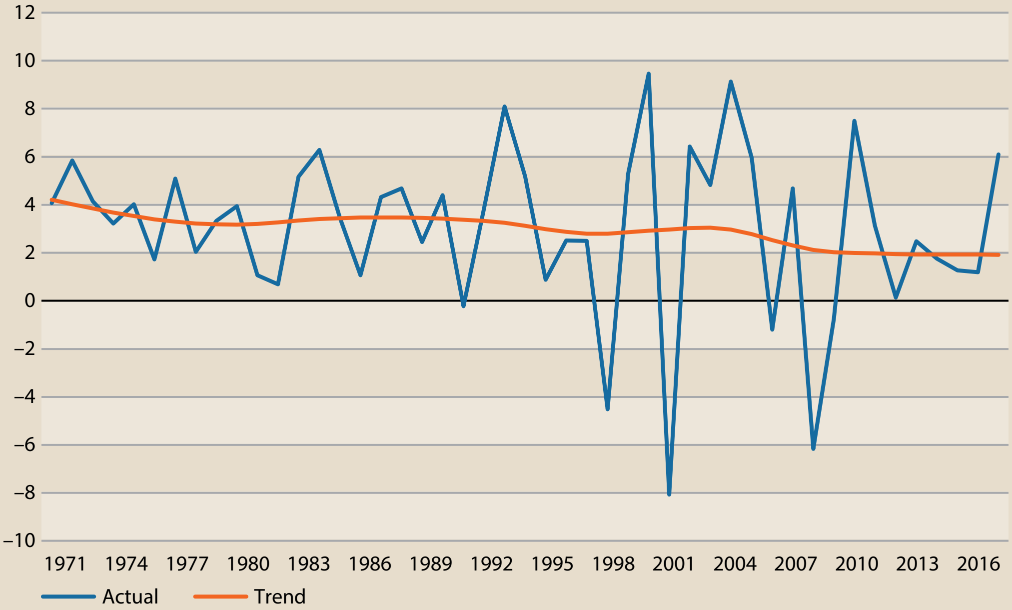


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

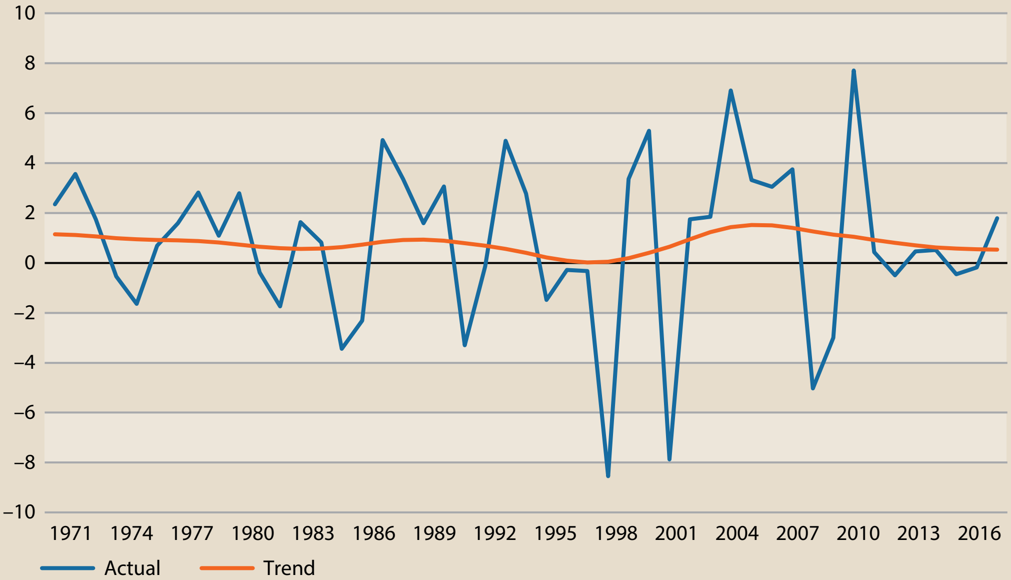


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

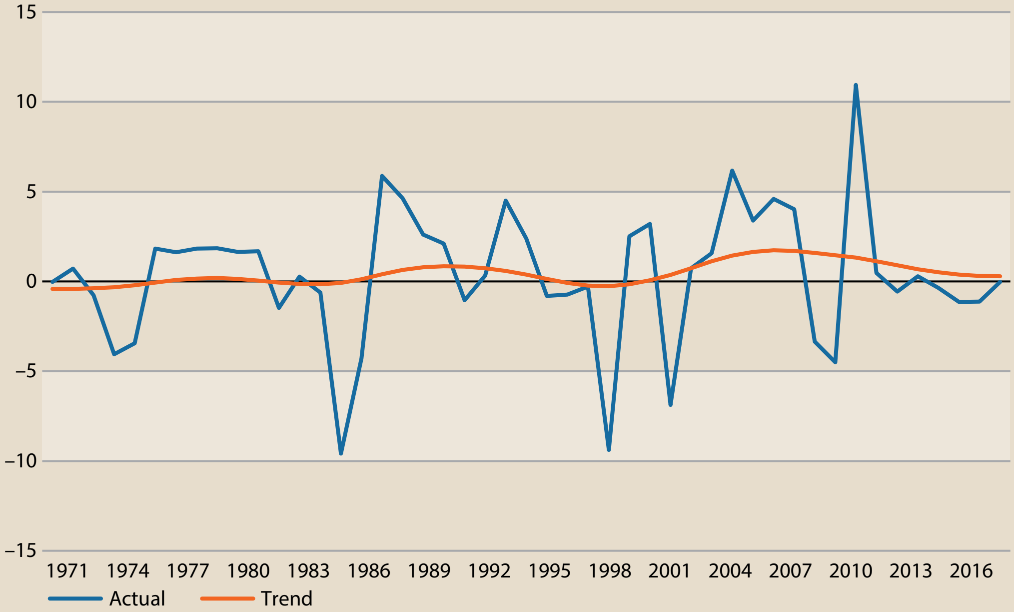


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

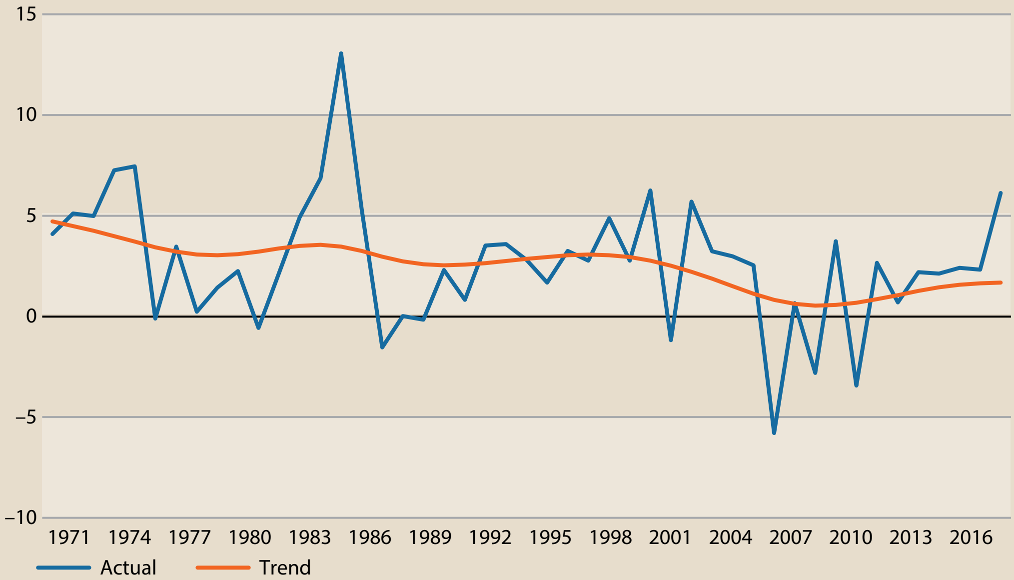


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

spike in capital productivity growth in the 2000s (see Figure 5), which was perhaps assisted by the R&D incentives in the 1990s [4].

While Singaporean LP levels are the highest in the APO, average annual labor productivity growth fell from 3.4 and 3.3% in the 1980s and 1990s to about 2.2% since 2000. Indeed, growth of the capital–labor ratio fell steadily from 1971 to 2008, notwithstanding the 1979–85 spike during an interlude of high-wage growth (see Figure 6). The fall in capital deepening, particularly in the 2000s meant that its contribution to LP growth fell from over half in the 1990s to 12% in the 2000s, though this has since rebounded. Meanwhile, the average annual labor quality growth has declined from 1.3% in the 1990s to 0.7% in the 2000s and 0.5% in the 2010s, with this downward trend mainly due to the sharp increase in the number of low-skilled foreign workers. Earnest efforts to '(keep) the productivity torch burning' in Singapore failed to lift LP growth due to a reliance on cheap foreign labor to maintain global competitiveness that dampened incentives to substitute capital for labor in domestically oriented sectors [5]. A demand for cheap labor was inadvertently entrenched by firms seeking low wages, which, combined with an ageing population, has meant that delays in economic restructuring made future structural reform more difficult [4].

2010 marked the beginning of a new government resolve to restructure the economy toward one driven by productivity growth, with initiatives to tighten the inflow of foreign workers; a sectoral minimum wage to encourage productive use of labor; skills programs; increased R&D spending; and productivity-focused business grants [6, 7].

These measures appear to have had some success in raising LP and TFP growth in the latter part of the 2010s. LP growth accelerated to 3.6% a year in 2015–17 compared with 1.8% in 2010–15. LP growth at 2.3% in the 2010s had contributions from a marked deceleration in hours worked growth that exceeded the strong cutback in output growth. Capital deepening growth, mostly due to a cutback in labor growth, contributed 63% of the growth in LP in the 2010s, and is behind most of the 2015–17 jump. While TFP growth dropped overall to 0.3% a year in the 2010s as output growth fell more than input growth, it jumped from 0.1% a year in 2010–15 to 0.8% a year in 2015–17. Nonetheless, Singapore's TFP growth in the 2010s remained the fourth lowest among APO countries.

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Singapore has the highest levels of capital intensity in the APO and hence its growth rates are more moderate. Capital deepening in Singapore was 13th highest in the APO group in the 2010s before jumping in 2017. IT capital deepening was one of the highest over the past decade, and Singapore jumped to the first ranking in 2017 (see Table 4).

The contribution of labor-quality growth to LP growth was moderate during the last decade, before jumping in 2017 to mark the fourth highest contribution in the APO. Singapore has the highest human capital in the APO as measured by the education and training of the current workforce by the World Economic Forum (WEF), as well as the third highest ranking for entrepreneurial culture.

Singapore is highly technologically advanced, positioned among the top-three-ranked countries for the availability of the latest technologies as well as the NRI Technology and People pillars.

Manufacturing is an important sector of the Singaporean economy, of which 80% was medium- and high-tech manufacturing in 2018, i.e., the highest proportion in the APO. Imports and exports make up an important proportion of GDP and were the second highest in the APO in both 2010 and 2017.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	7.6 (2010)	1	8.3 (2017)	2
Capital deepening (pp)	Open	3.3 (2017)	6	1.5 (average of 2010–17)	13
IT capital deepening (pp)	Open	0.71 (2017)	1	0.33 (average of 2010–17)	3
Human capital					
Labor quality contribution to LP growth	Open	1.0 (2017)	4	0.5 (average of 2010–17)	11
WEF Current Workforce	0–100	76.1 (2019)	1	0 points behind APO leader	
WEF Entrepreneurial Culture	0–100	64.2 (2019)	3	6.2 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	6.1 (2018)	2	0.2 points behind APO leader	
NRI Technology Pillar	0–100	78.5 (2019)	1	0 points behind APO leader	
NRI People Pillar	0–100	73.6 (2019)	3	2.9 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	0 (2017 GDP)	20	0.5 (2017 employment)	19
Manufacturing share (%)	Open	19.6 (2017 GDP)	7	13.3 (2017 employment)	13
Medium- and high-tech share of manufacturing (%)	Open	85 (2010)	1	80 (2018)	1
Exports/GDP (%)	Open	199.7 (2010)	2	170.1 (2017)	2
Imports/GDP (%)	Open	173.7 (2010)	2	145.6 (2017)	2

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Singapore ranks first in the APO across all overarching indices and in the Productivity Readiness Index (see Table 5). It rates very highly on these indices globally as well.

TABLE 5

VALUES OF OVERARCHING INDICES FOR SINGAPORE.

Index	Value	Rank
Motivation	99	1
Capabilities	97	1
Efficiency of markets	99	1
Stability	97	1
Productivity Readiness Index	100	1

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Singapore is a highly developed country that has the most productive economy in the APO. Given this, it is unsurprising that Singapore performs well and ranks highly in most underlying determinant indicators (see Table 6). Nonetheless, the Singaporean government has expressed renewed motivation to fuel the next stage of development through productivity gains, given the physical supply constraints of a small city-state that is struggling to accommodate its current migrant import rate, an ageing population, and a desire to pivot toward a high value-added 'knowledge and innovative service-based' economy with adoption of general-purpose digital technology [1]. Examination of Singapore's performance in these underlying determinants reveals some areas for improvement.

Singapore has the most highly developed infrastructure in the APO, ranking first on the WEF Infrastructure indicator (see Table 6). Singapore ranks first globally for transport infrastructure and fifth for utility infrastructure in the WEF Global Competitiveness Report [8].

Singapore ranks among the top four for the WEF, IMF and The Heritage Foundation (THF) financial system indicators. Singapore has a deep and stable financial system, supported by high-performing financial institutions as indicated by Singapore's equal third ranking for the IMF Financial Institutions indicator.

Singapore ranks first on all institutional strength indicators listed in Table 5 (barring the aforementioned IMF indicator). These include the WEF Institutions indicator and the World Bank WGI Political Stability, Rule of Law, Control of Corruption, and Government Effectiveness indicators. The WEF report [8] identifies Singapore as the world leader in public-sector performance, with the lowest burden of government regulation and the most efficient legal framework for settling disputes, as well as in government's responsiveness to change and having a long-term vision. The WEF [8] also reveals Singapore's highly ranked performance for property rights, low corruption incidence, corporate governance, judicial independence, and security. Singapore, however, has some of the most imposing restrictions on freedom of the press, ranking 124 out of 141 in the WEF Global Competitiveness Report. Renewable energy regulation and the proportion of environment-related treaties in force are also areas in which Singapore ranks poorly [8]. Singapore ranks second highest in the APO for Social Capital but has a lower ranking of 11 for Voice and Accountability.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	5.8	1	0
Quality of primary education*	1–7	6.2 (2017)	1	0
WEF Skills/Future Workforce	0–100	81.4 (2019)	1	0
Education expenditure/GDP* (%)	Open	2.9 (2013)	15	2.3
Innovation system				
WEF Innovation Capability	0–100	75.2 (2019)	4	5
KOF Informational Globalisation, de facto	0–100	99.7 (2017)	1	0
Infrastructure				
WEF Infrastructure	0–100	95.4 (2019)	1	0
Business environment				
THF Business Freedom	0–100	92.8 (2019)	3	3.4
WEF Administrative Requirements	0–100	86.9 (2019)	= 3	6.2
WEF Domestic Competition	0–100	73.8 (2019)	2	1
THF Tax Burden	0–100	90.3 (2019)	2	2.7
WB WGI Regulatory Quality	−2.5 to 2.5	2.13 (2018)	2	0.1
WEF Labour Market	0–100	81.2 (2019)	1	0
THF Labour Freedom	0–100	90.9 (2019)	1	0
NRI Governance	0–100	88.2 (2019)	1	0
Financial system				
WEF Financial System	0–100	91.3 (2019)	2	0.1
IMF Financial Markets	0–1	0.72 (2018)	4	0.1
THF Financial Freedom	0–100	80 (2019)	2	10
Health system				
Life expectancy at birth (years)	Open	83.5 (2018)	3	1.2
Infant mortality* (deaths/1000 live births)	Open	2.8 (2018)	2	0.3

(Continued on next page)

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	91.6 (2017)	1	0
KOF Financial Globalisation, de jure	0–100	85.9 (2017)	1	0
FDI Stock/GDP (%)	Open	469.3 (2019)	2	37.2
THF Investment Freedom	0–100	85 (2019)	1	0
Trade				
WEF Trade Openness	0–100	88.7 (2019)	1	0
THF Trade Freedom	0–100	94.8 (2019)	2	0.2
Services Trade Restrictions Index*	0–100	38.1	5	10.7
KOF Trade Globalisation	0–100	96.4 (2017)	1	0
KOF Trade Globalisation, de jure	0–100	93.6 (2017)	1	0
Demand				
WEF Macroeconomic Stability	0–100	99.7 (2019)	5	0.3
THF Monetary Freedom	0–100	85.6 (2019)	1	0
Savings				
Gross savings (% of GDP)	Open	42.8 (2019)	2	5.4
Institutions				
WEF Institutions	0–100	80.4 (2019)	1	0
IMF Financial Institutions	0–1	0.76 (2018)	= 3	0.17
WB WGI Political Stability	−2.5 to 2.5	1.49 (2018)	1	0
WB WGI Rule of Law	−2.5 to 2.5	1.84 (2018)	1	0
WB WGI Control of Corruption	−2.5 to 2.5	2.17 (2018)	1	0
WB WGI Government Effectiveness	−2.5 to 2.5	2.23 (2018)	1	0
Social capital				
WEF Social Capital	0–100	61.8 (2019)	2	1.4
WB WGI Voice & Accountability	−2.5 to 2.5	−0.06 (2018)	11	1.08

Source: Appendix G.
Note: * Supplementary indicator.

Singapore ranks in the top three for all business environment indicators listed in Table 6 and is consistently considered one of the most business-friendly economies in the world. The labor market is very flexible, with high levels of meritocracy and incentivization within the labor market [8]. Government measures introduced in 2019 to decrease the ratio of foreign workers to local employees have restricted labor supply, particularly to the services sector. This policy change is however likely to boost long-term productivity growth, given that easy access to low-cost low-skilled imported labor has discouraged productivity boosting capital investment and dragged down LP growth [4]. Singapore has the second lowest tax burden in the APO, and it is both low-cost and very fast to start a business [8].

Singapore also has a highly competitive domestic landscape [8]. Singapore's insolvency regulatory framework as well as attitudes towards entrepreneurial risk, however, rank relatively poorly in the WEF global rankings.

The Singaporean economy is very open to trade, ranking first in the APO on WEF Trade Openness, KOF Trade Globalisation, and KOF Trade Globalisation de Jure indicators, and second in THF Trade Freedom indicator. Singapore, at 0.02%, has the second lowest trade tariffs in the world behind Hong Kong, the least nontariff barriers in the world, as well as a highly efficient border clearance system [8]. Singapore as a financial services hub is one of the biggest service producers in the APO, with services making up a third of the total exports. However, Singapore ranks fifth in the 2016 World Bank Services Trade Restrictions Index, suggesting the potential for further liberalization of the services sector.

Singapore is very open to foreign investment. It legally treats foreign and domestic businesses equally, and most economic sectors are open to 100% foreign ownership. Singapore ranks in the top two for all foreign investment indicators in Table 6.

Challenges Ahead

Singapore is one of the most highly developed countries in the world, and is, by far, the most productive economy in the APO. The consistent trend of falling output growth over the last few decades has corresponded with the steady fall in both LP and TFP growth. If it is to ensure that productivity growth is able to drive higher economic growth moving forward, Singapore could address several challenges.

First, transitioning from the historical reliance on low-skilled and inexpensive foreign labor presents a major challenge. Restrictions on the inflow of foreign workers through quota systems have encouraged a more productive use of labor. Grants such as the Productivity Innovation Credit were implemented to encourage businesses to invest in capital–labor substitution, though wage subsidies from 2012 that were extended to 2017 may have reduced the effectiveness of these incentives [4]. Indeed, broad-based productivity business grants may have inadvertently propped up inefficient firms [5]. In taking measures to support firms in the transition period, when productivity growth gains may lag increased costs, it should be careful to avoid inadvertent support to inefficient firms.

Sectoral targeting of productivity growth initiatives, as through the '23 Industry Transformation Maps' [1], may assist, given a two-tier productivity growth landscape with domestically oriented sectors, dominated by SMEs, lagging significantly behind externally oriented sectors [9]. Fostering productivity growth in domestically oriented industries is especially important to ensure a greater economic resilience, given the growing global trade risks that will likely cause volatility and headwinds for externally oriented sectors [1].

Second, Singapore still has room to address several institutional weaknesses, including its regulatory framework for insolvency, low perceptions of citizens' capacity for political participation and expression, and restrictions on the freedom of the press [8].

For Singapore to pivot toward a high value-added knowledge-and-innovation hub, the government should consider continued support to promote R&D [1]. The IMF [10] has noted that when compared to peers with similar public-sector-funding-to-GDP ratios of R&D, the industry-financed research-expenditure-to-GDP ratio has remained historically quite low, suggesting there may be scope for encouragement of commercially financed innovation.

Singapore ranks fifth in the APO in the 2016 World Bank Services Trade Restrictions Index, lagging the leader Japan by over ten points. This suggests the potential for the services sector to be further liberalized.

Finally, restructuring should be carefully monitored to ensure that it does not contribute to entrenched long-term inequality. Additional social inclusion measures during this structural reform transition period for low-income workers are recommended [1].

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SRI LANKA

Sri Lanka is a relatively small nation with an older and slower-growing population, compared with other APO countries. It has a large rural population and also a relatively large agricultural sector. Sri Lanka's average income has increased nearly five times since 1970 (see Figure 1). The country's average income ranks around the middle of the APO group (see Table 1). Its rate of increase has been strong over the last decade.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	21.4 (2017)	14	0.5 (growth rate in 2010–17)	17
Rural population proportion (%)	79.0 (2010)	3	78.8 (2017)	2
GDP (USD billion at PPP, % per year)	273.4 (2017)	15	5.3 (growth rate in 2010–17)	8
GDP per capita (USD at PPP, % per year)	12,750 (2017)	10	4.8 (growth rate in 2010–17)	8
Employment rate (%)	38.9 (2010)	13	38.3 (2017)	16
Age dependency ratio (%)	48.3 (2010)	11	49.4 (2017)	11
Old-age dependency ratio (%)	9.3 (2010)	8	11.7 (2017)	7

Source: Appendix G.

Productivity Performance

Sri Lanka's level of labor productivity (LP) is above average within the APO group. Its rate of total factor productivity (TFP) growth has slowed over the last decade, while its rate of LP growth has remained strong since 2000 (see Table 2).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	11.7 (2010)	8	16.3 (2017)	8
Labor productivity growth (% per year)	4.4 (2000–10)	5	4.7 (2010–17)	7
TFP growth (% per year)	1.6 (2000–10)	7	0.2 (2010–17)	18

Source: Data and calculations from APO Productivity Database 2019.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	2.4	2.5	2.8	4.4	4.7	6.0	1.2
TFP growth	0.6	0.9	2.4	1.6	0.2	0.9	–1.7
Capital productivity growth	–0.4	0.6	2.9	–0.1	–1.4	–1.0	–2.3
Output growth	4.1	4.2	5.1	5.1	5.3	6.1	3.5
Combined inputs growth	3.5	3.3	2.8	3.5	5.2	5.1	5.3
Capital growth	4.5	3.6	2.2	5.2	6.7	7.1	5.8
IT capital growth	21.0	3.8	11.4	16.8	3.2	3.4	2.7
Hours worked growth	1.8	1.7	2.3	0.7	0.7	0.0	2.3
Labor quality growth	0.6	1.2	1.0	0.7	1.2	0.9	1.9
Capital deepening	1.5	1.0	–0.1	2.5	4.1	4.9	2.3

Source: Author's estimates based on data from APO Productivity Database 2019.

Sri Lanka's economic growth has been variable, but at the same time, quite robust for a country embroiled in civil war until 2009 and faced with various other political, economic, and climatic turmoil. In its 2019 classification, the World Bank lifted Sri Lanka from a lower-middle-income status to an upper-middle-income status.

Output growth fell from a high in the 2000s, though it had been steadily increasing since the 1970s. Sri Lanka's trend rate of growth went as high as 6.1% in the 2000s (see Figure 2). It has since slipped back, with the growth in trend output being 4.5% in 2017. Input accumulation, especially of capital, has been the most important source of growth, though there was at least one period of strong TFP contribution in the 1990s. Growth in labor hours upped its contribution in the 1990s but fell in the 2000s and the 2010s as the capital's contribution rose. The labor quality's contribution has remained fairly steady (see Table 3).

The growth rate has seen strong contributions from input accumulation, first from labor and, in the last decade, from capital. TFP growth and its contribution to output growth have been strong, except for the 2010s. Growth of 2.4% a year accounted for nearly half of the output growth in the 1990s (see Figure 4). While TFP growth remained quite strong in the 2000s, it fell in the 2010s and was negative in 2017.

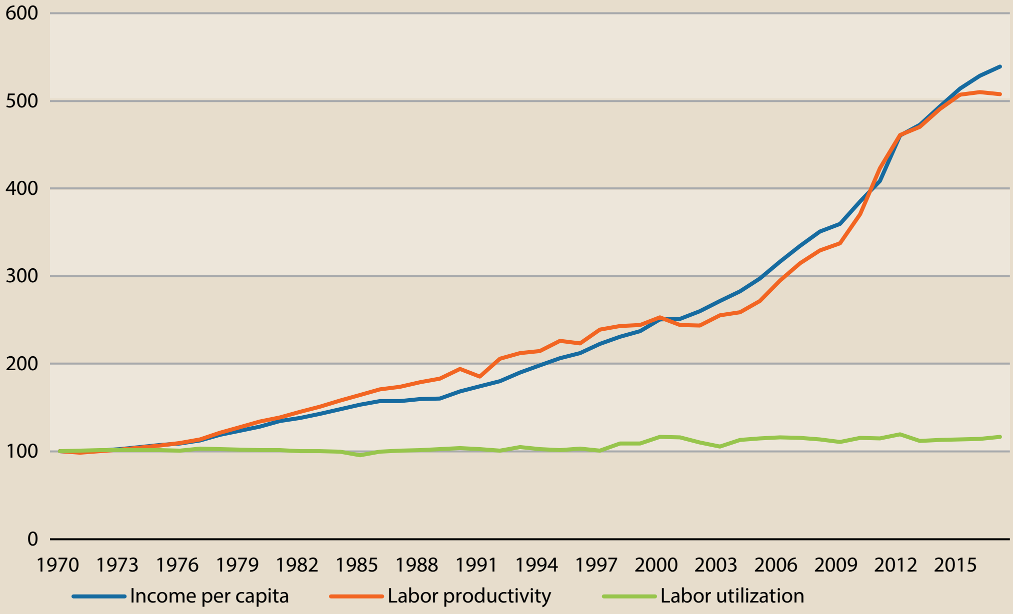
LP growth has also been volatile but rose strongly in the 2000s. In trend terms, annual LP growth peaked at 5.3% in 2010 (see Figure 3). Actual LP did not grow at all in 2017. Capital deepening contributed 2.5 percentage points, or over half, of LP growth in the 2000s and 4.1 percentage points, or nearly 90%, of the LP growth in the 2010s. While TFP growth made the major contribution to LP growth in the 1990s, this faded in the 2000s and more so in the 2010s.

Growth in the capital–labor ratio (see Figure 6) shows increased capital deepening in the 2010s after a low in the 1990s. The growth in capital was very high in the 2010s. In 2017, the actual growth in capital was 5.9%. With strong growth in capital, capital productivity growth has gone from positive in the 1990s to negative in the 2000s and the 2010s (see Figure 5). The trend rate in 2017 was –1.3%.

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

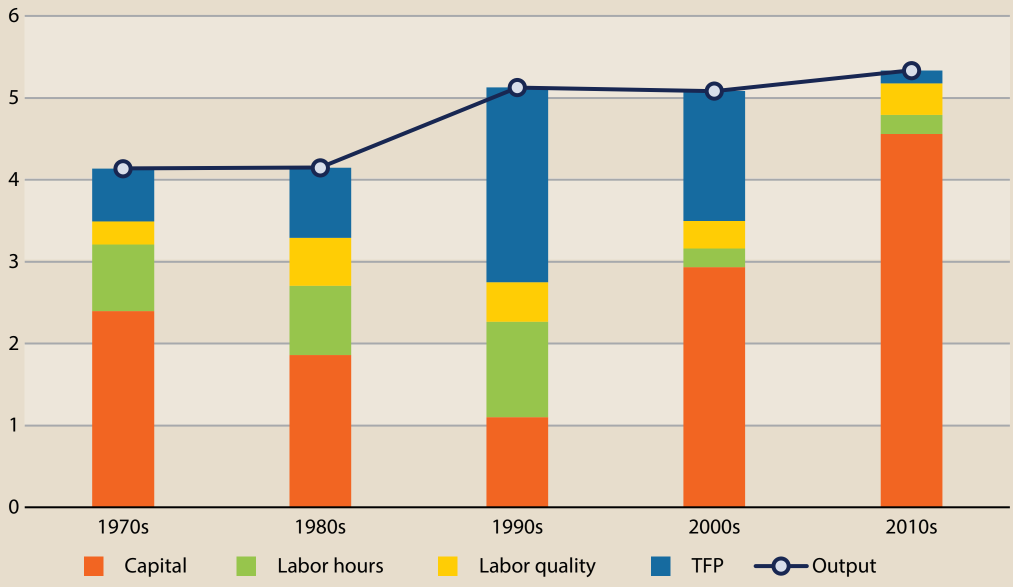


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN IN % PER YEAR AND PP CONTRIBUTIONS).

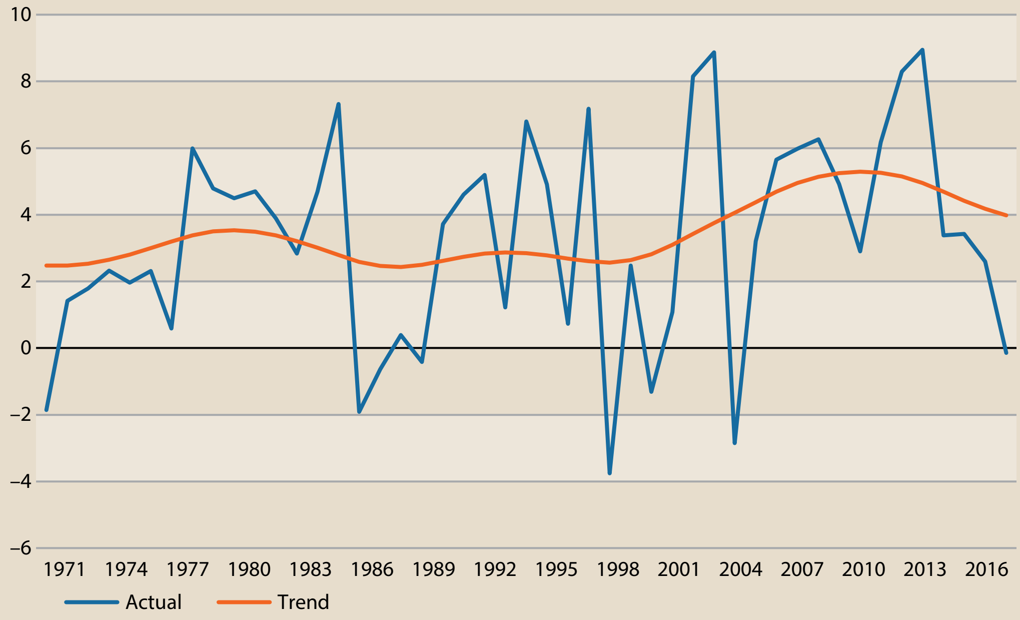


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

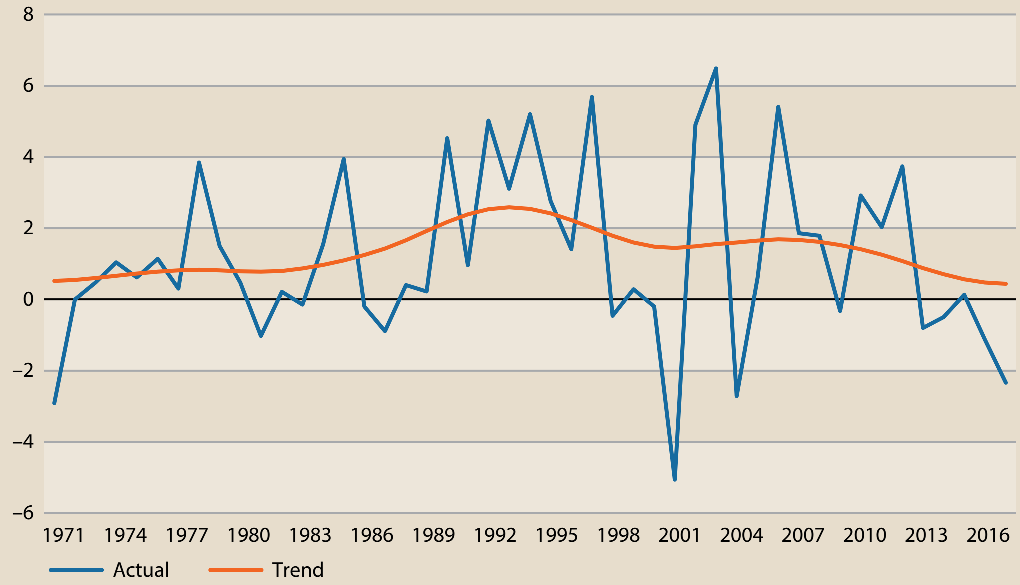


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

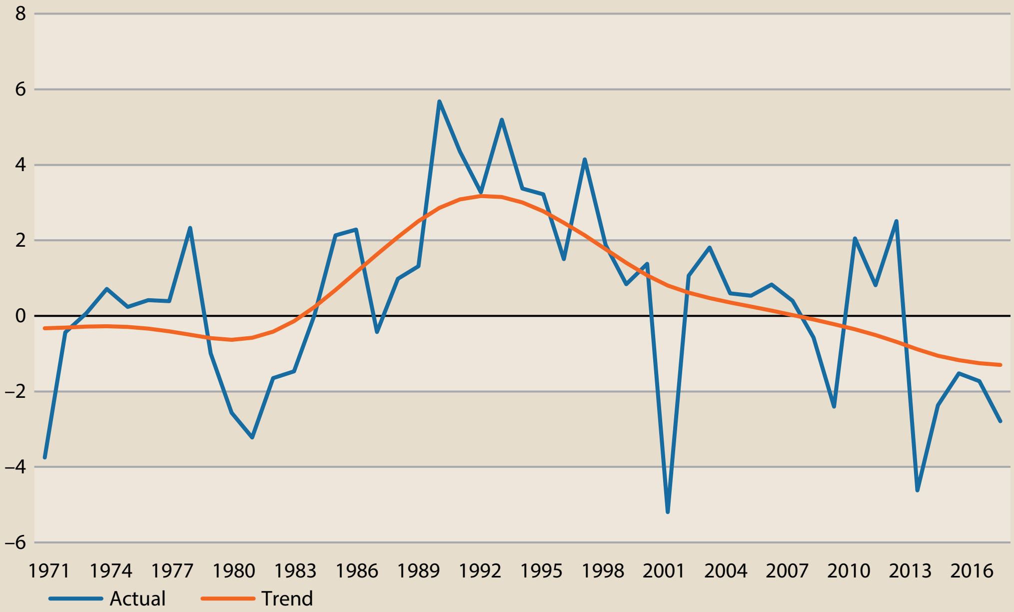


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

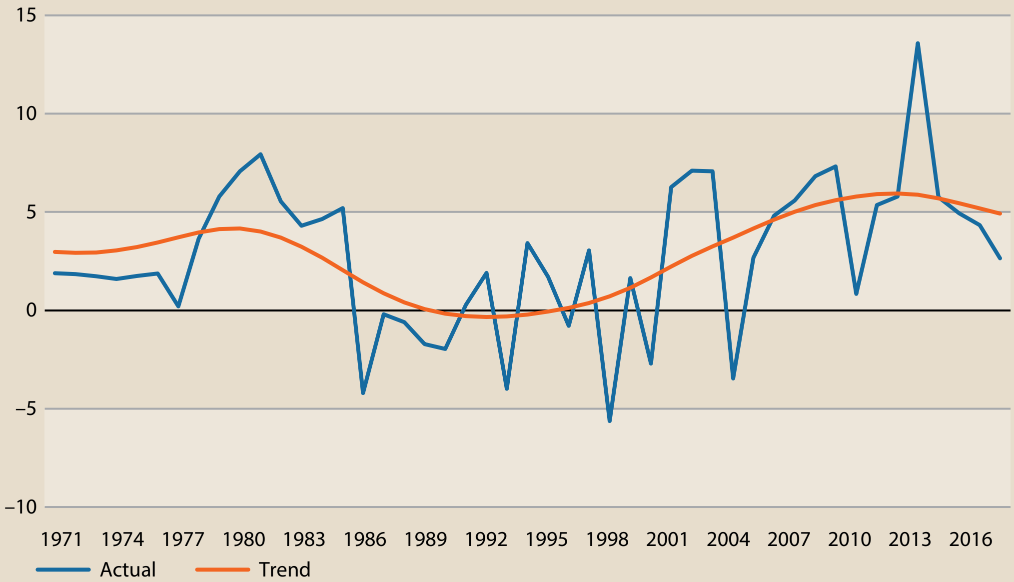


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

Sri Lankan growth has been aided by strong reform efforts but hindered by the civil war. Economic liberalization in the 1970s raised private investment, followed by a strong GDP growth in the 1980s [1]. Sri Lanka was embroiled in a civil war from 1983 to 2009 [2]. Ethnic conflict hurt the economy, notably in tourism [3], a sector that has increasingly become a viable source of employment [4]. In the 1990s, 'A pickup in reforms, mainly of a structural adjustment nature… helped raise economic growth' [1]. However, security concerns, a global slowdown, and a severe drought caused negative growth in 2001. A ceasefire in 2002 and a relatively calm political environment in 2006 saw some growth return. The end of the war in 2009 brought a relatively small peace dividend [5], with growth reaching over 7% between 2010–12 but then falling back to 4%. Sri Lanka's economic growth slowed between 2015–16 due to economic and political uncertainty, unfavorable weather conditions, and a slowdown in growth of demands for its traditional export markets. Most recently, 'Real GDP growth slowed to 3.1% in 2017, reflecting a contraction in agriculture from large-scale floods and lingering effects of a drought' [6, p.5].

TFP growth increased in the 1990s as foreign investment poured into Sri Lanka but has been lackluster since the recent growth slowdown. The high volatility of TFP growth is the result of changes in policy regimes, internal conflicts, or external shocks [7]. In the early 1990s, TFP growth increased mainly due to investments in sophisticated garment factories under the 'Multi-Fibre Agreement.' From 2010 to 2014, the high capital formation 'resulted in an improvement in TFP growth, creating a positive loop' [7]. Economic growth slowed during 2015–16 and 'the TFP residual halved during this period and has continued to decline in recent years' [6].

Capital's contribution to output growth has only accelerated since the 1990s as a result of government stimulus. Physical capital and TFP growth made substantial contributions to growth in the 1990s because of reforms that boosted investment [1]. Between 2010 and 2014, capital formation was mainly by infrastructure projects completed by the government' [7] while 'FDI remained stagnant, at below 2% of GDP since 1998' [6]. Capital has increased in part because 'the new government in 2015 has reoriented the focus for activating the private sector and foreign investors in order to drive the economy and create jobs' [8].

Capital productivity growth was also the victim of political instability. '…the productivity of physical capital slowed down in recent years, largely due to neglect and fast depreciation as a result of the political conflict and wars' [1].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

While Sri Lanka's measure of capital in proportion to its GDP is one of the lowest among APO countries, the country has had the second-highest rate of capital deepening (see Table 4). Much of this capital has come from the government to enhance the country's infrastructure, as noted above.

The Sri Lankan working population's skillset is above average globally as well as compared to its APO peers. The country's entrepreneurial culture, while also above average globally, is slightly below average in the APO group. While access to technology is about average among APO members, the indicator denoting technology integration into the society is slightly below average. The WEF ranks Sri Lanka in the bottom third of all countries for its number of internet users as a percentage of the adult population [9].

Finally, agriculture and manufacturing as a percentage of GDP are about average, though Sri Lanka has the second-highest proportion of its labor force employed in manufacturing. Imports, and especially exports, do not make up a large portion of Sri Lanka's GDP relative to its APO peers.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.3 (2010)	17	2.5 (2017)	18
Capital deepening (pp)	Open	1.7 (2017)	12	4.1 (average of 2010–17)	2
IT capital deepening (pp)	Open	0.0 (2017)	15	0.03 (average of 2010–17)	19
Human capital					
Labor quality contribution to LP growth	Open	0.5 (2017)	9	0.4 (average of 2010–17)	14
WEF Current Workforce	0–100	59.7 (2019)	8	16.4 points behind APO leader	
WEF Entrepreneurial Culture	0–100	50.8 (2019)	12	19.6 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.3 (2018)	11	1.9 points behind APO leader	
NRI Technology Pillar	0–100	40.5 (2019)	10	38.0 points behind APO leader	
NRI People Pillar	0–100	28.4 (2019)	13	48.1 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	8.5 (2017 GDP)	13	26.1 (2017 employment)	11
Manufacturing share (%)	Open	17.6 (2017 GDP)	11	19.3 (2017 employment)	2
Medium- and high-tech share of manufacturing (%)	Open	12 (2010)	14	8 (2018)	16
Exports/GDP (%)	Open	19.7 (2010)	16	21.9 (2017)	14
Imports/GDP (%)	Open	27.0 (2010)	14	29.2 (2017)	14

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Sri Lanka's scores across these four indices are under 45, with the lowest score being for capabilities (see Table 5). Its overall Productivity Readiness Index has a value of 40. With Singapore scoring 100, there is clearly a lot more that can be done to make Sri Lanka more productivity ready.

TABLE 5

VALUES OF OVERARCHING INDICES FOR SRI LANKA.

Index	Value	Rank
Motivation	42	11
Capabilities	34	12
Efficiency of markets	39	13
Stability	44	8
Productivity Readiness Index	40	11

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Sri Lanka ranks slightly below average in a number of areas linked to higher productivity performance. While Sri Lanka's education system performs relatively well compared to its APO peers, there is room for improvement in Sri Lanka's trade and FDI policies. Sri Lanka's infrastructure, business environment, and institutions have shown mixed performance (see Table 6). Addressing these weaknesses will allow for stronger economic growth in future.

Infrastructure indicators suggest that Sri Lanka's transportation infrastructure performs relatively well in global terms, though its utility infrastructure is lacking [9]. The transport infrastructure score was bolstered by Sri Lanka's high railroad and liner-shipping connectivity, though the quality and connectivity of its roads are lacking. While Sri Lanka is ranked second globally in terms of access to electricity, the quality and reliability of its water supply are far below average.

The business environment in Sri Lanka also has areas of strengths and weakness. The county has a relatively strong entrepreneurial culture, and though administrative requirements in the country are not especially onerous, labor market policies are somewhat inflexible [9]. The country suffers from some of the highest redundancy costs globally, and indicators reflecting internal labor mobility and ease of hiring foreign labor are also low [9]. Private investment is limited by 'burdensome bureaucracy' [10]. The country also faces a lack of domestic competition, especially in the service sector [9].

Foreign investors have become wary of investing in Sri Lanka since the recent political instability in 2018 [11]. Over the last few years, tourism, real estate, and telecommunications have been focuses of foreign investors [11], though the total amount invested dropped in 2019 [12] and remains well below that of its Asian peers [6]. Despite numerous tax incentives under the previous tax regime, FDI flows did not increase. The Sri Lankan government has made incentives more rule-oriented and investment-based to attract more upfront investment [6].

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.8 (2017)	10	2.1
Quality of primary education*	1–7	4.5 (2017)	8	1.7
WEF Skills/Future Workforce	0–100	67.8 (2019)	9	13.6
Education expenditure/GDP* (%)	Open	2.1 (2017)	18	3.1
Innovation system				
WEF Innovation Capability	0–100	34.9 (2019)	14	45.3
KOF Informational Globalisation, de facto	0–100	74.0 (2017)	= 13	25.7
Infrastructure				
WEF Infrastructure	0–100	69.2 (2019)	7	26.2
Business environment				
THF Business Freedom	0–100	76.5 (2019)	8	19.7
WEF Administrative Requirements	0–100	69.2 (2019)	10	23.9
WEF Domestic Competition	0–100	48.1 (2019)	14	26.7
THF Tax Burden	0–100	84.8 (2019)	7	8.2
WB WGI Regulatory Quality	−2.5 to 2.5	−0.17 (2018)	11	2.4
WEF Labour Market	0–100	51.8 (2019)	15	29.4
THF Labour Freedom	0–100	58.6 (2019)	= 12	32.3
NRI Governance	0–100	54.7 (2019)	11	33.5
Financial system				
WEF Financial System	0–100	56.9 (2019)	13	34.5
IMF Financial Markets	0–1	0.16 (2018)	= 12	0.66
THF Financial Freedom	0–100	40 (2019)	= 14	50
Health system				
Life expectancy at birth (years)	Open	76.8 (2018)	6	15.1
Infant mortality* (deaths/1000 live births)	Open	7.4 (2018)	4	4.9

(Continued on next page)

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	40.4 (2017)	14	51.2
KOF Financial Globalisation, de jure	0–100	37.2 (2017)	15	48.6
FDI Stock/GDP (%)	Open	15.3 (2019)	13	491.3
THF Investment Freedom	0–100	40 (2019)	= 15	45
Trade				
WEF Trade Openness	0–100	38.4 (2019)	19	50.3
THF Trade Freedom	0–100	67.6 (2019)	14	27.4
Services Trade Restrictions Index*	0–100	46.4 (2016)	8/14	19
KOF Trade Globalisation	0–100	44.5 (2017)	13	51.9
KOF Trade Globalisation, de jure	0–100	44.5 (2017)	15	49.2
Demand				
WEF Macroeconomic Stability	0–100	68 (2019)	17	32
THF Monetary Freedom	0–100	71.1 (2019)	16	14.5
Savings				
Gross savings (% of GDP)	Open	27.3 (2018)	11	20.9
Institutions				
WEF Institutions	0–100	51.6 (2019)	10	28.8
IMF Financial Institutions	0–1	0.38 (2018)	= 13	0.55
WB WGI Political Stability	−2.5 to 2.5	−0.14 (2018)	12	1.63
WB WGI Rule of Law	−2.5 to 2.5	0.03 (2018)	8	1.81
WB WGI Control of Corruption	−2.5 to 2.5	−0.34 (2018)	10	2.51
WB WGI Government Effectiveness	−2.5 to 2.5	−0.24 (2018)	14	2.47
Social capital				
WEF Social Capital	0–100	56 (2019)	6	7.2
WB WGI Voice & Accountability	−2.5 to 2.5	0.01 (2018)	10	1.01

Source: Appendix G.
Note: * Supplementary indicator.

Sri Lanka's WEF indicators for trade openness and prevalence of nontariff barriers show that it is among the most trade-restrictive countries globally, reflecting the country's complex and unstable tax system and difficulties in trading across borders [6]. Sri Lanka's authorities have recognized the need for trade liberalization but intend to reduce restrictions gradually to allow protected industries to adjust [6]. Sri Lanka has introduced regulatory reforms in recent years, including improvements in dealing with construction permits, registering property, paying taxes, and enforcing contracts. However, The Heritage Foundation (THF) notes that a 'bloated civil service' contributes to a lack of efficiency in the labor market [10]. Sri Lanka maintains one of the lowest tax-revenue-to-GDP ratios in the world, which severely limits the government's budget for health, education, and social protection [4]. Political interference has abated somewhat under the current administration, but corruption remains a problem in the judiciary, public procurement, and customs [10].

Sri Lanka has made strong strides in its education system. It has achieved almost universal elementary school attendance, youth literacy rates, and gender parity in schools [13]. It spends about 2% of its GDP on education, which is among the lowest percentages in the APO group, and there still are some quality and overcrowding concerns [13].

Sri Lanka's innovation capabilities are below average, both in the APO group and globally [9]. As noted above, ICT adoption in Sri Lanka is below the global average, as is the country's research and development sector [9].

Challenges Ahead

Reform efforts in Sri Lanka should work to increase FDI flows, integrate Sri Lanka more fully into the global economy, and reduce regulatory burdens, among other initiatives.

The country suffers from low private investment, FDI flows, and tax revenue. Greater inflows will be necessary for the government to enact effective and necessary programs in health and education. Sri Lanka's recent FDI reforms suggest that the government has recognized this need and is crafting policies to encourage upfront investment.

Sri Lanka's commodity exports have declined since the 1980s, and the import tariff regime is one of the most complex and protectionist in the world. Liberalizing Sri Lanka's protectionist stance could increase productivity growth, according to the IMF [6]. As of 2018, Sri Lanka's government is working to reduce restrictions and encourage trade.

A large regulatory burden and inflexible labor market policies have stifled the growth of formal businesses in Sri Lanka. The World Bank found that 'regulatory compliance burdens prompt entrepreneurs to operate informally, which undermines competition' [14]. Sri Lanka could work to reduce redundancy costs and increase internal labor mobility.

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THAILAND

In the 1980s, Thailand transformed the structure of its economy to develop an export sector that became the engine of its growth, enabling it to transition to an upper-middle-income economy [1]. Improvements in Thai living standards accelerated rapidly in the mid-1980s, as part of a more than six-fold increase in per capita income from 1970 to 2017 (see Figure 1). Thailand's income per capita was eighth highest in the APO in 2017. GDP growth has been relatively slow, compared with other APO countries, at an average of 3.2% a year from 2010 to 2017. Thailand is ageing at a relatively fast rate, and has the sixth highest old-age-dependency ratio in the APO. While the country's high employment rate, at 55.2% and fourth highest in the APO, can help to counter the fiscal pressures of an ageing population, it has fallen 3.4 percentage points since 2010 (see Table 1).

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	67.7 (2017)	9	0.4 (growth rate in 2010-17)	18
Rural population proportion (%)	50.8 (2010)	10	56.1 (2017)	9
GDP (USD billion at PPP, % per year)	1247.7 (2017)	6	3.2 (growth rate in 2010-17)	14
GDP per capita (USD at PPP, % per year)	18,400 (2017)	8	2.8 (growth rate in 2010-17)	11
Employment rate (%)	58.6 (2010)	2	55.2 (2017)	4
Age dependency ratio (%)	39.1 (2010)	16	40.2 (2017)	16
Old-age dependency ratio (%)	12.4 (2010)	5	15.9 (2017)	6

Source: Appendix G.

Productivity Performance

Labor productivity (LP) levels in Thailand were tenth highest among APO countries in 2017. LP growth has been relatively high for the last two decades, i.e., 3.8% a year in the 2000s, followed by 5.3% in the 2010s (see Table 2). Thailand's total factor productivity (TFP) growth performance has been more moderate and has slowed since the 2000s to 0.6% a year in the 2010s (13th in the APO).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	10.0 (2010)	11	14.5 (2017)	10
Labor productivity growth (% per year)	3.8 (2000–10)	8	5.3 (2010-17)	6
TFP growth (% per year)	1.2 (2000–10)	9	0.6 (2010-17)	13

Source: Data and calculations from APO Productivity Database 2019.

Thailand's rapid exports-led economic growth has generated substantial economic development since 1970. The shift in labor, from agriculture to manufacturing and services; economic liberalization; and the attraction of foreign direct investment (FDI) have all contributed to this rapid development. However, increasing productivity growth will be essential for Thailand to attain its target of high-income status by 2037 [2]. Implementing the Thailand 4.0 plan to transform the economy into a value-based industry and innovative knowledge economy will aid Thailand in the challenge of avoiding the middle-income trap. Increasing productivity growth is also crucial to offset the economic effects of an ageing population [1, 2].

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	2.0	4.7	3.7	3.8	5.3	4.8	6.6
TFP growth	0.6	0.9	–1.8	1.2	0.6	0.2	1.6
Capital productivity growth	1.5	1.0	–2.4	1.8	0.0	–0.5	1.1
Output growth	6.5	7.6	4.4	4.5	3.2	3.0	3.6
Combined inputs growth	5.9	6.6	6.2	3.3	2.6	2.8	2.0
Capital growth	5.0	6.6	6.9	2.7	3.2	3.4	2.5
IT capital growth	14.6	18.4	11.9	14.3	9.2	11.6	3.1
Hours worked growth	4.5	2.8	0.7	0.7	–2.1	–1.8	–2.9
Labor quality growth	2.5	3.8	4.5	3.4	3.9	3.7	4.3
Capital deepening	0.2	2.0	3.6	1.2	3.1	3.1	3.2

Source: Author's estimates based on data from APO Productivity Database 2019.

Strong output growth in the late 1980s and early 1990s was not sustained into the 2000s and 2010s, with average rates of growth declining to 3.2% a year in the 2010s, (see Figure 2). Over the past five years Thailand's output growth rates have lagged its regional peers [2].

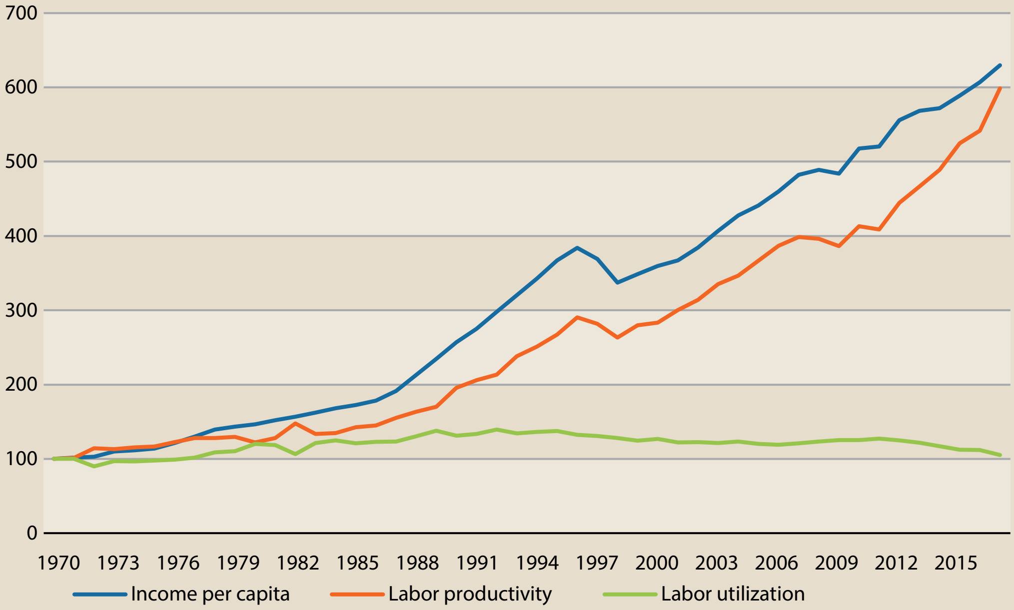
Input accumulation, particularly capital growth, has been the most important source of growth. However, the percentage point contribution of capital growth has halved from the 1990s to the 2000s and 2010s (see Figure 2). A transition toward skilled labor over the past two decades can be seen from the decline in the contribution of labor hours to the output growth, to negative levels in the 2010s (see Table 3), while labor-quality growth increased to contribute 50% of output growth in the 2010s (see Figure 2). Despite this, skills shortages persist as a key constraint to exploiting the full productivity gains from investments in new technologies. The time needed to fill a skilled worker's vacancy had increased from 5.2 weeks to 8 weeks from 2007 to 2015 [2].

Over the past five decades, TFP growth has been volatile around a fairly static trend just above zero (see Figure 4). TFP growth dipped to negative average annual growth rates of –0.8% in the 1990s before rising to relatively high levels of 1.2% in the 2000s and then 0.6% in the 2010s (see Figure

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

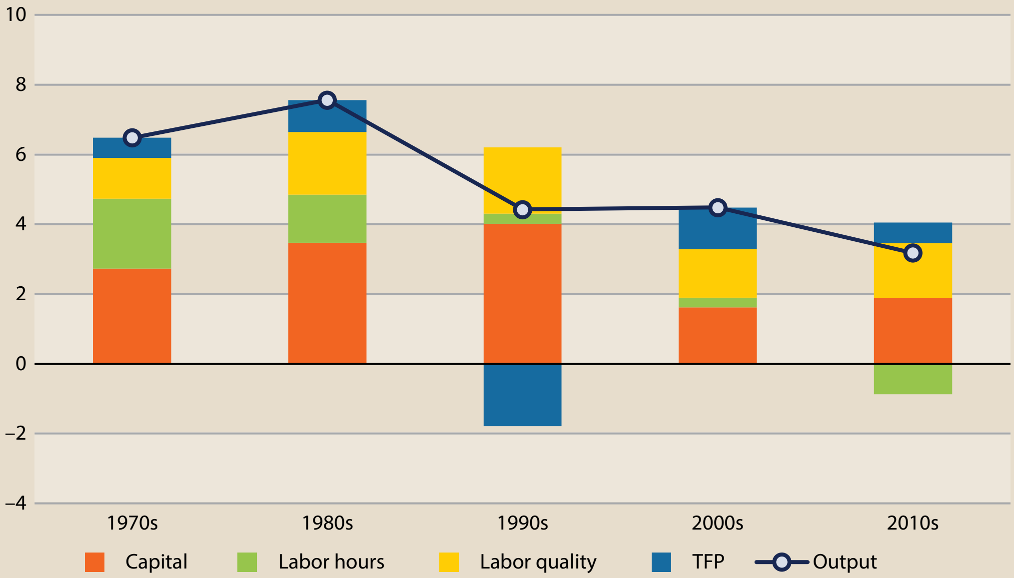


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

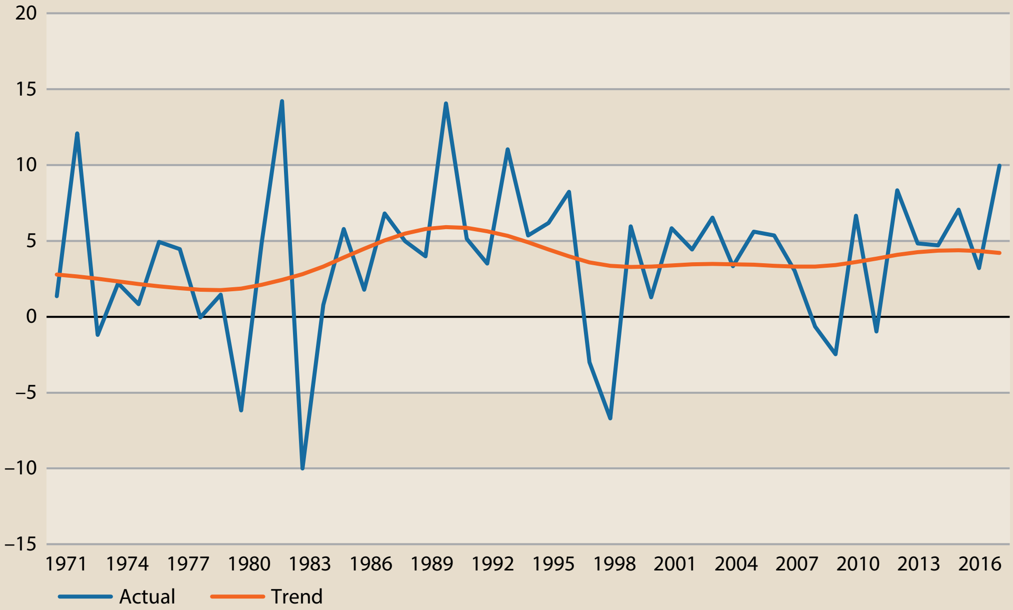


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

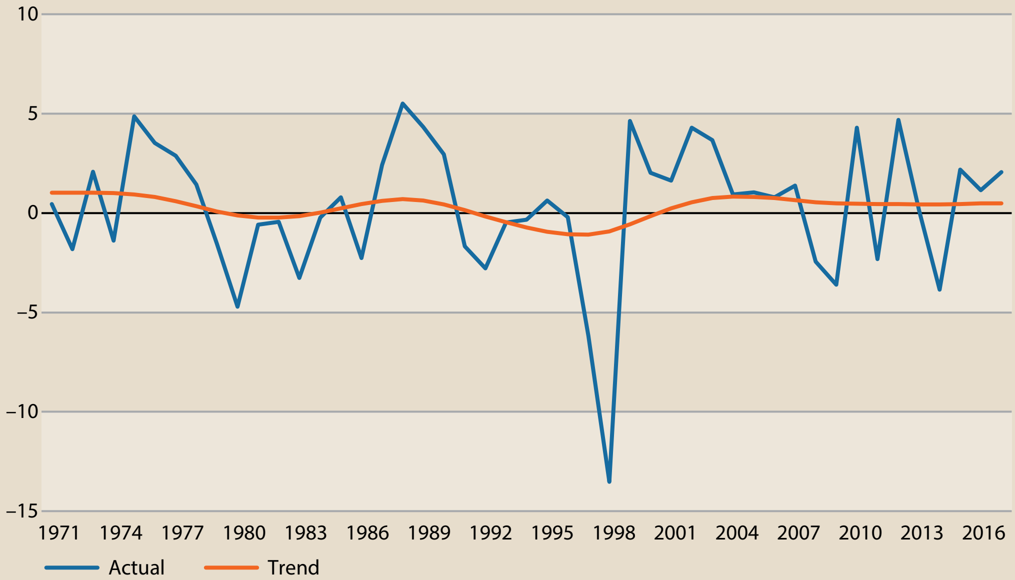


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

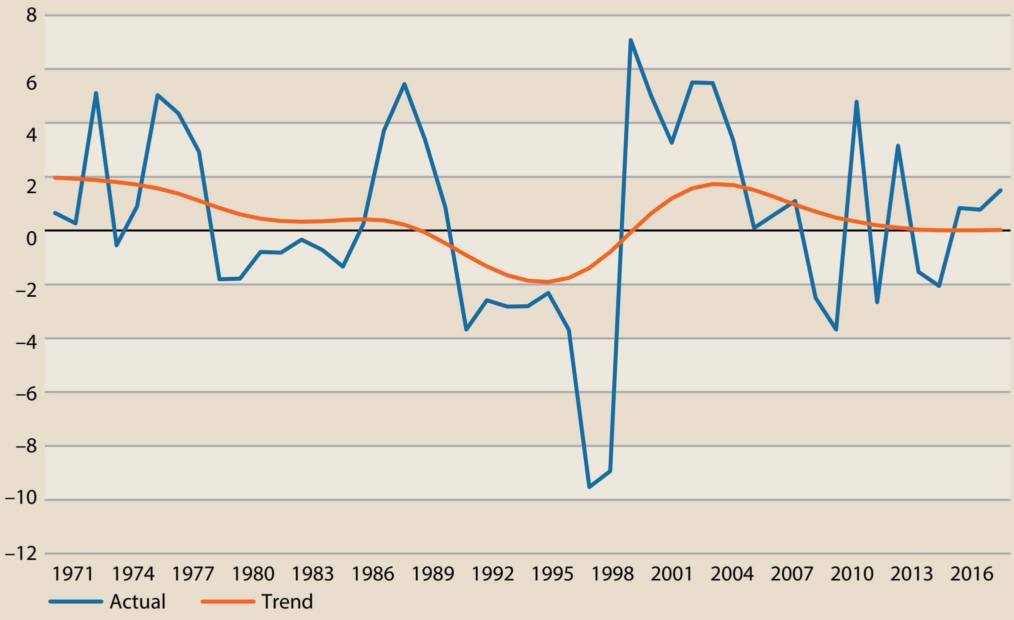


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

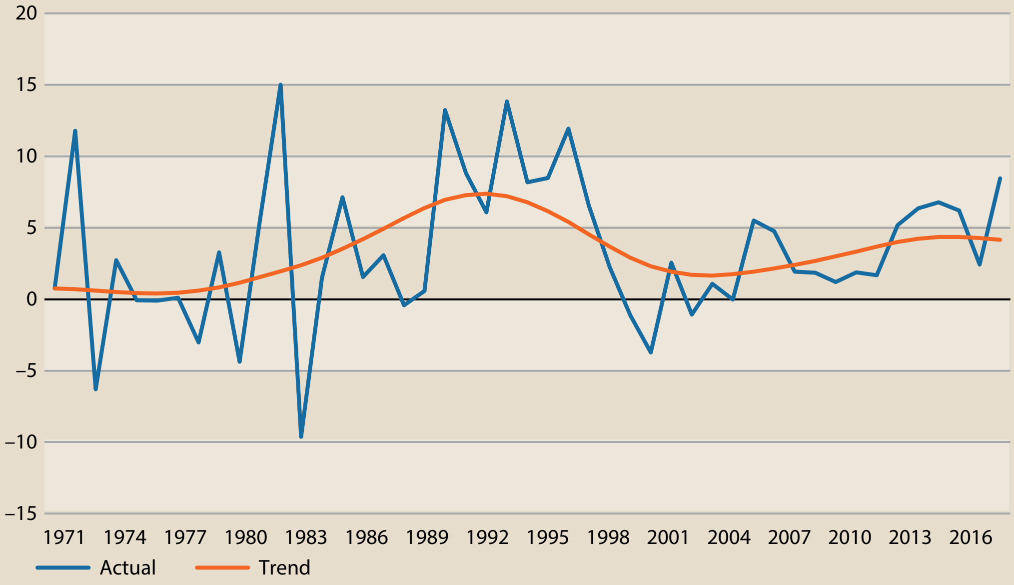


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

4). Over the 2000s the rebound in TFP growth accounted for a quarter of the output growth, before declining to a contribution of 18% in the 2010s (see Figure 2).

The spike in TFP growth in the 2000s was associated with the increase in growth in capital productivity to 1.8% in the 2000s from –2.4% in the 1990s (see Figure 5). Some have suggested that this may have been due to a creative destruction whereby only firms making efficient use of capital survived the Asian Financial Crisis, mostly in high-export sectors exposed to global competition [3, 4]. Since then, rising corporate debt and the increasing role of 'zombie firms' have constrained business investments in both tangible and intangible capital assets and hence dampened capital productivity growth in the 2010s [1]. Some analysis suggests that this may be due to factor and investment misallocations due to size-dependent policies that provide preferential tax and credit policies to small-and-medium enterprises, thereby raising costs for manufacturing plants to increase employment above 50-worker and 200-worker thresholds. Smaller firms are less able to make use of economies of scale to raise the productivity gains of capital investments.

LP growth has been consistently robust, rising significantly in the late 1980s and early 1990s before settling for a lower trend of 3.8% a year in the 2000s and 5.3% a year in the 2010s (see Figure 3). Capital deepening, particularly in IT capital, made important contributions to LP growth up to the mid-1990s and from the early 2000s (see Figure 6). Labor quality improvements made notable percentage point contributions to LP growth in the 2000s and 2010s, among the highest in APO countries. LP growth gains from 1980–95 were driven by the reallocation of labor from the low-productivity agricultural sector to manufacturing and services sectors, with manufacturing particularly leading in productivity growth [2]. However, this structural transformation stalled after the Asian Financial Crisis, following which LP growth has been driven by gains within sectors, although this has slowed over the last decade [2]. The significant cutback in hours-worked growth (see Figure 2) was an important contributor to the acceleration of LP growth from the 2000s to the 2010s by 1.5 percentage points (see Figure 3). The rate of this acceleration was one of the highest among APO countries, behind just Bangladesh, Pakistan, and the Philippines.

Recently, low productivity growth, combined with high wages relative to similar economies in the region, has led to the deterioration of Thailand's global competitiveness [1]. This trend, combined with growing global trade tensions, foreshadow potential downside risks for the economy's long-term growth prospects, given that exports made up two-thirds of GDP as of 2018 [2].

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that provide a more complete picture of some determinants. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Levels of capital intensity have remained relatively stable in Thailand since 2010, when it had a ranking of fifth in the APO (see Table 4). Capital deepening has increased over the last decade, spiking upwards in 2017. IT capital deepening has been the highest in the APO on average over the 2010s, although the contribution of IT capital to output growth has declined over the last few years.

The contribution of labor-quality growth to LP growth was the highest in the APO in 2017, and second highest on an average over the 2010s. Despite this, Thailand's human capital ranks 12th in the APO as measured by the education and training of the current workforce by the World Economic Forum (WEF). Thailand has been drawing on its skilled workforce to the point that skills shortages have emerged as a major productivity constraint [2]. Thailand has a relatively high ranking of seventh among APO countries for the WEF Entrepreneurial Culture indicator.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	4.0 (2010)	6	4.4 (2017)	6
Capital deepening (pp)	Open	5.1 (2017)	2	3.1 (average of 2010–17)	7
IT capital deepening (pp)	Open	0.45 (2017)	2	0.62 (average of 2010–17)	1
Human capital					
Labor quality contribution to LP growth	Open	2.8 (2017)	1	1.6 (average of 2010–17)	2
WEF Current Workforce	0–100	51.4 (2019)	12	24.7 points behind APO leader	
WEF Entrepreneurial Culture	0–100	57 (2019)	7	13.4 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.9 (2018)	6	1.4 points behind APO leader	
NRI Technology Pillar	0–100	49.6 (2019)	6	28.8 points behind APO leader	
NRI People Pillar	0–100	41.2 (2019)	7	35.3 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	8.3 (2017 GDP)	= 14	31.8 (2017 employment)	8
Manufacturing share (%)	Open	27.2 (2017 GDP)	3	16.3 (2017 employment)	7
Medium- and high-tech share of manufacturing (%)	Open	44 (2010)	7	41 (2018)	= 9
Exports/GDP (%)	Open	66.3 (2010)	6	60.6 (2017)	7
Imports/GDP (%)	Open	67.8 (2010)	5	54.0 (2017)	8

Source: Appendix G.
Note: * Supplementary indicator.

Thailand is technologically advanced, ranking among the top seven countries in the APO for the availability of the latest technologies and the NRI Technology and People pillars. Indeed, Thailand is an important producer of ICT hardware.

Manufacturing makes up over a quarter of GDP, which is the third highest GDP share in the APO, of which about 40% is medium-and high-tech manufacturing. Manufacturing is the highest productivity growth sector in Thailand [2]. Agriculture remains an important industry, making up over 30% of employment in 2017 despite contributing less than 10% of GDP. This is reflective of the suspended structural transformation following the Asian Financial Crisis, limiting labor reallocation from agriculture to manufacturing and services [2]. Both exports and imports have made up a less important proportion of GDP since 2010.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability. These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Thailand's performance across these four indices is relatively consistent, ranking in the top half of the APO for the Productivity Readiness Index (sixth rank), as seen in Table 5. In view of Singapore's scores of around 100, the indices confirm that there is all-round work to be done to improve productivity readiness. Stability is an area of greater weakness.

TABLE 5

VALUES OF OVERARCHING INDICES FOR THAILAND.

Index	Value	Rank
Motivation	58	6
Capabilities	55	6
Efficiency of markets	57	6
Stability	47	6
Productivity Readiness Index	55	6

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Thailand has achieved substantial LP growth over the last two decades, although TFP growth has been more moderate. This has been driven by the shift in labor from agriculture to manufacturing and services, lower growth in hours worked, economic liberalization, and the attraction of FDI. Enabling continued high productivity growth will require targeting underlying productivity determinants.

Infrastructure in Thailand is relatively well developed, with the country ranked ninth in the APO for the WEF Infrastructure indicator (see Table 6). Thailand ranked among the top ten globally in the WEF (2019) Global Competitiveness Report for airport connectivity and electricity access for the population. However, exposure to unsafe drinking water for the population and inefficiency of train and seaport services are all areas for improvement [6].

Thailand ranks among the top six in the APO for the WEF Financial System, IMF Financial Markets, and THF Financial Freedom indicators, suggesting a deep, diversified and stable financial system. Thailand's relatively high ranking in the IMF Financial Institutions indicator, on which Thailand has experienced a substantial improvement since 2000, likely underpins the high performance of the financial system. The private debt market remains underdeveloped in Thailand [7].

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.7	12	2.1
Quality of primary education*	1–7	3.5 (2017)	15	2.6
WEF Skills/Future Workforce	0–100	73.2 (2019)	6	8.2
Education expenditure/GDP* (%)	Open	4.1 (2013)	5	1.0
Innovation system				
WEF Innovation Capability	0–100	43.9 (2019)	8	36.3
KOF Informational Globalisation, de facto	0–100	89.8 (2017)	6	9.9
Infrastructure:				
WEF Infrastructure	0–100	67.8 (2019)	9	27.6
Business environment				
THF Business Freedom	0–100	83 (2019)	6	13.2
WEF Administrative Requirements	0–100	86.9 (2019)	= 3	6.2
WEF Domestic Competition	0–100	53.6 (2019)	9	21.2
THF Tax Burden	0–100	80.7 (2019)	11	12.3
WB WGI Regulatory Quality	−2.5 to 2.5	0.1 (2018)	7	2.13
WEF Labour Market	0–100	63.4 (2019)	8	17.8
THF Labour Freedom	0–100	63.7 (2019)	8	27.2
NRI Governance	0–100	61.6 (2019)	7	26.6
Financial system				
WEF Financial System	0–100	85.1 (2019)	6	6.3
IMF Financial Markets	0–1	0.71 (2018)	5	0.11
THF Financial Freedom	0–100	60 (2019)	= 4	30
Health system				
Life expectancy at birth (years)	Open	76.9 (2018)	5	7.8
Infant mortality* (deaths/1000 live births)	Open	9.1 (2018)	6	6.6

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	57.8 (2017)	9	33.8
KOF Financial Globalisation, de jure	0–100	47.2 (2017)	11	38.6
FDI Stock/GDP (%)	Open	46.9 (2019)	8	459.6
THF Investment Freedom	0–100	55 (2019)	= 8	30
Trade				
WEF Trade Openness	0–100	53.3 (2019)	12	35.4
THF Trade Freedom	0–100	83 (2019)	4	12
Services Trade Restrictions Index*	0–100	52.3	10	24.9
KOF Trade Globalisation	0–100	76.3 (2017)	4	20.1
KOF Trade Globalisation, de jure	0–100	67.9 (2017)	6	25.7
Demand				
WEF Macroeconomic Stability	0–100	90 (2019)	= 7	10
THF Monetary Freedom	0–100	74 (2019)	11	11.6
Savings				
Gross savings (% of GDP)	Open	31.5 (2019)	7	16.7
Institutions				
WEF Institutions	0–100	54.8 (2019)	9	25.6
IMF Financial Institutions	0–1	0.74 (2018)	5	0.19
WB WGI Political Stability	–2.5 to 2.5	–0.79 (2018)	15	2.28
WB WGI Rule of Law	–2.5 to 2.5	0.02 (2018)	9	1.82
WB WGI Control of Corruption	–2.5 to 2.5	–0.4 (2018)	11	2.57
WB WGI Government Effectiveness	–2.5 to 2.5	0.35 (2018)	7	1.88
Social capital				
WEF Social Capital	0–100	53.2 (2019)	9	10
WB WGI Voice & Accountability	–2.5 to 2.5	–1.01 (2018)	16	2.03

Source: Appendix G.
Note: * Supplementary indicator.

Indicators measuring the underlying institutional foundations of Thailand suggest a need for further development and institutional reforms. Thailand performs relatively well for the World Bank WGI Government Effectiveness indicator with a ranking of seven in the APO group. However, Thailand's ranks ninth on the WEF Institutions indicator and 15th on the World Bank WGI Political Stability indicator. The WEF [6] report highlights budget transparency and corporate governance as particular strengths of Thai institutions. However, security, freedom of the press, judicial independence, and intellectual property protection are areas in which Thailand ranks particularly poorly in the global rankings. Implementation and enforcement of regulation are required to strengthen institutional support for productivity. For example, in the period from 1999 to 2015, only one complaint to the Trade Competition Commission was prosecuted [8]. Corruption remains a challenge, with over a third of Thai firms expected to give gifts to get a construction permit or to secure a government contract [9]. Thailand also ranks lowly at 16th in the APO for the World Bank WGI Voice and Accountability indicator, which measures perceptions of citizens' freedom of political involvement and expression.

The Thai business environment is strengthened by very efficient and simplified administrative requirements, ranking at equal third in the APO, due to pro-business reforms implemented in 2018 [7]. Similarly, Thailand is ranked very highly for meritocracy and incentivization within the labor market [6]. The WEF [6] report, however, identifies a very inflexible labor market, with very high redundancy costs, inflexible wage determination, and weak workers' rights. Thailand's performance for The Heritage Foundation (THF) Tax Burden indicator is ranked 11th in the APO, with an improvement in its score since 2012.

Thailand ranks 12th for the WEF Trade Openness indicator, with a highly complex tariff system, high trade tariffs, and relative prevalence of nontariff barriers reducing the openness of the trade system [6]. The imports-to-GDP ratio fell from 68% in 2010 to 54% in 2017. Thailand has relatively high restrictions for trade in services, particularly for professional services and transport services. Border clearance efficiency is, however, a strength of the Thai trade system [6], and indeed Thailand ranks among the top six for THF and KOF trade freedom and globalization indicators.

Foreign investment in Thailand, while generally welcomed, is subject to government screening, and there are limitations to investment in certain sectors [7]. Thailand ranks equal eighth for THF investment Freedom indicator, and has a similar ranking for measures of Financial Globalization and FDI Stock/GDP.

Thailand's low ranking of 15 in the APO for the quality of primary education is concerning, given the need to invest in education and human capital for future workers to support an ageing population. Skills mismatching and shortages in the labor market are problem areas for Thailand.

Challenges Ahead

Thailand has achieved substantial developmental progress since 1970 as a result of an exports-led growth strategy, development of a strong manufacturing sector, foreign investment, and economic liberalization. Thailand has set a target to transition from upper-middle-income to high-income status by 2037 as part of its 20-year national strategy. However, a World Bank [2] modelling suggests that Thailand will remain an upper-middle-income country past 2050 without a significant pickup in investments and productivity growth. Hence, overcoming the challenges to productivity growth is essential for Thailand's economic development and objectives.

Thailand's structural transformation has been described as only partially complete, given that agricultural subsidy programs attracted workers back to the agricultural sector, which employs 30.9% of the labor force, compared with 11.2% in Malaysia [2] and yet accounted for just 8.3% of GDP in 2017. Hence, capital deepening in the agricultural sector has been identified as a priority to lift LP growth and facilitate Thailand's structural transformation [2]. Maintaining progress in the reduction of poverty will depend on productivity improvements, particularly in agricultural sectors to ensure that growth is inclusive of the rural poor in the face of lower agricultural prices in the global commodity cycle [2].

Institutional challenges include low-ranking security, freedom of the press, judicial independence, and intellectual property protection. Strengthened implementation of the 2017 Competition Act and the prosecution of breaches would protect the competitive landscape [8]. Strengthened anticorruption efforts, given the high incidences or expectations of giving gifts to receive construction permits or secure government contracts, would improve investor sentiment and certainty [9].

Labor market reforms could focus on the inflexible labor market, balancing the need to strengthen workers' rights with reducing the very high redundancy costs and inflexible wage determination in Thailand. Trade reform to simplify the very complex tariff system and reduce nontariff barriers may encourage productivity growth in externally exposed industries.

Thailand has been described as facing an 'innovation paradox' whereby returns to R&D are high, with firms investing in technology exhibiting higher productivity, but actual investments are low compared with regional peers [8]. Inefficiencies in processing patent claims are a priority to be addressed to improve intellectual property protections for innovating firms [2]. Given that firms receiving FDIs in Thailand are more productive, thanks to knowledge spillovers and exposure to global competition, relaxation of FDI limits to allow FDI inflows for more non-strategic industries could improve productivity [2]. FDI inflows in Thailand are below its structural peers, which is reflective of investor uncertainty amidst political volatility [2], as reflected in Thailand's ranking of 15 in the APO for the World Bank WGI Political Stability indicator.

Liberalization of the service sector should be considered, given greater restrictions compared with Malaysia and other regional peers and the service sector's LP lagging the manufacturing sector's LP by 28% [8]. This openness can be promoted by implementing the ASEAN framework agreement on services [2]. The services sector is an important supporter of economic growth, given the weak contributions from agriculture and industry [2].

Finally, skills shortages point at the need to invest in education and human capital for both future and current workers so that LP growth can rise to support a population that is ageing at one of the fastest rates in Asia [1, 2]. Training programs could be adjusted to reflect the needs of older lifelong learners. 'Skilled occupation shortage lists,' adopted in the neighboring Malaysia, can inform immigration and skills policy [2]. These reforms can help achieve the knowledge-based model envisioned by the Thailand 4.0 plan.

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VIETNAM

Vietnam is a country of over 90 million people. Agricultural production, while still a significant share of activity in the economy, has declined in importance relative to manufacturing and services. Job creation in the non-farm economy has enticed people to the cities. However, 65% of its residents still live in rural areas. Average income is low relative to APO economies at more advanced stages of development but is rising more quickly, supported by productivity growth. In 2017, Vietnam's GDP per capita was almost seven times its level in 1970. Vietnam's employment rate is high, but its workforce is ageing.

TABLE 1

CONTEXTUAL INDICATORS.

Indicator	Value	APO rank	Value	APO rank
Population (million, % per year)	93.7 (2017)	7	1.1 (growth rate in 2010–17)	13
Rural population proportion (%)	69.5 (2010)	6	65.0 (2017)	6
GDP (USD billion at PPP, % per year)	658.6 (2017)	11	6.0 (growth rate in 2010–17)	6
GDP per capita (USD at PPP, % per year)	7,000 (2017)	16	4.9 (growth rate in 2010–17)	7
Employment rate (%)	56.9 (2010)	4	57.8 (2017)	3
Age dependency ratio (%)	43.3 (2010)	14	43.3 (2017)	14
Old age dependency ratio (%)	9.4 (2010)	7	10.2 (2017)	8

Source: Appendix G.

Productivity Performance

Labor productivity (LP) in Vietnam is low among APO economies but has grown at consistently strong rates since the 1980s (see Figure 3). In the 2010s, Vietnam recorded average annual growth in LP of almost 6% a year, the best performance among APO economies. Strong growth in total factor productivity (TFP) contributed to this result, as did capital deepening (see Tables 2 and 3).

TABLE 2

QUICK VIEW ON PRODUCTIVITY.

Indicator	Value	APO rank	Value	APO rank
Labor productivity level (USD at PPP)	3.5 (2010)	17	5.2 (2017)	17
Labor productivity growth (% per year)	5.1 (2000–10)	2	5.8 (2010–17)	1
TFP growth (% per year)	−0.3 (2000–10)	20	1.8 (2010–17)	4

Source: Data and calculations from APO Productivity Database 2019.

An era of market-oriented reforms initiated in 1986 with the *Doi Moi* (renovation) process extended private-property rights and opened Vietnam's economy to foreign investment and trade. With these changes, Vietnam gradually evolved from a poor, isolated agriculture-based economy to a fast-growing, exports-driven producer of manufactured goods and services. Vietnam's growth record is remarkable for its stability. In the three decades following the first of the *Doi Moi* reforms, annual growth in real GDP averaged 6.6%. Since 1992, when a new constitution strengthened property-right protections for foreign businesses, calendar-year growth has never dropped below 5%. In its April 2020 World Economic Outlook, the IMF forecasts that growth in Vietnam's real GDP will slow down from 7.0% in 2019 to 2.7% in 2020, amidst a deep global recession [1]. This would be the weakest annual growth outcome for Vietnam since 1980.

TABLE 3

PRODUCTIVITY AND RELATED GROWTH THROUGH THE DECADES.

(IN % PER YEAR)

	1970–80	1980–90	1990–00	2000–10	2010–17	2010–15	2015–17
Labor productivity growth	0.8	2.8	5.4	5.1	5.8	5.3	7.0
TFP growth	–1.2	1.4	1.5	–0.3	1.8	1.6	2.5
Capital productivity growth	–1.8	1.2	–1.8	–2.7	–0.9	–1.0	–0.6
Output growth	2.7	5.3	7.7	7.1	6.0	5.8	6.4
Combined inputs growth	3.8	3.9	6.2	7.4	4.2	4.2	4.0
Capital growth	4.4	4.1	9.5	9.8	6.9	6.8	7.0
IT capital growth	7.1	13.5	13.2	18.7	15.3	15.3	15.5
Hours worked growth	1.9	2.5	2.3	2.0	0.2	0.5	–0.6
Labor quality growth	1.2	1.1	0.6	2.7	1.4	1.2	1.9
Capital deepening	1.5	1.0	3.6	4.2	3.2	3.1	3.5

Source: Author's estimates based on data from APO Productivity Database 2019.

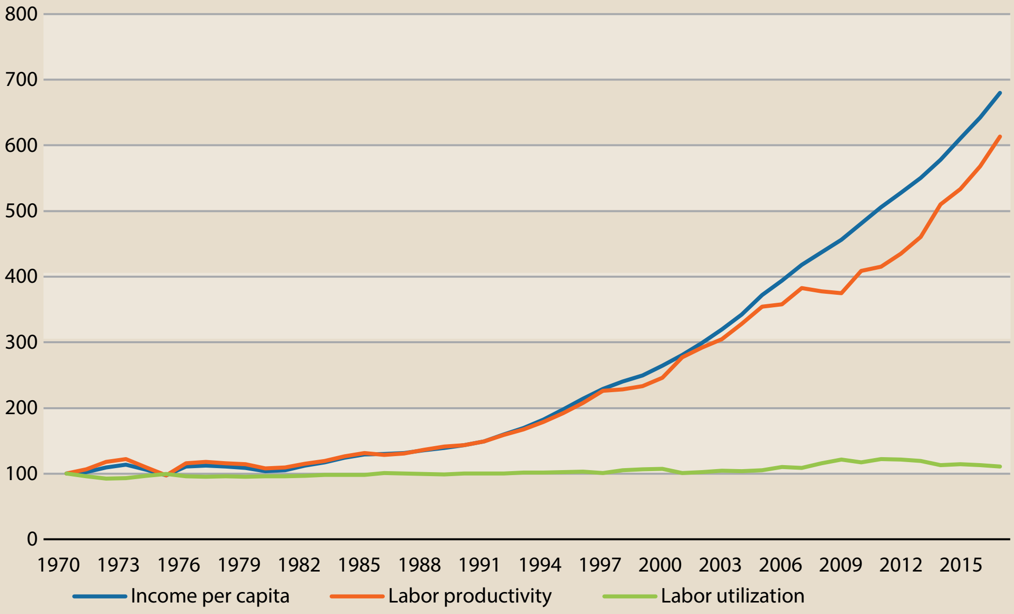
Sustained growth in LP from the mid-1980s and more modest rises in labor utilization brought significant increases in GDP per person (see Figure 1). After growing 3.2% per year on average in the 1980s, per capita GDP grew by an average 6.1% a year in the 1990s and 6.0% per year in the 2000s. While LP declined during the global financial crisis, it accelerated again thereafter, expanding by 5.8% a year from 2010 to 2017. Labor utilization declined 5.8% over this period as Vietnam's population grew faster than hours worked. Even with measured labor utilization shrinking, per capita incomes grew at an average rate of 4.9% in the seven years from 2010 to 2017.

An increase in the rate of capital accumulation in the 1990s contributed to productivity gains as new laws encouraged foreign investment while curtailing the government's ability to nationalize firms. Capital deepening contributed more than half of the total growth in LP in the 1990s and more than three quarters in the 2000s. Growth in the capital stock continued to outpace increases in labor supply from 2010 to 2017, with capital deepening slowing only slightly from rates recorded in the previous two decades (see Figure 6). While small compared with the contribution of other capital, the growth contribution of IT capital has increased to be more than four times its level in 2000. With all the accumulation of capital, average capital productivity has declined almost constantly since the early 1990s (see Figure 5).

FIGURE 1

AVERAGE INCOME AND ITS COMPONENTS.

(INDEX 1970=100).

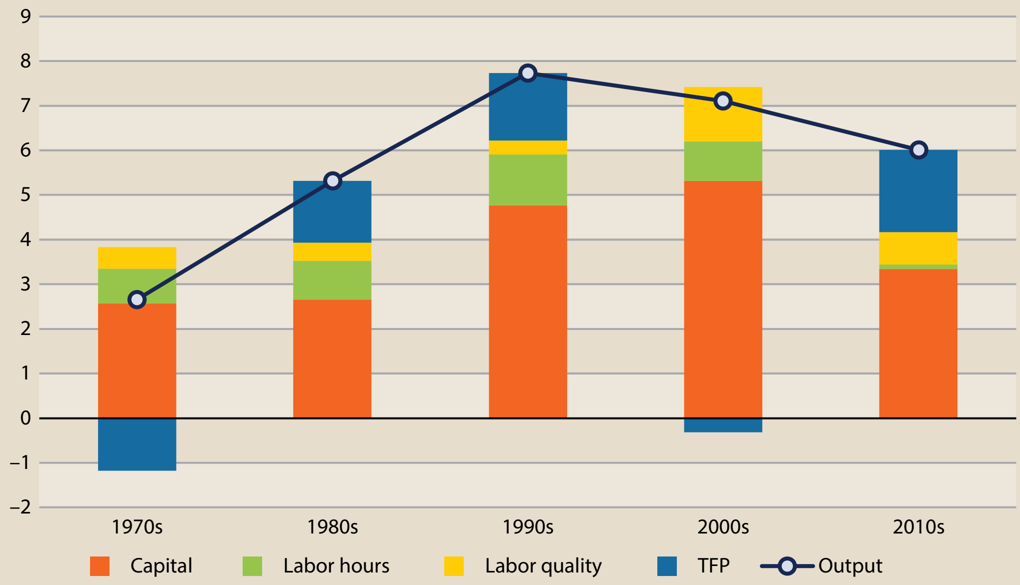


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 2

OUTPUT GROWTH AND ITS SOURCES.

(IN % PER YEAR AND PP CONTRIBUTIONS).

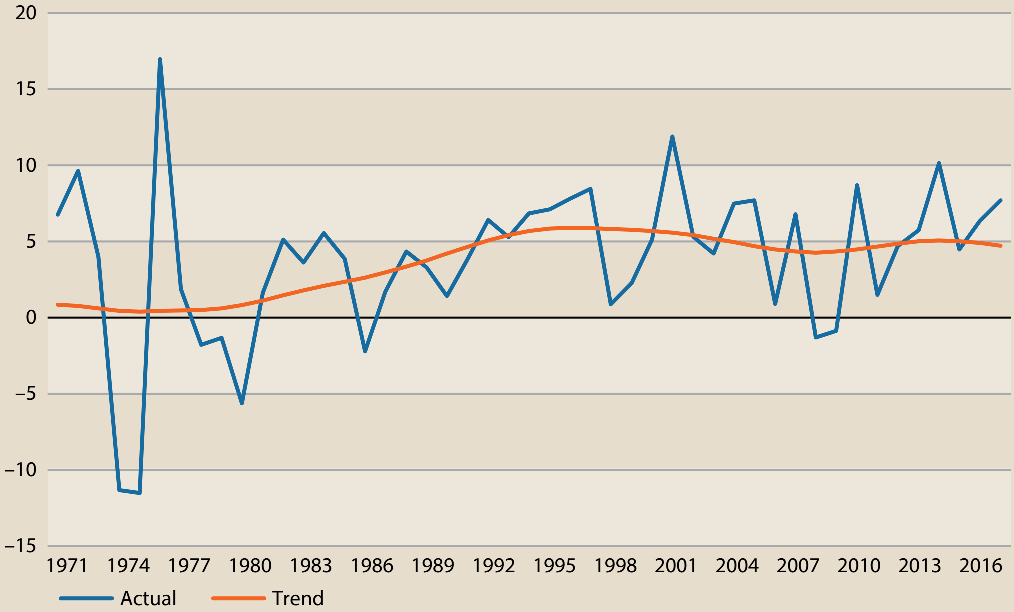


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 3

ANNUAL LABOR PRODUCTIVITY GROWTH.

(IN %)

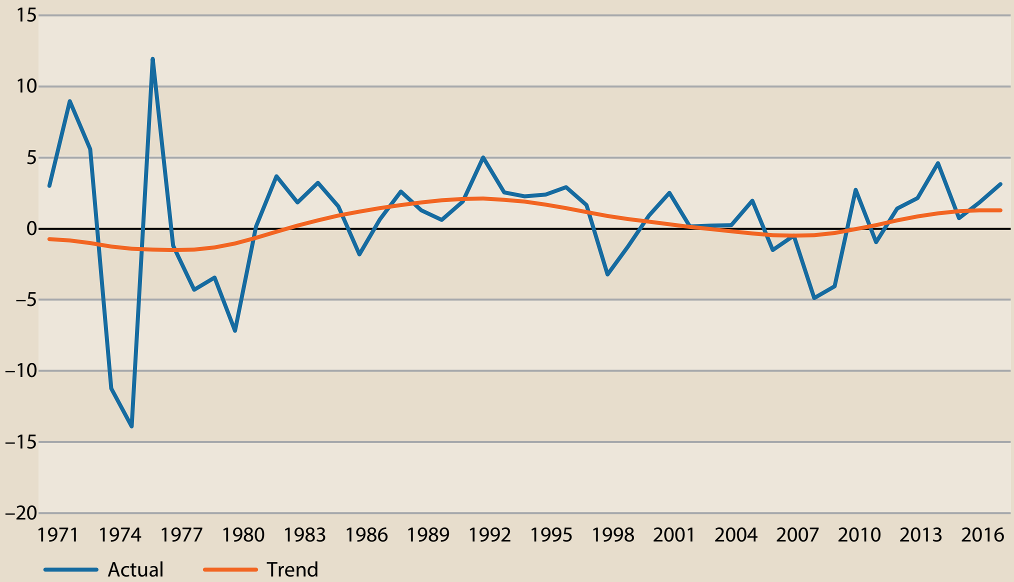


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 4

ANNUAL TFP GROWTH.

(IN %)

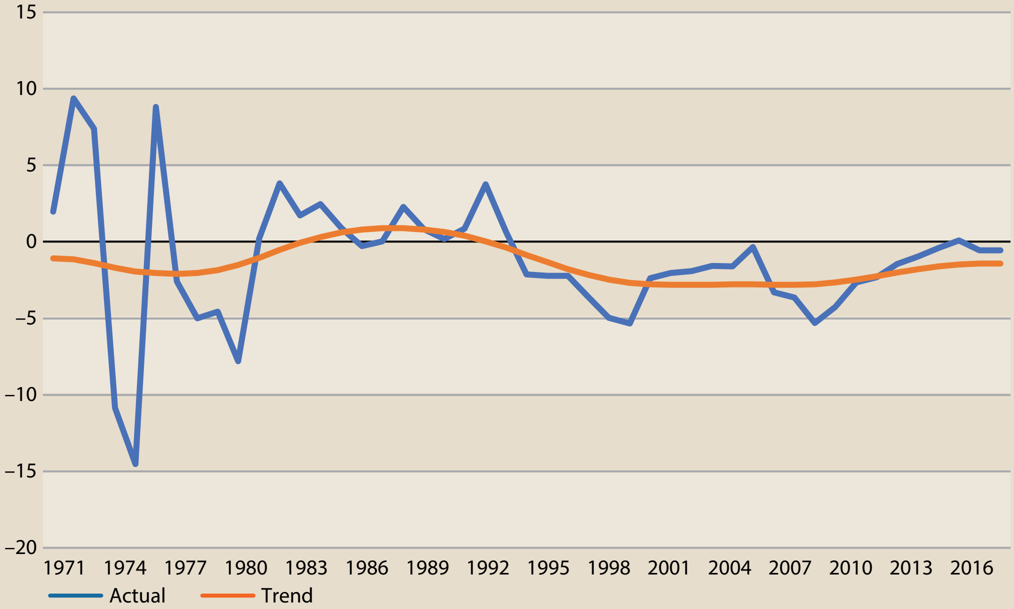


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 5

ANNUAL CAPITAL PRODUCTIVITY GROWTH.

(IN %)

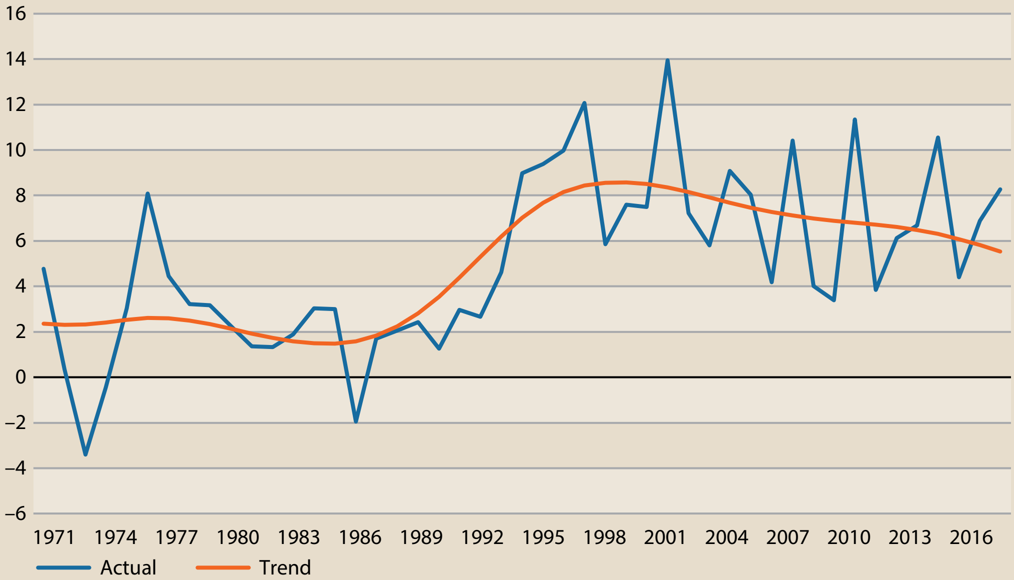


Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

FIGURE 6

ANNUAL GROWTH IN THE CAPITAL–LABOR RATIO.

(IN %)



Source: Author's estimates based on data from APO Productivity Database 2019.
Note: Trend lines were formed with a Hodrick–Prescott filter.

After falling in the 2000s, TFP grew strongly from 2010 to 2017 (see Figure 4), contributing an average 1.8 percentage points to output growth (see Figure 2). This improvement followed two decades of trade reforms, which capitalized on institutional development and encouraged export market growth while opening the economy to import competition [2]. Tariffs and quotas on imported products were reduced as Vietnam concluded a series of trade agreements culminating in its accession to the WTO in 2007 [3]. While foreign direct investment (FDI) declined from a peak in 2008, trade continued to increase relative to output in the 2010s. In 2017, Vietnam's exports were roughly equal in value to its gross domestic product, while imports of goods and services were equivalent to 98% of GDP. Production of services and manufactured goods (e.g., textiles and footwear, and more recently, machinery and mobile phones) contributed strongly to the activity from 2010 to 2017 as agriculture's share of GDP continued to fall.

Increases in workers' skill levels have recently helped offset the effect of slower growth in hours worked, contributing an average 0.7 percentage points a year to economic growth from 2010 to 2017. Educational outcomes have improved alongside rising living standards while poverty rates are significantly lower than thirty years ago.

Productivity Diagnostics

This section reviews diagnostic indicators for the productivity determinants that were set out in Chapter 4, along with some supplementary indicators that add a more complete picture in certain areas. The indicators from Chapter 4 are currently available, whereas the supplementary indicators do not go beyond 2017. The section also draws on the quantitative analysis of indicators in Chapter 5 and, where appropriate, the discussion of selected issues in Chapter 6.

Immediate Determinants

Indicators are available on capital intensity, human capital, knowledge, and products and markets (see Table 4). Indicators on intangible capital are not available.

Vietnam's capital-to-GDP ratio declined slightly in the 2010s amidst fast growth in the country's services sector. This occurred despite significant capital deepening, including rapid accumulation of IT capital.

Workers' skills continued to increase from 2010 to 2017. Vietnam ranks 13th among APO economies for the World Economic Forum (WEF) Current Workforce indicator, ahead of most countries in its income group. Further improvement in the skills and education of the workforce will be needed to close gaps with the best-performing countries in the APO.

Vietnam's production of medium- and high-technology goods has expanded alongside increased ICT investments and improvements in workers' skills. Vietnam performs relatively well on the Portlans Institute's NRI Technology Pillar (seventh in the APO), a broad measure covering indicators of internet access, mobile network coverage, creation of digital products, and spending on ICT. It also scores relatively well on the NRI People pillar, which tracks ICT skills and ICT use, among broader indicators of educational attainment. In contrast, Vietnam lags most APO economies for the WEF indicator on the availability of new technologies.

Rapid structural changes have seen manufacturing expand at a more rapid rate than the overall economy, while agriculture's share of GDP has declined. Both sectors represented roughly 17% of

GDP in 2017. However, agriculture continues to employ a larger share of the total workforce (40% in 2017 compared with 17% in manufacturing). Trade is vital to the performance of the economy. Exports and imports are each close in value to Vietnam's GDP, reflecting the importance of its participation in global value chains.

TABLE 4

INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Range	Value	APO rank	Value	APO rank
Capital intensity					
Capital/GDP ratio	Open	2.7 (2010)	13	2.6 (2017)	17
Capital deepening (pp)	Open	3.8 (2017)	4	3.2 (average of 2010–17)	5
IT capital deepening (pp)	Open	0.4 (2017)	4	0.3 (average of 2010–17)	4
Human capital					
Labor quality contribution to LP growth	Open	0.7 (2017)	5	0.7 (average of 2010–17)	7
WEF Current Workforce	0–100	48.3 (2019)	13	27.8 points behind APO leader	
WEF Entrepreneurial Culture	0–100	50.4 (2019)	13	20.0 points behind APO leader	
Knowledge					
Availability of latest technologies*	1–7	4.0 (2018)	16	2.3 points behind APO leader	
NRI Technology Pillar	0–100	44.8 (2019)	7	33.7 points behind APO leader	
NRI People Pillar	0–100	37.7 (2019)	9	38.7 points behind APO leader	
Products and markets					
Agriculture share (%)	Open	17.0 (2017 GDP)	5	40.2 (2017 employment)	6
Manufacturing share (%)	Open	17.0 (2017 GDP)	13	17.3 (2017 employment)	3
Medium- and high-tech share of manufacturing (%)	Open	25 (2010)	= 12	41 (2018)	10
Exports/GDP (%)	Open	71.4 (2010)	4	100.3 (2017)	3
Imports/GDP (%)	Open	79.5 (2010)	3	97.5 (2017)	3

Source: Appendix G.
Note: * Supplementary indicator.

Underlying Determinants: Productivity Readiness

The analysis in Chapter 5 combines the indicators of underlying determinants into overarching indices representing motivation, capabilities, efficiency of markets, and stability (see Table 5). These indices range up to 100. They give broad indications of where countries stand on productivity determinants and their overall productivity readiness.

Vietnam's estimated Productivity Readiness Index value of 41 places it at 10th among the 16 APO economies in the database. Relatively low scores for the subindices of motivation and efficiency of markets drag down the headline result. In contrast, Vietnam's scores for capabilities and stability are not far outside the top eight APO economies.

TABLE 5

VALUES OF OVERARCHING INDICES FOR VIETNAM.

Index	Value	Rank
Motivation	41	10
Capabilities	40	10
Efficiency of markets	40	11
Stability	43	9
Productivity Readiness Index	41	10

Source: Author's estimates.

Underlying Determinants: Specific Strengths and Weaknesses

Indicators of underlying determinants of productivity reveal the progress Vietnam has made in removing barriers to trade and investment, investing in skills and infrastructure, and strengthening institutions (see Table 6). However, there remain some significant barriers to productivity growth. In particular, more could be done to improve the regulatory environment, address corruption, upgrade transport infrastructure, and build on the progress in lifting workers' skills.

Improvements in educational attainment are reflected in Vietnam's reasonably strong performance on the WEF Skills/Future Workforce indicator. On the other hand, despite significant educational spending, the quality of Vietnam's education system, including primary education, ranks behind other APO countries at similar income levels, including India and the Philippines. In contrast, considerable progress has been made in lifting health outcomes, with higher life expectancy and lower infant mortality than other lower-middle-income APO economies.

Vietnam performs relatively well on the WEF Infrastructure indicator, ranking 11th among APO economies. Electricity reaches almost 99% of the population, while the country is well connected by rail and air services. However, more could be done to improve roads. Vietnam's innovation system ranks ahead of most other lower-middle-income countries as measured by the WEF Innovation Capability and KOF Informational Globalisation indicators. This reflects, in part, the country's success in bringing in FDI, which has enabled strong growth in Vietnam's medium- and high-technology manufactured exports.

Progress in reducing tariffs, and Vietnam's relatively efficient customs processes, contribute to a reasonable performance on the WEF Trade Openness indicator. There remain, however, significant nontariff barriers to trade. Vietnam has more significant restrictions on services trade than other lower-middle-income APO countries including Pakistan, Sri Lanka, and Bangladesh.

The IMF ranks Vietnam's financial market above those of all other lower-middle-income APO countries except India. The IMF indicator is based on measures of depth, access, and efficiency of a country's financial markets. Vietnam's slightly worse performance on the WEF Financial System indicator reflects the low regulatory capital ratio of its banks, which contributes to a low score for financial system stability.

TABLE 6

INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Range	Value	APO rank	Points behind APO leader
Education system				
Quality of education system*	1–7	3.6 (2017)	14	2.2
Quality of primary education*	1–7	3.4 (2017)	16	2.7
WEF Skills/Future Workforce	0–100	65.6 (2019)	10	15.8
Education expenditure/GDP (%)*	Open	4.2 (2018)	4	1.0
Innovation system				
WEF Innovation Capability	0–100	36.8 (2019)	12	43.4
KOF Informational Globalisation, de facto	0–100	87.6 (2017)	7	12.1
Infrastructure				
WEF Infrastructure	0–100	65.9 (2019)	11	29.5
Business environment				
THF Business Freedom	0–100	65.6 (2019)	= 10	30.6
WEF Administrative Requirements	0–100	62.6 (2019)	14	30.5
WEF Domestic Competition	0–100	53.7 (2019)	8	21.1
THF Tax Burden	0–100	79.5 (2019)	14	13.5
WB WGI Regulatory Quality	–2.5 to 2.5	–0.35 (2018)	14	2.58
WEF Labour Market	0–100	58.2 (2019)	11	23
THF Labour Freedom	0–100	62.5 (2019)	= 9	28.4
NRI Governance	0–100	56.6 (2019)	9	31.6
Financial system				
WEF Financial System	0–100	63.9 (2019)	12	27.5
IMF Financial Markets	0–1	0.38 (2018)	8	0.44
THF Financial Freedom	0–100	50 (2019)	= 10	40
Health system				
Life expectancy at birth (years)	Open	75.3 (2018)	9	9.4
Infant mortality (deaths/1000 live births)*	Open	20.7 (2018)	9	18.2

(Continued on next page)

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Indicator	Range	Value	APO rank	Points behind APO leader
Foreign investment				
KOF Financial Globalisation	0–100	58.2 (2017)	8	33.4
KOF Financial Globalisation, de jure	0–100	53.3 (2017)	10	32.6
FDI Stock/GDP (%)	Open	61.0 (2019)	6	445.6
THF Investment Freedom	0–100	40 (2019)	= 15	45
Trade				
WEF Trade Openness	0–100	54.3 (2019)	11	34.4
THF Trade Freedom	0–100	79.6 (2019)	11	15.4
Services Trade Restrictions Index*	0–100	48.5 (2016)	9	21.1
KOF Trade Globalisation	0–100	62.6 (2017)	8	33.8
KOF Trade Globalisation, de jure	0–100	53.6 (2017)	9	40.1
Demand:				
WEF Macroeconomic Stability	0–100	75 (2019)	11	25
THF Monetary Freedom	0–100	68.2 (2019)	18	17.4
Savings				
Gross savings (% of GDP)	Open	22.6 (2018)	16	25.6
Institutions				
WEF Institutions	0–100	49.8 (2019)	= 12	30.6
IMF Financial Institutions	0–1	0.42 (2018)	11	0.51
WB WGI Political Stability	–2.5 to 2.5	0.11 (2018)	= 10	1.38
WB WGI Rule of Law	–2.5 to 2.5	0 (2018)	10	1.84
WB WGI Control of Corruption	–2.5 to 2.5	–0.49 (2018)	13	2.66
WB WGI Government Effectiveness	–2.5 to 2.5	0 (2018)	12	2.23
Social capital				
WEF Social Capital	0–100	48 (2019)	12	15.2
WB WGI Voice & Accountability	–2.5 to 2.5	–1.44 (2018)	19	2.46

Source: Appendix G.
Note: * Supplementary indicator.

Vietnam ranks above other APO countries at similar income levels for indicators of the quality of its institutions, e.g., the World Bank's measures of political stability and the rule of law. Work remains to be done to address corruption and burdensome regulation, which holds Vietnam back in measures such as the WEF Institutions indicator despite improving the public sector's performance.

Challenges Ahead

In recent years, Vietnam has concluded free-trade agreements and taken steps to combat corruption while pursuing reform of the financial sector and state-owned enterprises [4]. Development partners such as the World Bank and IMF have encouraged Vietnam to continue efforts to address corruption, remove obstacles to trade, upgrade its infrastructure, and alleviate burdensome regulatory requirements [4, 5]. Vietnam could also improve the business environment by removing unnecessary barriers to trade in services, with the aim of lowering firms' input costs and enhancing the country's competitiveness in global value chains.

While it successfully contained the spread of coronavirus, Vietnam's dependence on trade leaves it vulnerable to deteriorating global conditions in 2020. In the coming years, population ageing will weigh on economic growth, which until now has benefited from increases in the working-age population. This will require Vietnam to achieve faster growth in LP to keep increasing living standards at recent rates.

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[2] OECD. OECD Investment Policy Reviews: Vietnam; 2018.

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PART C

APPENDIXES

APPENDIX A

PRODUCTIVITY TRENDS IN THE APO REGION

This appendix provides an overview of productivity trends in APO countries in support of the material in Chapter 2. It demonstrates that productivity growth, while generally strong in comparison with other regions, has been mixed within the region in the 2010s. APO countries have generally placed reliance on accumulation of inputs and capital deepening as sources for output and productivity growth.

Data for the chapter are sourced from the *APO Productivity Database 2019,* which provides estimates up to 2017. Unless otherwise indicated, the use of 'the 2010s' refers to the period from 2010 to 2017. The productivity indicators are economy wide. Consequently, output is represented by GDP, while input measures are totals for an economy.

Labor Productivity

Labor productivity (LP) is the rate at which output is produced from the quantity of labor used. The labor input measure includes all those involved, whether they be direct production workers, back-office people, or managers. It includes the self-employed, as well as those employed.

The labor input measure used in the *APO Productivity Database* has both a quantity and a quality dimension. Hours worked are used here as the quantity measure of labor input and labor productivity is the output produced per hour worked. The labor quality component captures changes in the composition of skills in employment and so a shift toward increased skills means an increase in labor quality.

Stronger LP Growth in APO Countries

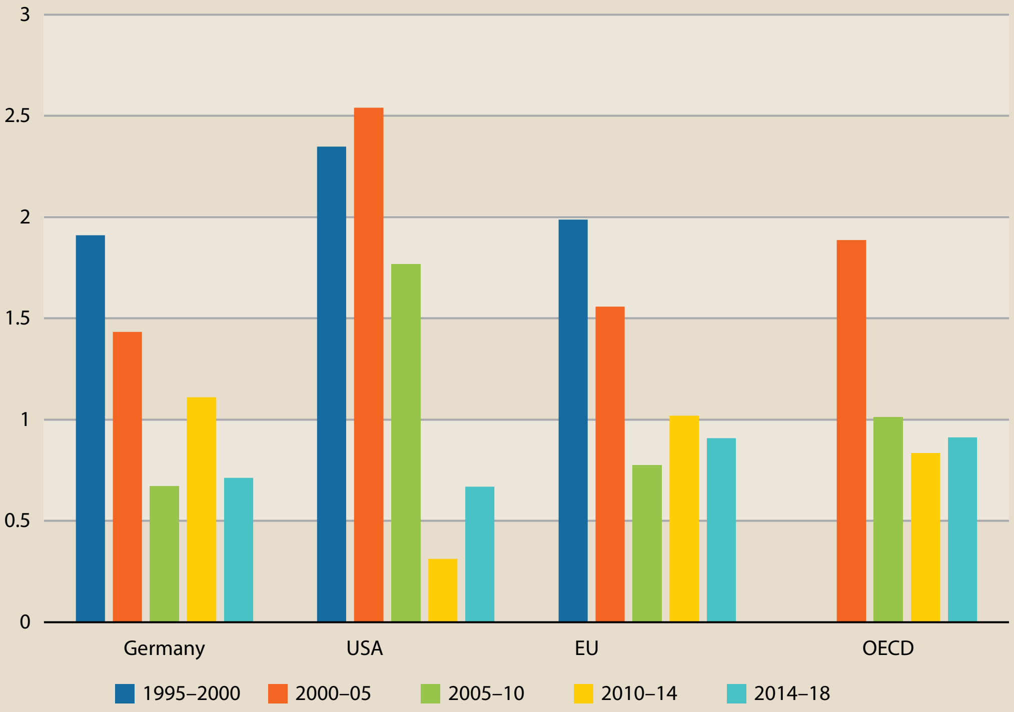
The productivity trends in APO countries should be viewed against the backdrop of a slowdown in LP growth around most of the world in the second half of the 2000s and into the 2010s. Many reasons have been put forward for the productivity slowdown, without a single reason emerging as the dominant one. One factor has been the Global Financial Crisis (GFC) in 2008, although the productivity slowdown had begun before that in the USA and other countries. Nevertheless, the GFC has undoubtedly contributed to the slowdown through slower output growth and greater uncertainty. Some experts have also pointed at effects from credit constraints, capital misallocation, higher concentration and markups, and a slowdown in creative destruction (involving the exit of low-productivity firms). A reduction in the growth of technological opportunities has been put forward as a reason [1], as have measurement difficulties associated with new products [2]. Technological optimists have suggested that the slowdown represents long lags before the productivity potentials of new technologies are realized [3].

The productivity slowdown in OECD economies is evident in Figure A-1, while Table A-1 illustrates the slowdown in emerging and less-advanced economies.

FIGURE A-1

LABOR PRODUCTIVITY GROWTH IN ADVANCED ECONOMIES.

(IN % PER YEAR)



Source: OECD [4].

TABLE A-1

LABOR PRODUCTIVITY GROWTH IN VARIOUS COUNTRIES AND REGIONS.

(IN % PER YEAR)

	1990s	2000s	2010s
China	8.8	9.9	6.5
Central & Eastern Europe and Central Asia	–0.7	3.9	2.0
Russian Federation	–2.5	4.0	1.2
Latin America	1.1	0.8	0.2
Brazil	1.3	1.4	0.1
South Africa	0.0	2.7	–0.5

Source: Author's estimates based on data from The Conference Board Total Economy Database.

Importantly, LP in the APO region has fared much better than in other regions in the 2010s. For the 20 APO countries as a group, the average annual rate of growth in LP increased from 2.8% in the 2000s to 3.3% in the 2010s. Moreover, there are signs of even stronger growth in the most-recent data. While LP grew at an annual average rate of 3.1% between 2010 and 2015, the rate increased to 4% between 2015 and 2017.

Acceleration in the Lower-productivity Economies

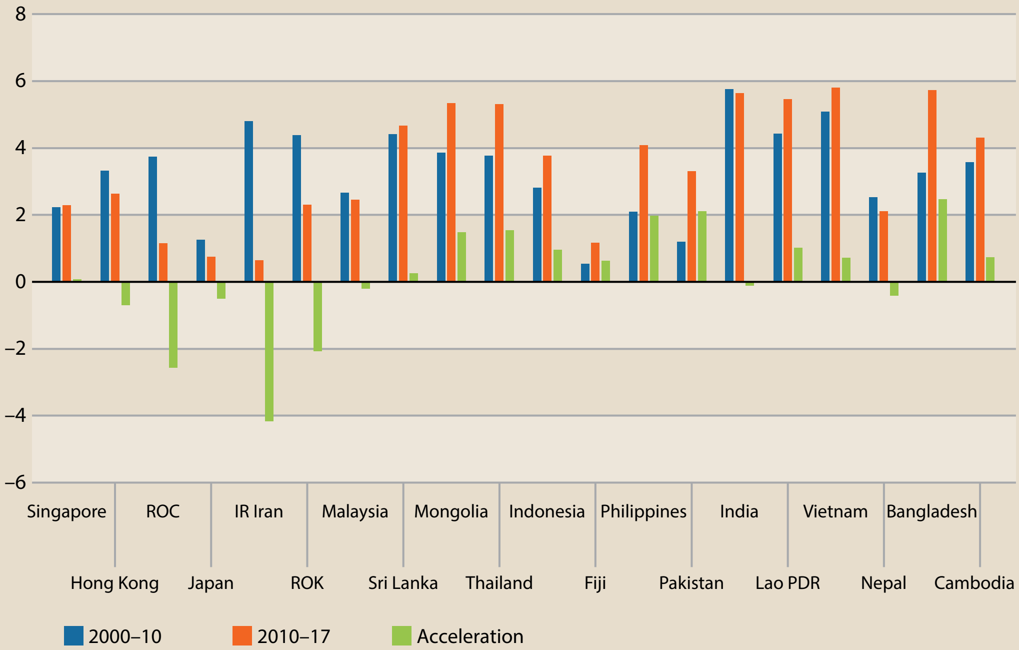
Productivity growth for the 2000s and the 2010s, and the acceleration between the two decades, are shown for individual countries in Figure A-2.The countries are presented in order of the size of their levels of LP in 2017 (see Chapter 2).

Most APO countries had a more rapid rate of LP growth in the 2010s than in the 2000s. Twelve countries had an acceleration, while the remaining eight countries experienced slower productivity growth.

FIGURE A-2

LABOR PRODUCTIVITY GROWTH IN INDIVIDUAL APO COUNTRIES.

(IN % PER YEAR)



Source: APO Productivity Database 2019.

The productivity acceleration occurred outside of the high-income, high-productivity countries of the region. Bangladesh, Pakistan, the Philippines, Thailand, and Mongolia had accelerations in annual LP growth of well over 1 percentage point. On the other hand, the high-income countries apart from Singapore (i.e., Japan, Hong Kong, ROK, and ROC) experienced a productivity slowdown, just as has been observed in high-income countries in other regions. IR Iran had a steep deceleration, while Malaysia, India, and Nepal had mild decelerations.

Recent productivity performances have also been improving. Thirteen of the 20 APO countries have had a stronger rate of LP growth during 2015 to 2017 than they had during 2010 to 2015. Ten countries had annual growth rates of over 4% during 2015 to 2017. The highest rates were in Vietnam, Thailand, India, and Bangladesh.

Six countries had impressive annual LP growth of more than 5% in the 2010s. They were Vietnam, Bangladesh, India, Lao PDR, Mongolia, and Thailand.

Behind LP Trends

There are two ways to explain LP growth. It may be seen either

- as the difference between output growth and growth in hours worked; or
- as the combination of capital deepening, improvements in labor quality, and production efficiency (in the form of TFP growth).

The first way is presented here, and the second way is presented in a separate section below.

The first way comes directly from the definition of labor productivity as output divided by hours worked. In growth form, LP growth equals output growth minus hours growth.

The OECD [4] found that GDP growth had slowed in most countries in the 2010s compared with pre-GFC rates. For the OECD group, growth fell from 2.64% in the 2001–07 period to 2.01% in the 2010–17 period. The growth rate also fell in Brazil, Russia, PR China, and South Africa.

The OECD [4] also noted that employment has grown more rapidly in the 2010s than in the pre-GFC period. Along with slower growth in output, this has led to slower growth in LP.

For the group of APO countries, there has been little change in output growth in the 2010s, compared with the 2000s. Annual growth in the 2010s (up to 2017) was 4.2%, compared with 4.3% in the 2000s [5].

Output growth has been generally strong-to-very-strong in APO countries (see Figure A-3). Mongolia, Cambodia, India, Lao PDR, and Vietnam have had growth rates of over 7% a year.

While most countries had mild increases in their output growth in the 2010s, IR Iran had a large decline in the output and the high-income countries experienced declines. Only four other countries had declines that were relatively mild.

The most recent output growth remains generally strong. Eleven countries had GDP growth of over 4% in the period 2015 to 2017. Nine countries had growth of more than 5%.

In contrast with the OECD, labor growth has been lower in APO region in the 2010s. The rate of growth in hours worked for the group of APO countries fell from an average of 1.5% annually in 2000–10 to 0.9% in 2010–17.

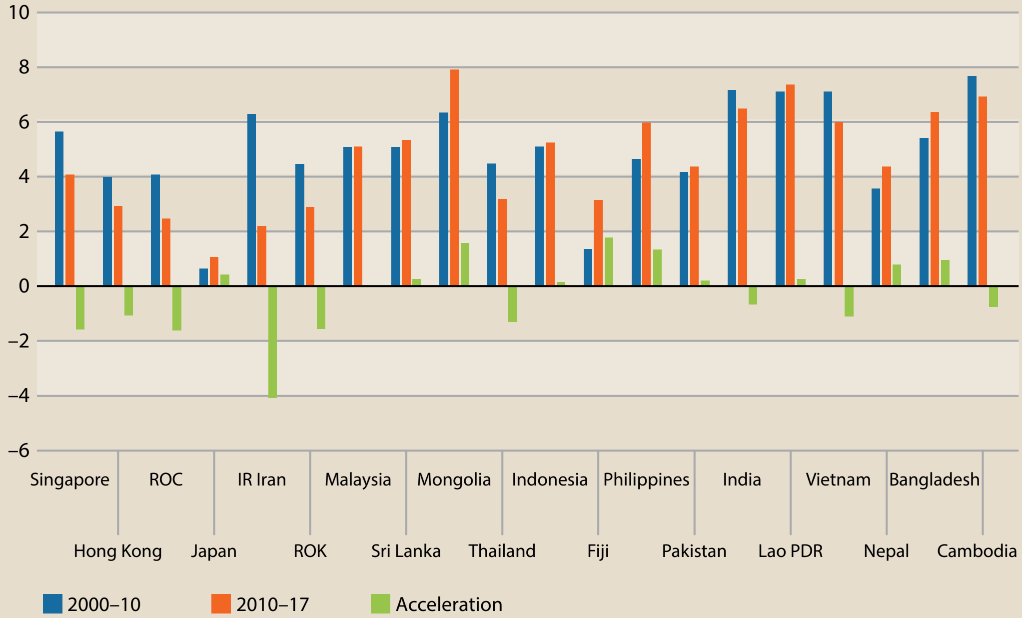
Figure A-4 shows growth in hours worked for individual APO countries. Twelve countries had slower growth in hours worked in the 2010s than in the 2000s. Thailand stands out as having a strong cutback in hours worked in the 2010s. There were also marked decelerations in Pakistan, Vietnam, Singapore, Bangladesh, and Cambodia.

The combined effects of changes in output growth and hours-worked growth on the changes in LP growth rates between the 2000s and the 2010s are shown in Figure A-5. Output accelerations and hours-worked decelerations both appear as positive contributions to an acceleration in LP growth. Conversely, weaker output growth and stronger hours-worked growth appear as negative contributors.

FIGURE A-3

OUTPUT GROWTH IN INDIVIDUAL APO COUNTRIES, 2000S VS. 2010s.

(IN % PER YEAR)

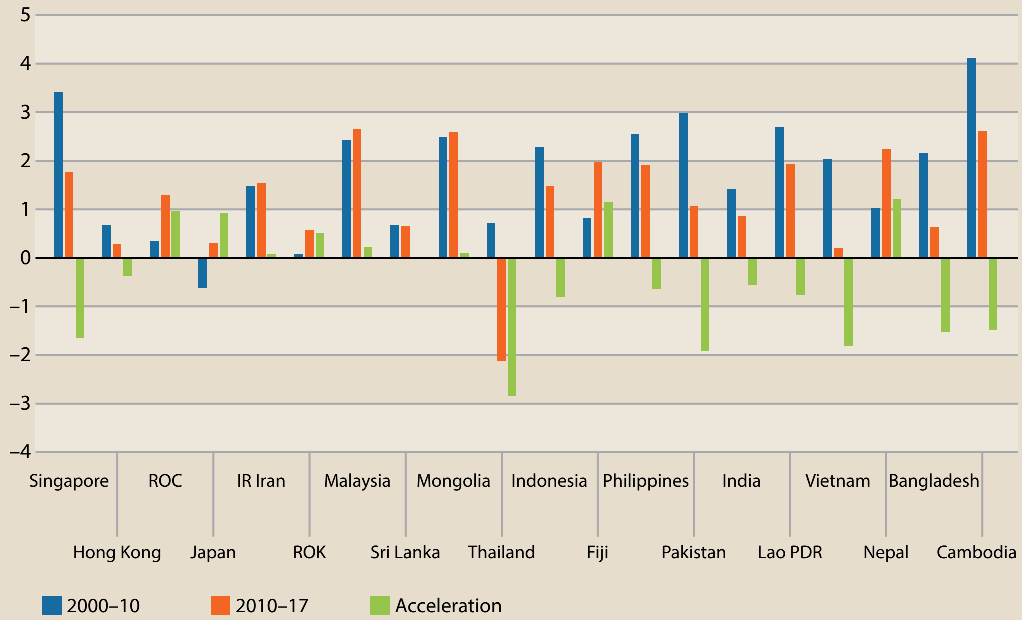


Source: APO Productivity Database 2019.

FIGURE A-4

GROWTH IN HOURS WORKED FOR INDIVIDUAL APO COUNTRIES, 2000s VS. 2010s.

(IN % PER YEAR)

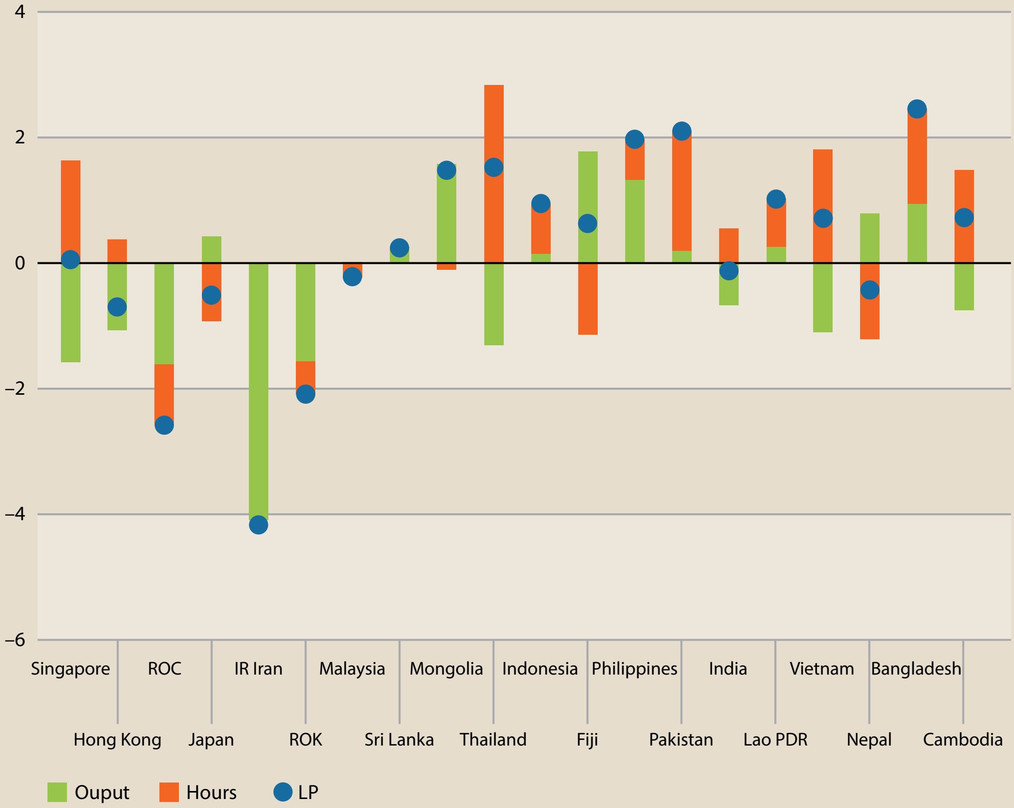


Source: APO Productivity Database 2019.

FIGURE A-5

CONTRIBUTIONS OF OUTPUT AND HOURS WORKED TO CHANGES IN LP GROWTH BETWEEN 2000s AND 2010s.

(PERCENTAGE POINTS).



Source: Author's estimates based on APO Productivity Database 2019.

The acceleration in LP growth was associated more with weaker growth in hours worked than with stronger output growth. Since output growth has been consistently strong (at least in the middle-productivity economies), there was little acceleration in the 2010s. On the other hand, slower output growth was the main contributor to weaker LP growth in Asian Tiger economies.

Cutbacks in hours-worked growth were more prominent contributors to LP accelerations among the lower-productivity countries. As pointed out above, Bangladesh, Pakistan, the Philippines, Thailand, and Mongolia had accelerations in their annual LP growth of well over 1 percentage point. Bangladesh, Pakistan, and the Philippines had the combination of faster output growth and weaker labor growth; Thailand had weaker output growth, but much weaker labor growth; while Mongolia had slightly higher labor growth in combination with stronger output growth.

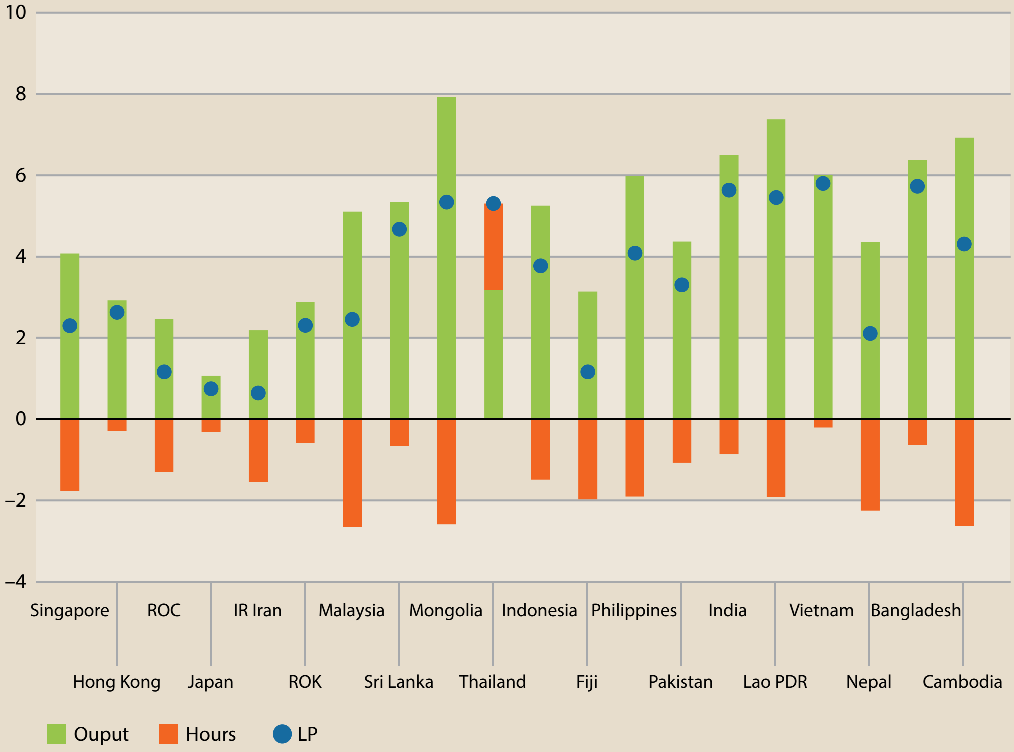
The productivity slowdown in high-income countries can be attributed mainly to weaker output growth. Singapore, which had slightly stronger LP growth, also had a strong cutback in output growth but it was just exceeded by its cutback in hours-worked growth.

IR Iran had the steepest deceleration in LP growth, and this was due to the collapse in its output growth.

Finally, Figure A-6 gives an impression of contributions of output and hours worked to LP growth in the 2010s. While output growth is a positive contributor, the hours-worked growth is a negative contributor. In the case of Thailand, hours worked made a positive contribution to LP growth because there was a decline in hours worked.

FIGURE A-6

CONTRIBUTIONS OF OUTPUT AND HOURS WORKED TO LP GROWTH IN THE 2010s.
(PERCENTAGE POINTS).



Source: Author's estimates based on APO Productivity Database 2019.

Capital Productivity

Capital productivity is the rate at which output is produced from the capital employed. Capital covers all assets relevant to production, including buildings, machines, equipment, and land.

Capital productivity can be of interest as an indicator of the extent to which capital is productively employed, though some caution is required in using it for that purpose (see Chapter 2).

The OECD [4] has noted that there had been a fall in capital productivity in advanced economies over the past 20 years, reflecting a fall in the cost of capital. It also stated that the rate of decline had moderated since the GFC. In the period of 2010 to 2017, capital productivity grew at annual rates of 0.53% in Germany, –0.91% in France, –0.44% in the UK, and –0.49% in the USA.

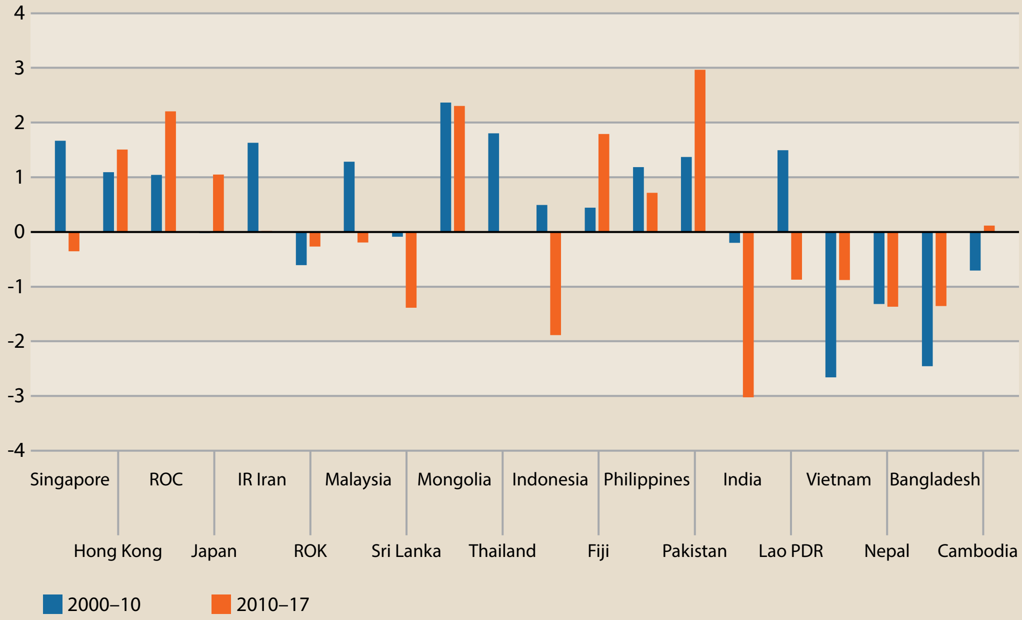
Capital productivity growth in APO economies is shown in Figure A-7. Countries are presented in the order of their levels of LP in 2017 (representing their relative stages of development).

There is no clear pattern, with a diversity of experience from a strongly positive growth to a strongly negative one. There is a group of only six countries, namely, Thailand, IR Iran, Cambodia, Malaysia, the Republic of Korea, and Singapore, for which capital productivity growth in the 2010s was less than half a percentage point away from zero growth.

FIGURE A-7

CAPITAL PRODUCTIVITY GROWTH IN INDIVIDUAL APO COUNTRIES.

(IN % PER YEAR)



Source: APO Productivity Database 2019.

Behind the Capital Productivity Trends

Capital productivity growth can be explained in proximate terms as the difference between output growth and capital growth. Output growth was shown in Figure A-3. Rates of capital growth in the 2000s and the 2010s are shown in Figure A-8.

Capital growth has been a major part of the growth strategy among APO countries. Fourteen countries have had rates of capital growth of over 4% a year in either or both the 2000s and the 2010s. Seven countries have had capital growth at more than 6% a year.

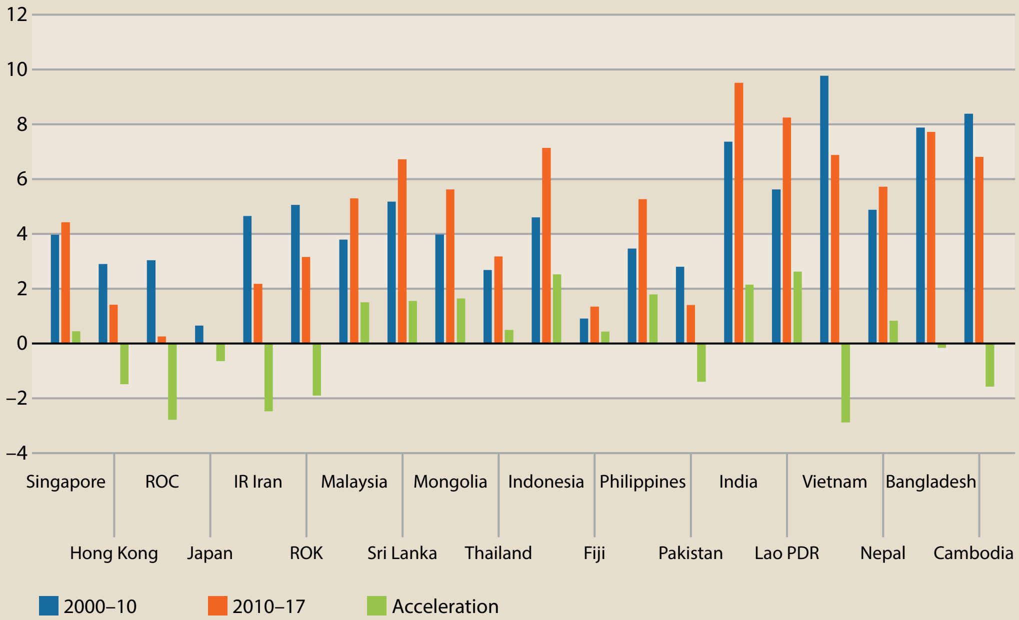
Most countries had an acceleration in capital input in the 2010s. Lao PDR, Indonesia, and India had over 2 percentage points more annual growth. The high-income countries, apart from Singapore, had slower rates of capital growth in the 2010s.

The output and capital contributions to capital productivity growth in the 2010s are shown in Figure A-9. This shows capital productivity growth as a mismatch between output growth and capital growth (shown as a negative growth). In cases such as Mongolia and Pakistan, capital productivity rose because output growth was more rapid than capital growth. However, in cases such as India and Sri Lanka, capital productivity fell because capital growth was more rapid than output growth.

FIGURE A-8

CAPITAL GROWTH IN INDIVIDUAL APO COUNTRIES IN 2000s AND 2010s.

(IN % PER YEAR)

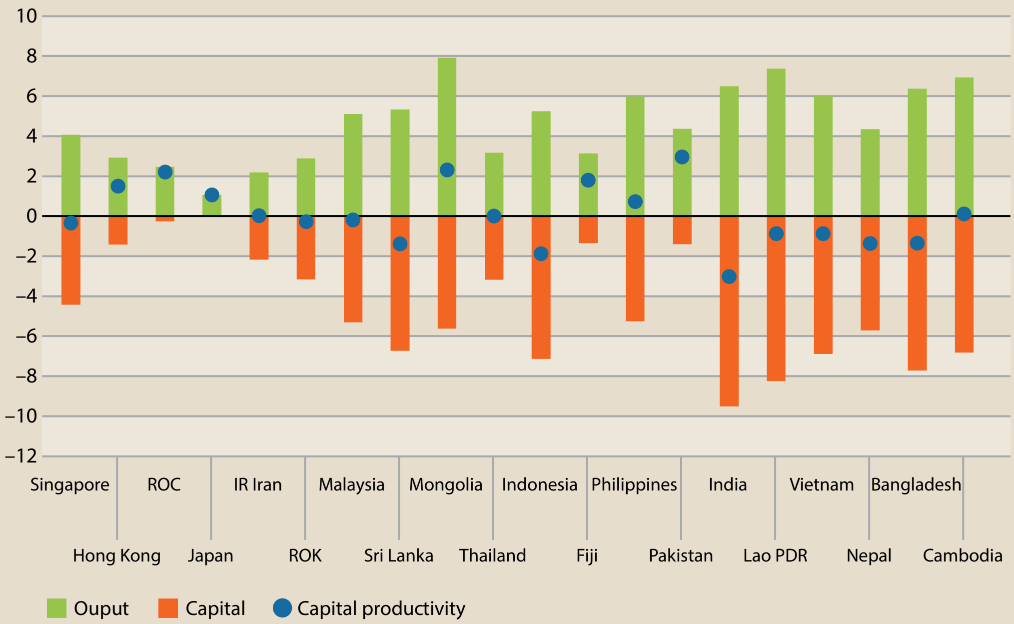


Source: APO Productivity Database 2019.

FIGURE A-9

CONTRIBUTIONS OF OUTPUT AND CAPITAL GROWTH TO CAPITAL PRODUCTIVITY IN THE 2010K.

(PERCENTAGE POINTS).



Source: Author's estimates based on APO Productivity Database 2019.

Total Factor Productivity

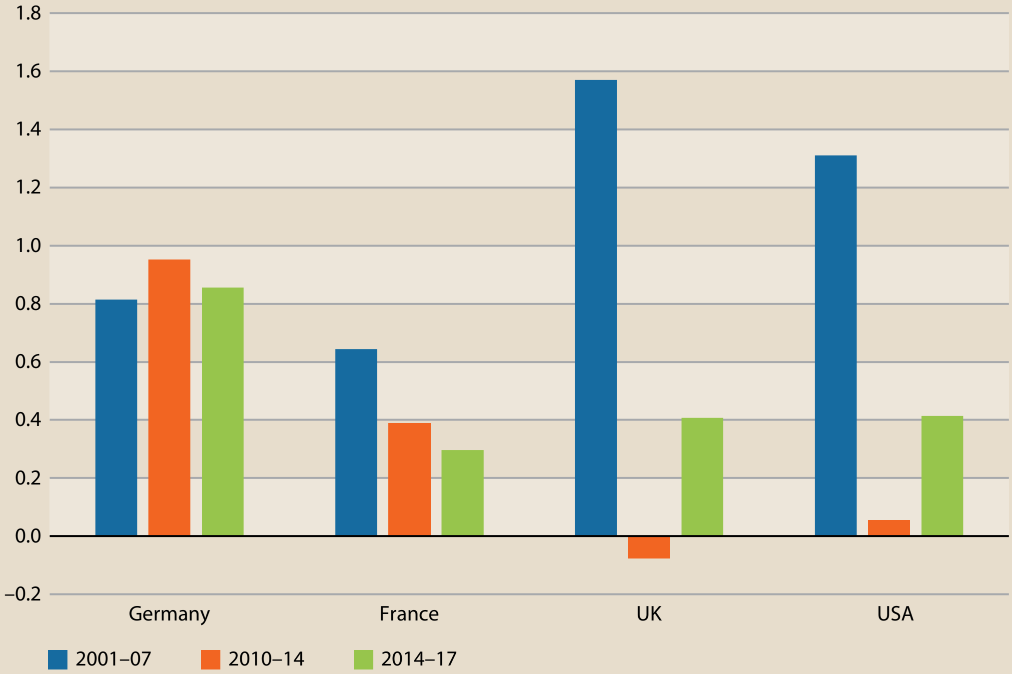
Total factor productivity (TFP) is the rate at which output is produced from a combination of the inputs used. Typically, labor and capital inputs are included in a combined inputs measure but, in the measures reported here, labor quality is also included as an input. TFP captures the efficiency and effectiveness with which inputs are combined to generate output. TFP growth is important because additional output means additional income and therefore additional returns to inputs such as labor and capital.

TFP growth, including labor quality improvements, has been weak in advanced economies in the 2010s. The OECD [4] reported that like LP growth, TFP growth also remains weak across most OECD economies, and although some countries, including the UK and the USA, have seen a pickup in recent years, growth remains well below pre-crisis rates. Figure A-10 provides an illustration.

FIGURE A-10

TFP GROWTH IN SELECTED ADVANCED ECONOMIES.

(IN % PER YEAR)



Source: OECD [4].

TFP growth was mostly weaker in APO countries in the 2010s. Twelve had decelerations, while eight had more rapid growth (see Figure A-11). There was no clear pattern among high-productivity or other countries, since both experienced falls in their TFP growth rates. Vietnam had a very strong acceleration of more than 2 percentage points, and Pakistan and Fiji had accelerations of more than 1 percentage point. Other countries with accelerations were Nepal, Bangladesh, Cambodia, and the Philippines.

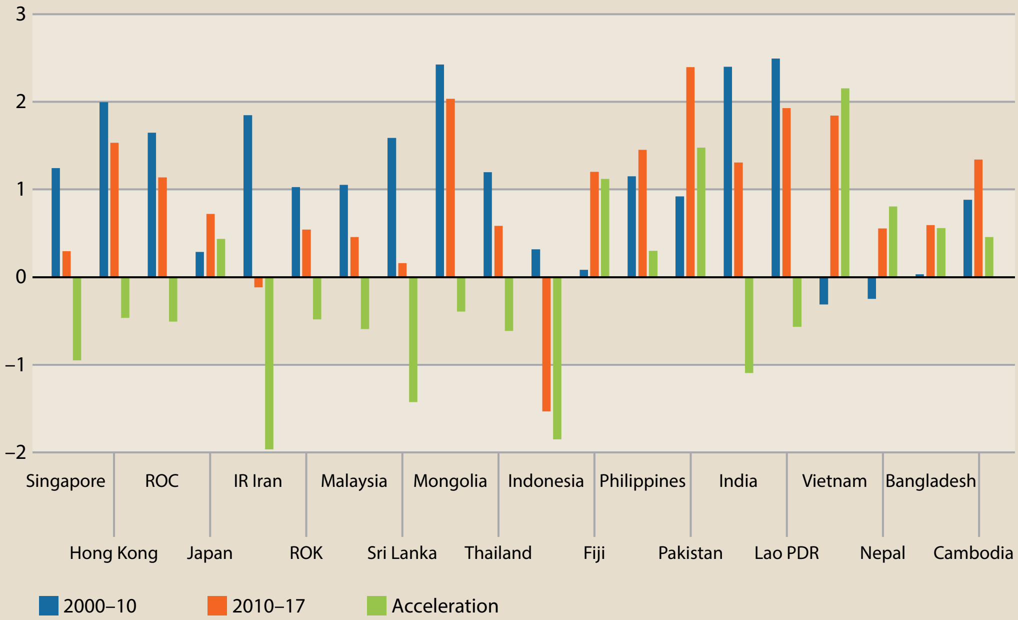
TFP growth in the most recent years looks generally promising. Thirteen countries had stronger TFP growth rates in the period 2015 to 2017 than during 2010 to 2015. Eleven countries had rates of growth from 2015 to 2017 of over 1.5%, which is strong for TFP growth, especially because labor-quality effects have been removed. Only three countries had negative TFP growth during that period.

The best performers in the 2010s, with TFP growth rates of over 1.5%, were Pakistan, Mongolia, Lao PDR, Vietnam, and Hong Kong.

FIGURE A-11

TFP GROWTH IN INDIVIDUAL APO ECONOMIES.

(IN % PER YEAR)



Source: APO Productivity Database 2019.

Behind the TFP trends

TFP growth can be explained as the difference between output growth and combined input growth. Changes in output growth were examined in Figure A-3. Rates of growth in the combined capital and labor inputs are displayed in Figure A-12.

Rates of growth in combined inputs were strong in the lower-productivity APO countries. The high-productivity countries, apart from Singapore perhaps, had lower rates of growth in combined inputs.

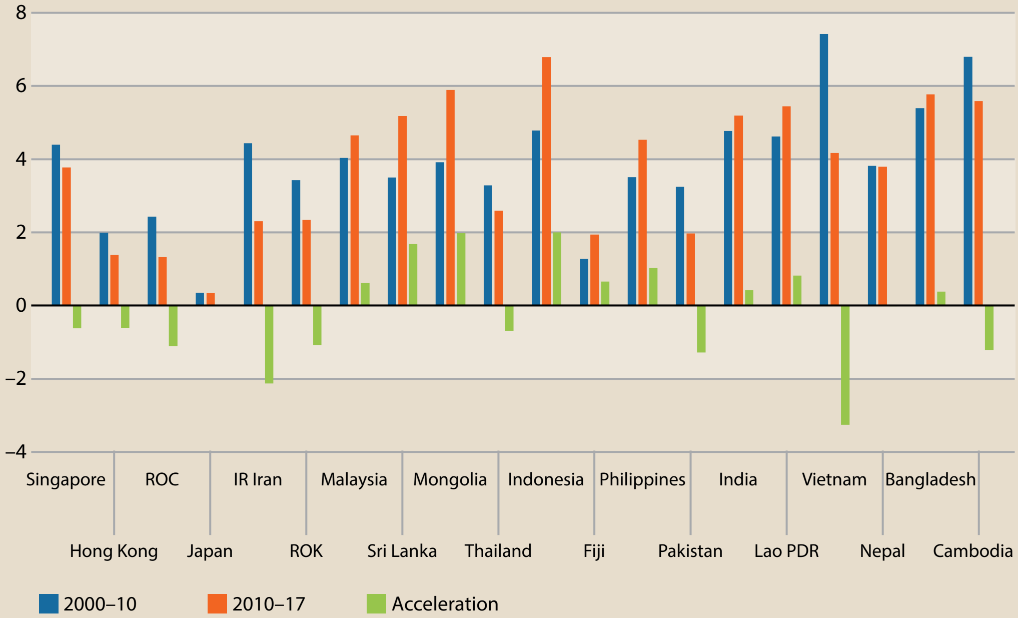
Eleven countries had slower growth in inputs in the 2010s than in the 2000s. Vietnam had the biggest slowdown with input growth 3.3% less a year.

Figure A-13 shows the contributions of output and input growth to TFP accelerations in the 2010s. The TFP accelerations in Vietnam, Pakistan, and Cambodia were due to constraints on input growth, whereas Fiji and other countries with accelerations benefitted from stronger output growth. For Hong Kong, the ROK, the ROC, and Singapore, TFP growth was weaker in the 2010s because output growth fell further than input growth. Japan had a TFP acceleration because output growth picked up, while input growth changed little.

FIGURE A-12

COMBINED GROWTH IN CAPITAL AND LABOR INPUTS IN APO COUNTRIES IN 2000s AND 2010s.

(IN % PER YEAR)

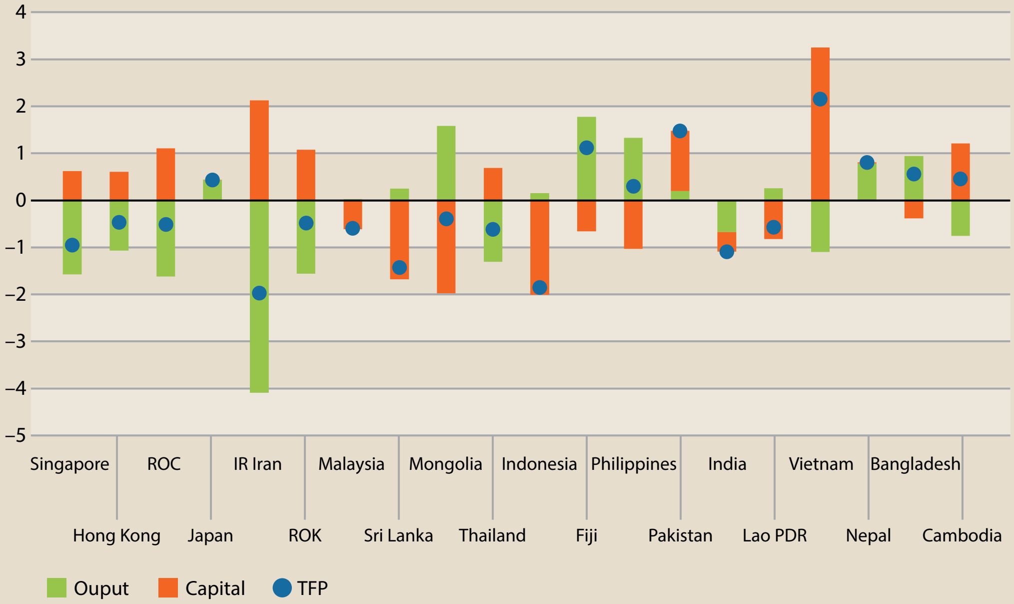


Source: APO Productivity Database 2019.

FIGURE A-13

CONTRIBUTIONS OF OUTPUTS AND COMBINED INPUTS TO CHANGES IN TFP GROWTH BETWEEN 2000s AND 2010s.

(PERCENTAGE POINTS).

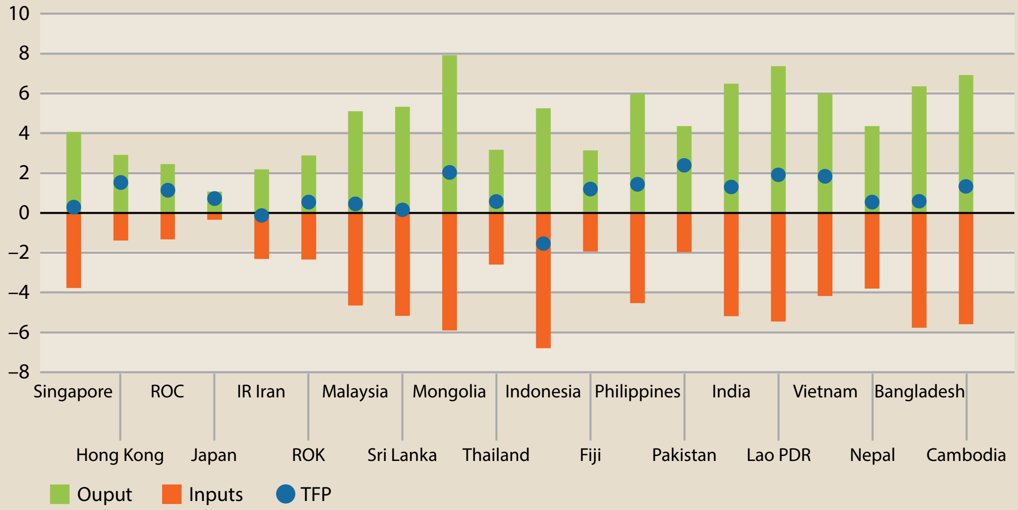


Source: Author's estimates based on data from APO Productivity Database 2019.

The output and input contributions to TFP growth (not acceleration) for 2000–17 are shown in Figure A-14. Only two countries, namely, IR Iran and Indonesia, had negative TFP growth. In the case of Indonesia, there was very strong input growth of 6.8%. Among five countries with annual TFP growth rates over 1.5%, Hong Kong and Pakistan had relatively small growth in inputs, whereas Mongolia, Lao PDR, and Vietnam had comparatively strong growth in output.

FIGURE A-14

OUTPUT AND COMBINED INPUTS CONTRIBUTIONS TO TFP GROWTH IN THE 2010s.
(PERCENTAGE POINTS).



Source: Author's estimates based on data from APO Productivity Database 2019.

Productivity Growth through Skills

As mentioned above, labor quality can be thought of as an element that has been taken out of broadly defined TFP growth and attributed specifically to enhancements in skills. The labor quality component captures the direct effects of enhanced skills on productivity that arise because people with more education attainment and workforce experience are more productive. The component does not capture indirect effects that might arise because, for example, the rate of innovation is linked to the availability of skills.

Enhanced skills have brought some strong productivity gains in APO countries, especially among the lower-productivity countries. Figure A-15 shows the amount of LP growth that could be attributed to labor quality growth. The three stand-out contributions of over 1.2 percentage points in the 2010s came from Indonesia, Thailand and Mongolia. Bangladesh and Cambodia also had strong contributions over 0.8 of a percentage point. A further four countries had contributions over 0.6 of a percentage point.

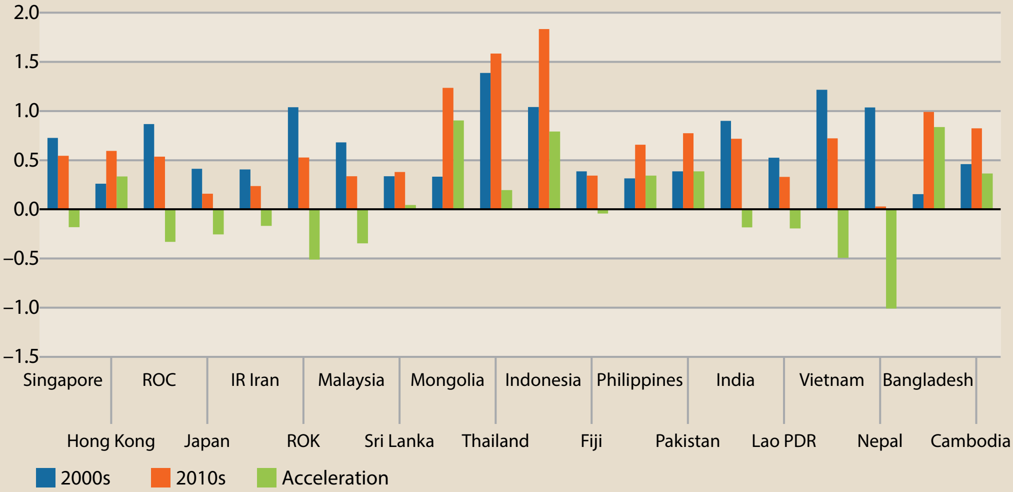
Employment skewed towards the unskilled in many countries in the 2010s compared with the 2000s (see Figure A-15). This was especially so in IR Iran, Sri Lanka, India, and Singapore.

Pakistan and Vietnam, on the other hand, had strong increases in productivity due to upskilling.

It is worth noting in passing that there were some extraordinarily strong rates of productivity growth if the TFP growth and labor quality contributions are combined, as is done in Figure A-16.

FIGURE A-15

LABOR QUALITY'S CONTRIBUTIONS TO LP GROWTH.
(PERCENTAGE POINTS).

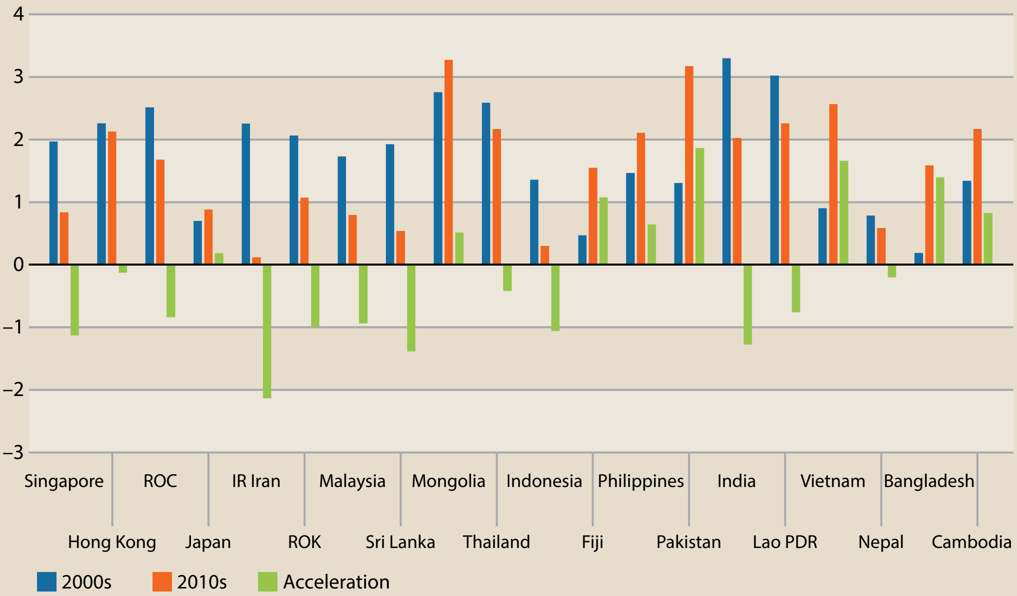


Source: APO Productivity Database 2019.

India and Lao PDR had growth of over 3% a year in the 2000s and Mongolia and Pakistan had growth rates of over 3% in the 2010s. A growth rate of over 1% a year would be considered strong in an advanced economy (see Figure A-10). Fifteen APO countries had growth rates of over 1% a year in the 2000s while there were thirteen in the 2000s.

FIGURE A-16

COMBINED TFP GROWTH AND LABOR QUALITY'S CONTRIBUTIONS IN 2000s AND 2010s.
(IN %)



Source: APO Productivity Database 2019.

Capital Deepening, Labor Quality, and TFP

It was mentioned in an earlier section that there are two ways to decompose LP growth. One is to consider contributions from output growth and hours-worked growth, as was shown in the section. The second way, which is discussed here, is to decompose LP growth into three elements, i.e., contributions from capital deepening, labor quality, and TFP growth.

Capital deepening comes essentially from increases in the ratio of capital to labor. Technically, that growth is weighted by the share of capital in total value added (or total costs of production less costs of intermediate inputs). However, the capital share does not change a lot over time. The intuition behind the effect of capital deepening on LP growth is that giving workers more and better equipment to work with raises the amount of output they produce per hour. In other words, it raises labor productivity.

Labor quality captures any shifts in the composition of hours worked towards greater skills. Because skilled workers are more productive, an increase in labor quality also raises the amount of output produced per hour worked on an average.

Finally, improvements in TFP, or the efficiency with which labor and capital are combined, will mean that the amount of output produced per unit of labor will also increase.

The rate of capital deepening has weakened in major advanced economies in the 2010s [4]. This has been due to a combination of weaker growth in capital after the GFC and stronger growth in labor.

APO countries have been almost evenly divided between those that have experienced higher rates of capital deepening (11 countries) and those that have had lower rates (nine countries). A striking feature of the contributions of capital deepening to LP growth, as shown in Figure A-17, is that capital deepening has tended to be stronger in lower-productivity countries and weak or negative in high-productivity countries.

It is also notable that the more rapid rates of capital deepening in the 2010s have mostly been in the lower-productivity countries. There are some exceptions such as Fiji and Pakistan that have had little capital deepening.

The rates of capital deepening are very high in some countries. For example, the rates in Bangladesh and Sri Lanka mean capital deepening contributed over 4 percentage points to annual labor productivity growth in the 2010s. India, Indonesia, Vietnam, Lao PDR, and Thailand also had rates of over 3 percentage points.

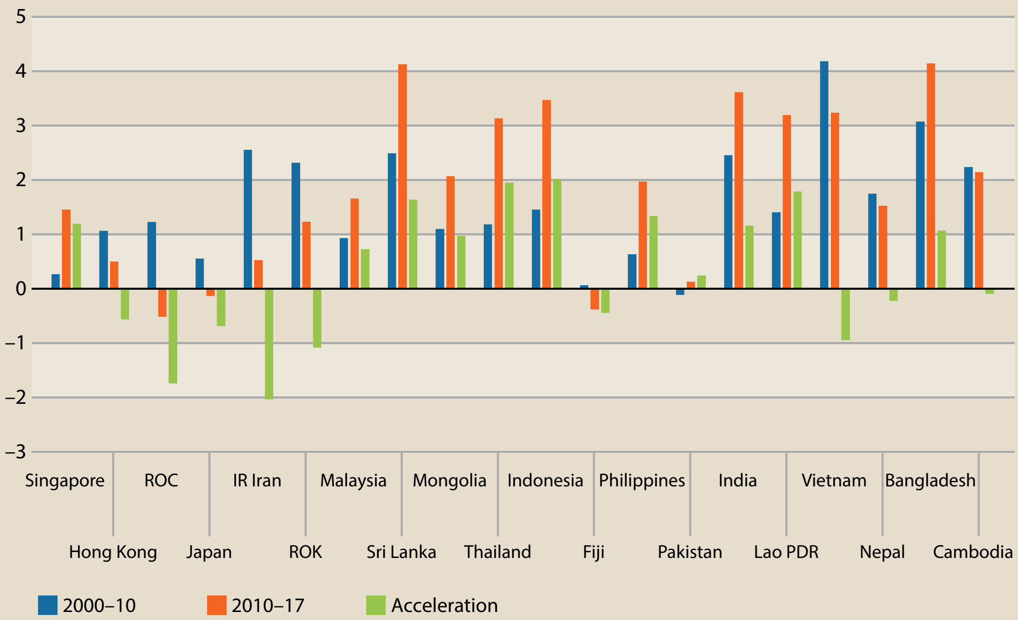
Figure A-18 shows how the changes in capital deepening from the 2000s to the 2010s came about. Increases in capital growth and reductions in labor growth are shown to have increased the rate of capital deepening. Conversely, slower capital growth and faster labor growth appear as negatives.

The lower-productivity countries tended to have a combination of more rapid capital growth and less labor growth, whereas the lower capital deepening in the high-productivity countries was mostly due to weaker capital growth. Singapore’s stronger capital deepening was mostly due to a cutback in labor growth.

FIGURE A-17

CONTRIBUTIONS OF CAPITAL DEEPENING TO LP GROWTH IN APO COUNTRIES IN 2000s AND 2010s.

(PERCENTAGE POINTS).

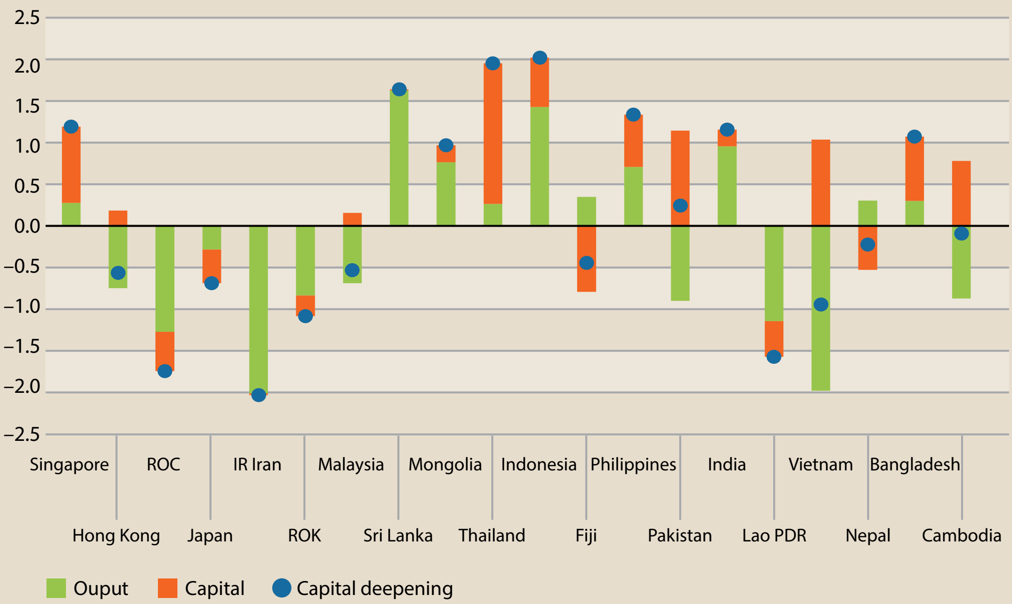


Source: APO Productivity Database 2019.

FIGURE A-18

CONTRIBUTIONS OF CAPITAL AND LABOR GROWTH TO CHANGES IN CAPITAL DEEPENING BETWEEN 2000s AND 2010s .

(PERCENTAGE POINTS).



Source: Author's estimates based on data from APO Productivity Database 2019.

As noted above, improvements in labor quality in the form of greater intensity of skills and TFP growth also contribute to LP growth. However, they are not considered separately again here. Rather, the combination of contributions from capital deepening, labor quality, and TFP to LP growth are highlighted. Figure A-19 presents the contributions to the change in LP growth for each country from the 2000s to the 2010s.

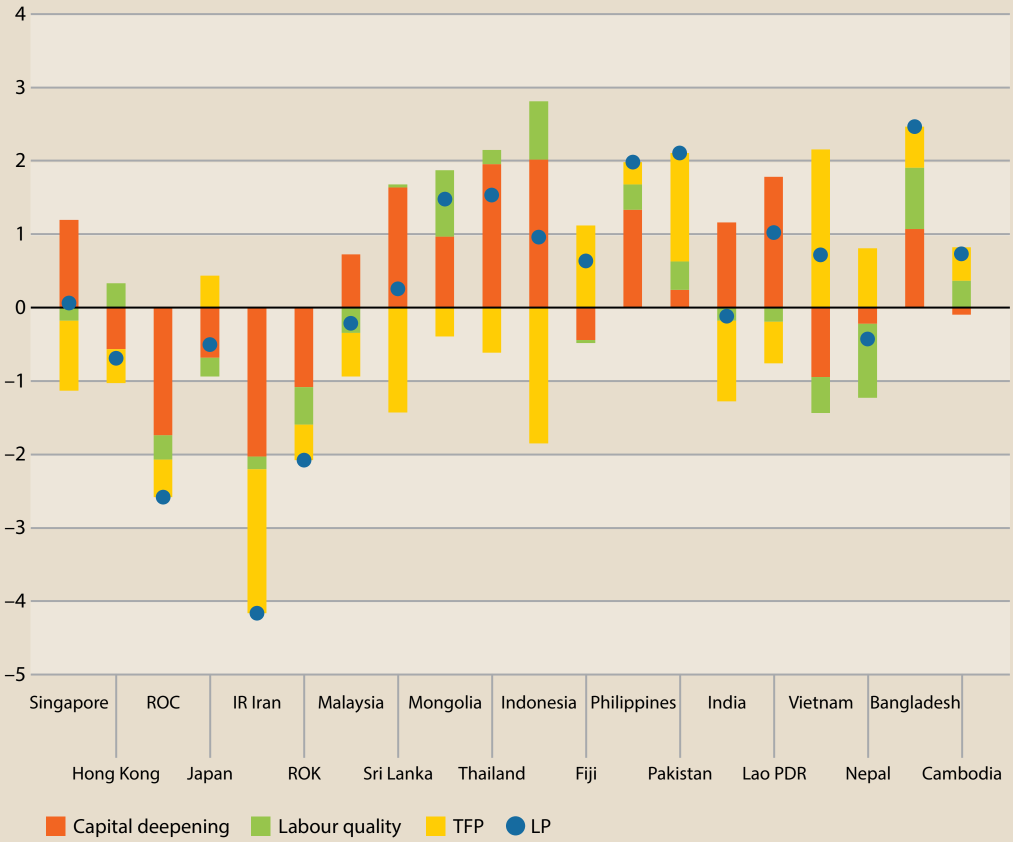
Increases in the rate of capital deepening provided most of the impetus for stronger LP growth in the lower-productivity countries (see Figure A-19). This fits with the earlier observation, and is also replicated in Figure A-19, that TFP growth tended to be weaker in most countries in the 2010s. Apart from Singapore, the high-income countries had weaker LP growth due to weaker capital deepening.

TFP accelerations were more important than increases in capital deepening in Pakistan, Cambodia, Vietnam, and Fiji. Some countries, such as Bangladesh, Mongolia, and Indonesia had strong contributions from greater use of skills.

FIGURE A-19

CONTRIBUTIONS OF CAPITAL DEEPENING, LABOR QUALITY, AND TFP TO CHANGES IN LP GROWTH FROM 2000s TO 2010s.

(PERCENTAGE POINTS).

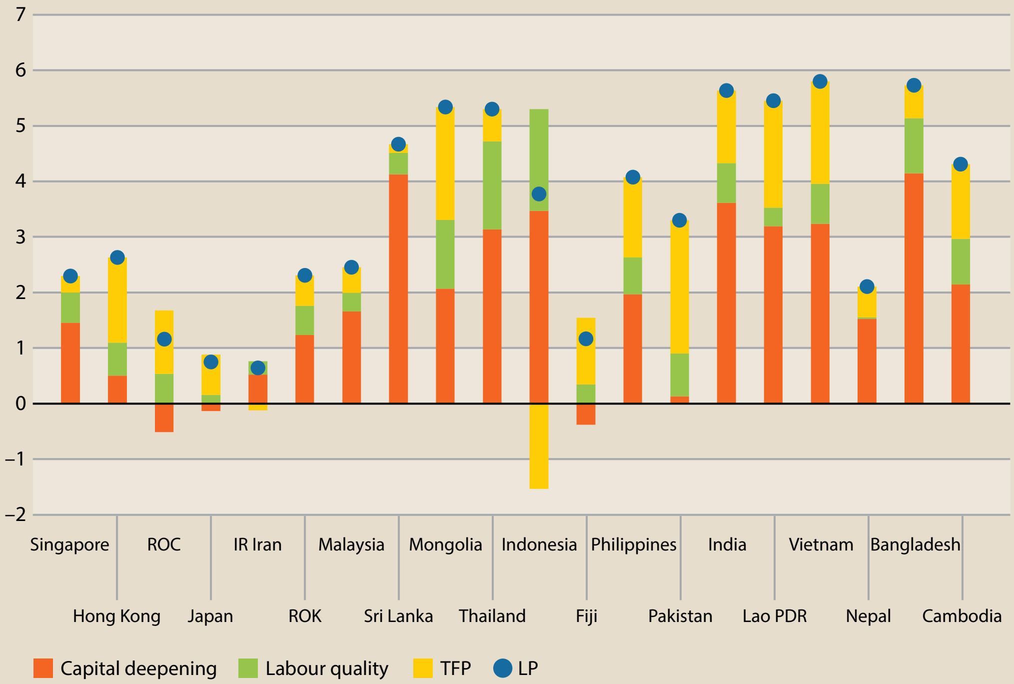


Source: APO Productivity Database 2019.

Again, for completeness, the contributions to LP growth (not acceleration) in the 2010s are shown in Figure A-20. The reliance on capital deepening among countries with strong LP growth is clear.

FIGURE A-20

CONTRIBUTIONS OF CAPITAL DEEPENING, LABOR QUALITY, AND TFP TO LP GROWTH IN THE 2010s.
(PERCENTAGE POINTS).



Source: APO Productivity Database 2019.

Key Point Summary

- While labor productivity growth has slowed in the 2010s in other regions around the world, it has increased in the APO region as a whole.
    - However, like other high-income countries, the high-income APO countries have also seen a productivity slowdown.
    - LP growth sped up in nearly all other countries.
    - Because output growth has been consistently strong (at least in the middle- and lower-productivity economies), there was little acceleration in the 2010s. The acceleration in LP growth was more due to weaker growth in hours worked.
    - Slower output growth was the main contributor to weaker LP growth in the Asian Tiger economies.
- Greater capital deepening provided a boost to LP growth in the 2010s in the middle- and lower-productivity economies.
- Some of the middle- and lower-productivity economies also had sizeable contributions from changes in the mix of skills.

- TFP growth has featured in periods and countries with strong output growth.
    - TFP growth has been more prominent, and more consistently so, in high-productivity APO countries.
    - Other countries have maintained a reliance on capital accumulation but have increased their TFP growth as the sources of their additional output growth in the 2010s.
    - Eight countries had higher TFP growth in the 2010s than in the 2000s
- Capital productivity performance has been diverse, with growth in 2010s falling within a range of highly positive to strongly negative. Only six countries had capital productivity growth within half a percentage point of zero.
    - Those countries with strongly negative capital productivity had very strong capital growth. At first glance, the strong negative in capital productivity raises the issue of whether all of the capital growth was productively employed.

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[4] OECD (Organisation for Economic Cooperation and Development). OECD Compendium of Productivity Indicators. Paris: OECD; 2019.

[5] APO (Asian Productivity Organization). APO Databook 2019. Tokyo: APO; 2019.

APPENDIX B

LITERATURE REVIEW

Many factors can cause productivity to differ between countries, and a vast body of productivity literature attempts to show what those factors are, and how much they matter. The aim of this review is to identify the major determinants of productivity, based on evidence from empirical studies. First, a set of 'immediate determinants' are considered. These are factors within or partly within the control of individual firms in determining what and how to produce.

The consideration then turns to a group of 'underlying determinants' that affect the environment in which firms operate. These factors are typically beyond the control of individual firms, but they can be influenced by the decisions of governments.

In this appendix, evidence is presented on the role and importance of different immediate and underlying determinants and the mechanisms through which they affect productivity. While determinants are discussed individually, they are in fact interrelated, and their interactions also help to explain why some countries are more productive than others. Important interactions between different determinants are cross-referenced. The literature review in this appendix is used to define a framework of determinants that can explain productivity differences between countries (see chapter Productivity Trends) and as a foundation for the identification of indicators of productivity determinants (see chapter Productivity Determinants) as well as the quantitative modelling of country-level variations in productivity indicators (see chapter Diagnostic Indicators). While insights into how productivity determinants are measured and analyzed are presented, there is no attempt to survey the extensive literature on what determines productivity or the methods that have been used to figure this out. Readers can refer to Syverson [1] and Bartelsman and Doms [2] for survey articles, or the more recent literature review in Kim and Loayza [3].

Immediate Determinants

Firms' decisions about the type of labor and capital to employ in production, and the knowledge they use to combine inputs, affects their productivity. Decisions about what and where to produce, and the markets in which to sell the products, also affects the productivity. The 'immediate' determinants considered in this review are labor and human capital; physical capital; intangible capital; knowledge; and products and markets.

Labor and Human Capital

The quality of labor used in production affects the amount of output firms can produce with their given inputs. Measures of human capital such as the quantity and quality of education are positively related with countries' long-term growth rates [4]. Research using firm-level data finds that productivity is increasing in measures of labor quality such as education, tenure, or experience [5–7].

When constructing measures of total factor productivity (TFP), country-level studies often adjust data on labor inputs to account for returns to human capital, approximated by years of schooling. This increases effective labor inputs to production and reduces the TFP 'residual.' This approach removes the direct mechanism by which increases in human capital, e.g., the efficiency of labor, boost the measured TFP (though it still contributes to higher labor productivity). The literature does, however, suggest two other ways in which labor quality can affect TFP. First, a more educated workforce is better at creating new technologies [8, 9]. Second, with better educated workers, developing countries can more easily adopt technologies from frontier countries [4]. There is evidence that the human capital stock affects TFP by influencing the rate of technology diffusion, or technological catchup. Trade provides an important mechanism for the flow of production knowledge between countries. Miller and Upadhyay [10] find that human capital has a positive effect on TFP in low-income countries that are relatively open to trade.

Other papers emphasize that the human capital of managers is a particularly important determinant of productivity. Studies of management practices and productivity are considered in the section on 'Knowledge' in this appendix.

Physical Capital

Investment in physical capital boosts labor productivity through capital deepening. Acquiring certain types of physical capital may also contribute to output indirectly, through higher TFP. This has been shown for investment in information technology (IT). Jorgenson, et al. [11] examine the role of IT in the productivity resurgence in the USA that began in the mid-1990s. They show that the pickup in labor productivity growth from 1995 to 2000 was driven by growth in the TFP of IT producers, together with massive investments in IT across the USA's economy. Oliner, et al. [12] also find that IT played an important role in spurring the productivity revival in the USA from the mid-1990s. European countries experienced a decline in productivity growth over this period. Van Ark, et al. [13] find that weaker productivity growth in Europe, compared with the USA was, in part, due to lower rates of capital deepening in information and communications technologies in Europe.

Syverson [1] reviews evidence of the mechanisms through which IT capital can contribute to TFP in particular industries. In different settings, IT may enhance producers' ability to improve capacity utilization of other physical capital [14]; customize products or execute production processes more efficiently [15]; or replicate business process improvements throughout an organization [16]. The adoption of new IT may also be accompanied by increased skill requirements for workers, which if matched by corresponding changes to human resource practices can result in further increases in TFP [15]. Other studies find evidence consistent with the notion that IT works as a general-purpose technology that enables subsequent innovation over time [17].

Intangible Capital

Businesses can increase their productive capacity by spending on product research, developing new products or markets, or improving organizational efficiency. Similar to spending on physical assets such as machinery and equipment or buildings, expenditure on intangible assets enables firms to increase output repeatedly over time. This is what distinguishes capital from intermediate inputs, which are used or transformed in a given period, not continuously like a computer or the software that runs it. Official macroeconomic data on investment now include some but not all types of intangible capital recognized in the literature [18]. Analysis of country-level data on intangibles reveals different rates of investment in intangible capital, which helps to explain income gaps between countries [19]. In this section, evidence is presented that investment in intangible capital is associated with higher TFP. In the next section on 'Knowledge,' evidence is presented illustrating that high-performing firms achieve productivity gains over other businesses by combining inputs of labor and physical and intangible capital in effective and complementary ways.

Corrado, et al. [20, 21] developed influential measures of innovation-based capital expenditure. In their framework, investment in intangible capital includes spending on computer programs and computerized information, research and development, and knowledge embedded in brands and other firm-specific resources. Industry-level studies reveal evidence of a positive relationship between investment in intangible assets and TFP in different countries such as Japan [22], PR China [23], and Brazil [24]. Among the types of intangible assets that have been found to generate productivity gains are R&D spending, training and goodwill, advertising, and organizational and brand capital.

Much work has been done examining the effects on productivity of research and development (R&D). Nadiri [25] analyses the results of a number of studies and reports evidence of a strong positive relationship between R&D expenditure and TFP. This is consistent with the findings of recent research. Doraszelski and Jaumandreu [26] find that R&D is an important driver of productivity differences between Spanish manufacturing firms in the 1990s. Guellec, et al. [27] show, using data on 16 countries from 1980 to 1998, that spending on R&D, whether by businesses, the public sector, or foreign firms, is an important determinant of long-term productivity growth.

Investment in other forms of intangible capital can also increase productivity. Battisti, et al. [28] find that intangible capital investment has a positive effect on TFP using a measure of intangibles that includes training and goodwill. Bontempi and Mairesse [29] show that so-called 'customer capital' (trademarks and advertising) has a positive effect on productivity for a panel of Italian firms. However, they find that estimates of the productivity effects of intangible investment are smaller when derived from data on expenses as opposed to balance sheet information on intangible assets. Ilmakunnas and Piekkola [30] argue that organizational work related to management and marketing creates organizational capital [31]. They analyze Finnish firm-level data and show that increased organizational activity leads to TFP gains that are greater than those due to research and development. De and Dutta [32] show that investment in organizational capability has a positive and significant effect on productivity in India's software industry. Other studies emphasize that a firm's productivity may be affected not only by its own stock of intangible capital but also by knowledge capital held by other firms [33]. Evidence of spillovers from knowledge and human capital is reviewed in the section on 'Innovation system.'

Knowledge

Productivity depends not only on firms' inputs, but also on the technology or the knowledge they use to combine those inputs. Firms may obtain additional productivity gains from IT investments by changing their businesses to take advantage of new technologies, e.g., through innovations in business organization or workplace practices [11, 15]. Bloom, et al. [31] examine the relative productivity performance of USA multinationals in Europe compared with the non-USA multinationals, again during the USA's mid-1990s productivity resurgence. They show that USA multinationals achieved higher productivity from IT than domestic European firms largely due to better people management. Garicano and Heaton [34] study the effect of investments in computing technologies on the efficiency of police departments, with productivity proxied by measures such as case solution rates. They find evidence suggesting that departments become more efficient with new IT, but only when such investments were paired with complementary organizational changes, which might be categorized as contributing to intangible capital. Garicano and Heaton emphasize that changes including improved middle-management accountability, training, and increased use of technical support personnel together enable departments to take advantage of IT investments to become more productive.

A large number of papers examine the relationship between management practices and productivity. Bloom and Van Reenen [35] show, using data on 732 manufacturing firms in the USA, France, Germany, and the UK, that management practices are strongly associated with productivity performance and profitability. They also find that USA firms are better managed than European firms. Bloom, et al. [36] argue that some management practices are akin to a technology. Based on analysis of survey data on more than 11,000 firms in 34 countries, they find that differences in management practices account for almost a third of TFP differences between countries. Bloom, et al. [37] analyze a Census Bureau survey of management practices in two waves of 35,000 manufacturing plants in 2010 and 2015. They find evidence of significant variation in management practices both across firms, and across plants within the same firm. They show that management practices explain about a fifth of the variation in productivity across firms in their samples, which is at least as large or larger than the variations explained by R&D, IT, or human capital.

Several studies seek to pin down which management practices matter for productivity. Tougher people management practices [31], recruitment and retention of workers with greater human capital [38], and high levels of managerial attention [39] are among the answers that emerge from the empirical literature.

Products and Markets

By developing new products and changing the mix of products they produce, firms can access larger markets and increase their profits. Product switching, and producers' ability to customize products and expand into new markets, can affect productivity within and across firms. Bartel, et al. [15] find that an improved ability to customize products contributes to productivity gains in manufacturing plants. Bernard, et al. [40] find that product switching is widespread among the USA's manufacturing firms and that firms selling multiple products are more productive than single-product firms. They also find evidence suggesting that the process of adding and dropping products leads to a reallocation of resources within firms toward more productive activities.

Exporting can increase the returns to innovation by giving firms access to larger markets [41]. This, in turn, can lead to productivity increases both within and across firms. Some studies emphasize, however, that higher productivity businesses with low marginal costs are the ones most likely to export. This aligns with the prediction of standard trade models featuring firms with differing levels of productivity. Entry costs to export markets imply that only the most efficient and profitable firms can benefit from the larger market share that exporting allows [42]. Some studies show, consistent with theory, that growth in export markets causes only the more productive firms to innovate [43, 44]. Export participation can also generate within-firm productivity gains for multiproduct firms by inducing them to skew export sales to their best performing products [45].

Garcia-Marin and Voigtlä [46] suggest that some studies underestimate within-firm productivity gains from exporting by using revenue-based measures of productivity that are affected by output prices. If more efficient producers charge lower output prices, such measures may be biased downwards. Using an indicator of productivity based on marginal cost, Garcia-Marin and Voigtlä find that new export entry, and expansion of exports, is associated with increased efficiency and that investment in technology helps drive these gains.

There are other, separate mechanisms by which exporting may generate within-firm productivity improvements. Some papers find evidence that firms based in developing countries benefit from knowledge transfers from buyers in higher-income countries [47]. One of the benefits of these knowledge transfers is increased technical efficiency. Shu and Steinwender [41] review the other evidence of 'learning-by-exporting.' The limitation of these studies is that they often relate either to makers of particular products in particular places, e.g., carpet makers in Egypt [47], or to special situations, e.g., Slovenia's transition to a market economy [48]. Yet this literature suggests an important mechanism through which exporting can lead to within-firm productivity gains, particularly in developing countries.

The empirical literature documents large differences in productivity between firms even within narrowly defined industries [1]. Lentz and Mortensen [49] develop a model in which innovative firms produce higher-quality products, make higher profits, and have an incentive to grow faster after entry into the market. This model can account for growth in economywide productivity that results from two sources: high-productivity firms growing more quickly than low-productivity firms, and the replacement of existing lower-productivity firms by higher-productivity entrants. A version of the model estimated for a panel of Danish firms suggests that three quarters of aggregate productivity growth is explained by reallocation of resources to higher-productivity firms. Of this, two thirds are due to more innovative firms expanding their share of the market, with the remaining third attributable to exit-and-entry dynamics.

Summary

The understanding of what drives productivity growth has evolved over time. Firms can become more productive by making better use of new machines and equipment, but also by employing higher-skilled workers. Modern measurements of capital account for businesses' investments in intangible assets, which like innovations in engineering and production technologies enable firms to produce more output with given inputs of labor and physical capital. Empirical studies have documented the significant productivity effects of the production and use of IT, as well as the role of management practices in improving firm-level efficiency. While the evidence of what drives productivity draws extensively on data for manufacturing industries, understanding the interplay between the larger set of determinants discussed in this review is, if anything, even more important for analyzing growth in the modern services sector.

Underlying Determinants

Firms typically have limited control over the environment in which they operate. Government policy, in contrast, influences the efficiency of markets for products, factors of production, and finance. Governments can also shape the fundamental institutions and rules that govern how different parties interact, and, in turn influence how resources are allocated in the economy. They also determine the provision of public goods in an economy and make policies that determine standards of healthcare and education, affecting the quality of the economy's stock of human capital.

Education System

A firm's productivity is affected not only by the human capital it uses in production but also by the stock of human capital at other firms and in the economy as a whole. This, in turn, depends on the effectiveness of a country's education system.

Barro [4] finds that for males, average years of schooling is positively related to growth, but the quality of education is more important. Barro finds that there is not a statistically significant relationship between females' years of schooling and growth. He interprets this as evidence that highly educated women are underutilized in many countries' labor markets. Wei and Hao [50] find that the quality of primary education, but not secondary or university education, has a positive effect on TFP in PR China.

Human capital can also boost productivity through spillover effects. Moretti [51] finds that when there is a large increase in the share of college graduates in a city, local manufacturing plants experience productivity gains over firms in other cities with small increases in the share of college graduates.

Innovation System

The innovation system, comprising the interrelated system of private businesses, universities, and government research agencies, influences the development, absorption, and diffusion of production knowledge over time. Innovation influences the productivity of firms that generate new ideas and knowledge themselves. One producer's spending on R&D may also benefit other firms. Given that the bulk of R&D is concentrated in large businesses and a small number of industries [52], e.g., production is more R&D intensive in pharmaceuticals and ICT than in other industries, the diffusion of knowledge benefits businesses and countries that do not have the scale or resources to profitably undertake significant R&D themselves.

Externalities from R&D arise because firms are not able to appropriate all the benefits of their innovations. Laws protecting IP enable a firm to capture part of those benefits. But other firms can devote resources to imitating or absorbing knowledge developed elsewhere. Nadiri [25] documents evidence of spillovers within and between industries, as well as from public spending on R&D and basic research at universities.

Proximity to knowledge producers may affect firms' ability to absorb innovations. Griffith, et al. [53] find that there is a positive correlation between the TFP of UK firms with an R&D presence in the USA, and the size of the USA's R&D capital stock. Their results suggest that foreign, innovating firms benefit from knowledge spillovers when they base themselves in technologically advanced countries. In other industries and countries, the importance of geography has diminished over time with the development of modern transport and communication technology [54].

Investment in R&D is essential to imitation as well as invention, improving firms' ability to absorb technologies developed elsewhere. Griffith, et al. [55] produce econometric evidence, using a panel of industries across 12 OECD countries, suggesting that R&D stimulates growth through both innovation and technology catchup. Research and development done at other firms, universities or research bodies might thus increase the expected returns to a firm's own R&D. If the benefits of such spillovers outweigh the disincentives, including the potential for others to benefit from one's innovations, then increased R&D from other sources should lead firms to do more R&D themselves. Bakhtiari and Breunig [56] test whether this is the case using data on Australian firms. They find evidence suggesting that the positive effects of spillovers dominate the disincentives, but only when firms are geographically proximate to those carrying out research and development (within 50 kilometers of clients and within 25 kilometers of other firms in the same industry). Increased R&D spending by a firm's suppliers is found to reduce its own R&D expenditure at all distances. In contrast, Kenta, et al. [57] analyze detailed firm-level data on Japanese companies and find that positive spillovers dominate both for clients and suppliers.

Much work has been done to assess whether protection of intellectual property rights (IPRs) encourages innovation. This might occur if IPR increases the returns to research and development. It is equally possible, however, that by limiting competition, which itself is a driver of productivity, strong protection of IPRs might impede innovation and productivity. Empirical studies have failed to establish conclusive evidence of a relationship between patenting-and-innovation and productivity [58]. A recent review by Williams [59] concludes that there is 'essentially no credible empirical evidence on the seemingly simple question of whether stronger patent rights, either longer patent terms or broader patent rights, encourage research investments into developing new technologies.'

There is evidence, though, that IPR affects other variables that influence TFP, particularly variables such as trade and foreign direct investment (FDI). Firms holding patents are more likely to export to countries with strong protection of IPRs [60]. The strength of IPR protection has also been found to influence FDI [61]; the transfer of technology from multinationals to foreign-based affiliates [62]; and licensing of intellectual property assets to unaffiliated foreign firms [63]. Since trade and FDI facilitate the diffusion of knowledge between firms and countries, regulation of IP rights might affect productivity through its effect on imports, FDI, and the transfer of IP assets between firms in different countries. That said, it would be a mistake to consider the laws protecting intellectual property in a country as separate from its legal system as a whole [61].

More generally, the pace at which a country adopts new technologies, and how intensively it uses adopted technologies, affects aggregate productivity growth. Comin and Hobijn [64] estimate adoption lags for 15 technologies using data on 166 countries for the period 1820 to 2003. They find that differences in technology adoption account for at least 25% of per-capita-income disparities. Comin and Mestieri [65] document that differences in the intensity of use of adopted technologies help to account for the divergence in productivity performances between countries.

Infrastructure

Infrastructure, including transport systems, communications systems, and energy generation and distribution networks, lowers production costs, reduces spatial barriers to knowledge diffusion and trade, and supports productivity growth.

A good infrastructure network increases the returns to labor and private capital, supporting TFP [3]. Empirical studies have established that railroad networks reduce trade costs and increase real incomes [66]; building dams increases downstream agriculture production [67]; mobile phone services (enabled by the construction of base towers) reduce wastage and increase profitability in the fishing industry [68]; and highways reduce input costs and increase productivity in the manufacturing industry [69] and increase regional trade flows, thereby lifting output in the transportation and retail industries [70].

Recent empirical studies appear to confirm that there is a positive relationship between infrastructure and economic growth [71, 72]. Many factors affect the size of the output gains that result from infrastructure investments. First, some investment projects are managed better than others. Inefficiencies in public investment and the possibility of corruption mean that the public capital stock need not increase in line with spending related to public investment [73]. The strength of a country's institutions and the adequacy of project selection also influence the output gains from public investment [74, 75]. Further, the growth effects of public infrastructure spending may depend on the size and composition of the existing stock of public capital [76-78]; the import-intensity of public investment [78]; the efficiency of use of the infrastructure assets [79]; and the quality of infrastructure assets and services [80–83].

Business Environment

A country's regulatory settings and taxes influence the environment businesses operate in, affecting the productivity of individual firms and the allocation of resources between firms. There is evidence that misallocation of resources is an important source of cross-country variation in productivity. Hsieh and Klenow [84] consider a measure of misallocation based on dispersion of revenue productivity across firms in the same industry. Using this indicator, they find that if PR China and India had levels of misallocation as low as those in the USA, which is a relatively efficient market, then TFP in the manufacturing industry would be 30–50% higher in PR China and 40–60% higher in India.

Governments can distort the allocation of resources through regulation of markets for products, labor, and capital. Nicoletti and Scarpetta [85] examine whether cross-country differences in product market regulations contribute to dispersion in growth rates in OECD countries. They find that lower barriers to trade and competition increase innovation, technological catchup, investment, and productivity growth. Arnold, et al. [86] find that lighter regulations of markets for services are associated with faster growth in high-productivity firms in ICT-using sectors in OECD countries. They argue that efficient regulation of services markets improves the allocation of resources to fast-growing high-productivity businesses.

Many studies document distortions generated by inefficient regulation of labor and capital markets. Like inefficient regulation of product markets, regulations designed to protect jobs can reduce productivity and output by misallocating resources between firms [87–91].

Misallocations can also result from regulations that constrain the supply of housing capital [92]; distort the size of businesses [93]; or treat businesses and workers differently depending on whether they operate in the formal or informal economy [94]. Regulations might also distort resource allocations and lower productivity by restricting FDI (see the subsection on 'Foreign Investment' below). In contrast, laws protecting intellectual property assets might either reduce aggregate productivity by impeding competition or increase it by encouraging trade and FDI (see the subsection on the 'Innovation System' above).

A country's taxation system might reduce aggregate TFP by systematically taxing high-productivity businesses at higher effective rates than low-productivity businesses [95]. Distortions that have the effect of penalizing more productive firms can reduce productivity through resource misallocation and by discouraging productive investment. Evidence from model simulations suggests such policies have the potential to lower firm-level productivity growth and the productivity of firms entering the market [96].

Policies that levy higher taxes on big firms, whether in terms of revenue, number of workers, or capital, might have such effects given the observed positive correlation between firm size and productivity. Productivity losses might result from high-productivity firms choosing not to grow, though some evidence suggests the effect on TFP could be relatively small [93]. The taxation system might also misallocate resources and reduce productivity by treating investments in different asset classes differently, thus distorting the user cost of capital for different assets. Investments are made on the basis of after-tax returns, leading to overinvestment in tax-favored assets and a reduction in economic efficiency. Fatica [97] analyses manufacturing industry data for 11 advanced economies. She finds that, compared with a benchmark where marginal tax rates are equal across asset types, differential taxation leads to underinvestment in ICT capital and overinvestment in other machinery and equipment.

Financial System

Financial market development is positively correlated with future rates of economic growth, investment, and productivity [98]. Empirical work shows that the financial system is an important underlying determinant of a country's productivity.

Credit constraints can affect TFP by preventing individual producers from entering the market or accumulating capital. There is also evidence that financial constraints impede innovation [99]. Bakhtiari, et al. [100] review literature on the effect of financial constraints on small and medium enterprises (SMEs). They document evidence that access to finance is an important determinant of innovation and productivity.

Financial market imperfections might also distort the allocation of capital across firms by generating dispersion in returns to capital. Midrigan and Xu [101] find that the effect on TFP of misallocation is modest (5–10% based on the model they estimate). In contrast, they find evidence that credit constraints have a larger impact on TFP by distorting entry and technology-adoption decisions. Gopinath, et al. [102] find evidence of productivity losses due to increased dispersion of returns to capital across manufacturing firms in Spain from 1999 to 2012. They document the presence of similar trends in Italy and Portugal, but not in north European countries. They argue that this is consistent with financial markets being relatively less well developed in the south.

Financial frictions may distort the allocation not only of capital but also of entrepreneurial talent across firms. Buera, et al. [103] show that this mechanism accounts for a significant part of cross-country differences in aggregate TFP, and in relative productivity levels between sectors. They argue that sectors like manufacturing, which face higher fixed costs, also have greater financing requirements and are thus more exposed to problems associated with inefficient financial markets.

Health System

Health can be viewed as a form of human capital, distinct from education, affecting how much time a person can spend working [104]. Poor health has been shown to have a negative effect on TFP [105]. Bloom and Sachs [106] show that health and demographic factors together explain more than half the difference in growth rates between Africa and the rest of the world. Higher life expectancy might increase growth by lifting the returns to education or, in some settings, by encouraging more saving and thus enabling greater capital accumulation.

Foreign Investment

FDI provides a channel through which local firms can increase their contact with foreign firms and thus benefit from a useful source of knowledge. Javorcik [107] looks for evidence, using firm-level data on firms in Lithuania, that local firms benefit from interactions with foreign firms. She finds no evidence of productivity spillovers across sectors or from multinational enterprises that supply local firms with intermediate inputs. However, she does find that interactions between foreign affiliates and local suppliers in upstream sectors generate positive spillovers. Productivity gains are associated with investments that are partly but not completely foreign-owned. Crespi, et al. [108] find evidence suggesting that multinational enterprises are a source of information spillovers.

More broadly, they find that firms' main sources of knowledge are competitors, suppliers, and plants within the same business group. There are important interactions between FDIs, institutions, and trade policies (see the next subsection on 'Trade'). There is also a relationship between FDI, regulations, and market efficiency. Andrews and Cingano [87] find that greater restriction of FDI is associated with lower allocative efficiency in services industries.

The influence of global value chains on productivity is discussed in the chapter, Focus Issues, and Appendix E.

Trade

Trade between countries lifts productivity through different mechanisms. We have considered studies showing that exporting can increase productivity across firms and within firms. Import competition has also been found to affect productivity. Pavcnik [109] examines the effect of trade liberalization on manufacturing plants in Chile in the late 1970s and early 1980s. She finds that exposure to foreign competition causes the productivity of plants producing import-competing goods to improve by 3 to 10% relative to the productivity of plants in non-traded goods sectors. A plausible explanation of this result is that producers pursue efficiency improvements when faced with greater competition. Pavcnik also shows that the exit of less productive plants from the trade-exposed sectors causes aggregate productivity gains.

Bloom, et al. [110] examine the impact on firms in 12 European countries of increased import competition following PR China's entry into the World Trade Organization. Quotas on Chinese imports were subsequently removed under the Agreement on Clothing and Textiles, thereby exposing European firms to heightened competition. Bloom, et al. show that in response, firms increased spending on R&D, increased their use of IT, and become more productive. They also find evidence that firms with lower TFP shrunk and exited the market in greater number than higher-productivity firms. This process generated a reallocation of employment to more technologically advanced firms.

Trade liberalization might also generate productivity improvements by giving local firms access to a wider range of imported inputs or by lowering their input costs. Amiti and Konings [111] study the effect of input tariffs on Indonesian manufacturing firms, exploiting plant-level data on intermediate inputs. They show that a 10-percentage point fall in input tariffs leads to a productivity gain of 12% for firms that use imported inputs. This is at least twice as large as the estimated productivity effects of reducing output tariffs (1–6%).

International trade can contribute to productivity growth if it causes a reallocation of workers out of the informal economy and into more productive businesses in the formal economy. McCaig and Pavcnik [112] examine the effect of labor reallocations in Vietnam caused by reductions in USA tariffs on Vietnamese exports. The tariff reductions caused a shift in workers from household businesses to the formal business sector and an implied increase in manufacturing industry's productivity. The extent of the implied productivity gains depends on estimates of the gap in productivity between formal and informal businesses. McCaig and Pavcnik find that the productivity gap, and thus the implied productivity gain induced by labor reallocation, is smaller when equations control the composition of the workforce.

Another branch of the literature focuses on restrictions on trade in services. Services are sold as final 'products' (such as tourism and education) and as inputs to the production of other services and goods. Restrictions on services imports (e.g., communications, transport, finance, legal, and accounting services) can increase the cost of imported intermediate inputs or reduce the quality or variety of services available to domestic producers. Hoekman and Shepherd [113] find evidence suggesting there is a negative relationship between services trade restrictions and exports of manufactured goods. Beverelli, et al. [114] examine the effect of reducing restrictions on services imports on the productivity of manufacturing industries. They find that reducing restrictions has a statistically significant, positive effect on labor productivity and TFP, but only when the institutional environment is controlled for. In countries with weak institutions (proxied by indicators of corruption, the rule of law and the quality of regulations), the productivity effect of reducing services restrictions is not statistically significant. Productivity gains due to softening restrictions on services are increasing in institutional quality. Beverelli, et al. find that the conditioning effect of institutions operates through FDI. (See Appendix F for more on trade in services.)

Demand

Demand can affect productivity by enticing product development and innovation, or by increasing competition between producers. Boldrin, et al. [115] show that there is a positive correlation between competition (measured using an index of industry profitability) and innovation, as measured by patents and citations. They also show that there is a positive association between competition and productivity.

Demand can drive innovation at the firm level since businesses channel innovation to the areas where it will be most profitable, developing new products as potential markets for those products grow [116].

In efficient markets, demand can affect productivity indirectly by helping to determine the density of producers in a particular place. Syverson [117] studies the effects of competition on productivity in the market for ready-mixed concrete. He finds that in local markets with concentrated high demand for concrete (and so also a high density of concrete plants) firms have higher average productivity levels, and there is less productivity dispersion. Inefficient producers find it harder to survive in denser markets with more intense competition. Other studies also find that competition boosts productivity [1].

Savings and Investment

The capital that firms use in production can affect their productivity. In a closed economy, the level of domestic investment is determined by the level of domestic saving. In an open economy, domestic saving and investment should be unrelated if capital markets are fully integrated. That is, if capital is mobile between countries, saving should flow to wherever the returns on capital are highest. There is evidence, however, that national saving rates are positively correlated with rates of domestic investment. This result, which was famously documented by Feldstein and Horioka [118], contradicts standard theories of economic growth and presents a puzzle [119].

Many studies have sought to explain the observed positive correlation between domestic saving and investment. There is evidence of 'home country bias' in investment portfolios [120], which could relate to currency or political risks. Regulations might also affect the relationship between local saving and investment by restricting foreign investment in sectors like utilities, residential property, or agriculture. Apergis and Tsoumas [121] survey the large number of papers that have attempted to solve the Feldstein–Horioka puzzle. The answers proposed in the literature include explanations that relate to the presence of low capital mobility over different periods, the failure of real interest parity, transaction costs for domestic and foreign investments, the intertemporal budget constraint, and tax policies that simultaneously affect saving and investment.

The available evidence suggests that the correlation between saving and investment is different in different countries, and that the positive correlation has declined over time [119, 121]. When goods and financial markets are well integrated, poorer countries with relatively high rates of return should experience higher investment without needing an increase in saving [122]. In other settings, domestic saving may be important for domestic investment, and thus also for productivity. For instance, if the owners of capital choose not to invest in other countries, then policies that cause an increase in domestic saving (e.g., reduced tax rates or subsidies) will also cause domestic investment to increase [120, 123]. The same result would be expected to occur in a closed economy. In an open economy with no home country bias, saving incentives should simply make local investors better off, thus crowding out foreign investment in the local market.

Institutions

Institutions are the laws, regulations, and rules that govern and constrain human interactions [124]. Institutions comprise both formal constraints, such as those enshrined in laws; and informal constraints, such as unwritten codes of conduct or behaviors that are self-enforced in different societies. North [124] notes that whereas some institutions are created (such as the USA's constitution), others evolve over time (English common law).

Institutions are central to the growth and economic development of countries [125]. Hall and Jones [126] examine relationships between institutions, government policies, factor accumulation, and productivity. They conclude that the long-term economic performance of a country "is determined primarily by the institutions and government policies that make up the economic environment within which individuals and firms make investments, create and transfer ideas, and produce goods and services."

North [124] argues that the major role of institutions is to reduce uncertainty. That is, institutions provide a stable and consistent framework for interactions between people. Researchers use different indicators of institutional development to examine the relationship between institutions, productivity, and growth. These have included, among other things, measures of corruption, political instability, protection of property rights, contract enforcement, risk of expropriation, political rights, and the quality of public services.

Barro [127] studies the relationship between growth and political instability using data on 98 countries for the period 1960 to 1985. He finds that growth is negatively related to political instability, proxied by the incidence of revolutions, coups, and political assassinations. A price-based measure of market inefficiency is also found to be negatively related to growth. Measures of corruption have been found to be negatively associated with investment and economic growth [128]. More generally, corruption, regulation and direct government involvement in poor economies has been shown, in numerous studies, to distort resource allocations [129].

Many studies examine the effect of institutions using proxies for the rule of law, i.e., the authority of the law itself and the principle, essential to a fair society, that all people are equal before the law. Closely related to the notion of the rule of law is respect for private-property rights. Well defined and adequately enforced property rights reduce uncertainty and risk facing producers and raise expected returns on investments. Knack and Keefer [130] find that indicators of contract enforceability have a positive effect on investment and growth. They also find that proxies of property rights affect growth even after controlling for investment, suggesting that institutional quality affects TFP.

Without effective institutions, regulatory change may be ineffective for improving productivity [114]. Other determinants of economic development, including those that are beyond the control of governments, may only affect a country's economic performance through their effect on institutional development. Easterly and Levine [131] investigate the relationship between geographic endowments, institutions, and income levels across countries. They measure institutional development using an index constructed from indicators of political rights and stability; protection of people and property against violence and theft; regulatory burden; and the quality of public services. They find that proxies for natural endowments (such as a country's latitude, whether or not it is landlocked, its ability to produce agricultural or mining commodities, and observed settler mortality rates) explain variations in income per capita only through their impact on institutional development. This is broadly in line with the results of Acemoglu, et al. [132]. They show that once the effect of institutions (proxied by a measure of property-right protection) is controlled for, a country's distance from the equator, and whether or not it is in Africa, has no statistically significant effect on income per capita. Consistent with Easterly and Levine [131], Rodrik, et al. [133] find that geography influences the quality of institutions. They find no evidence that trade affects economic outcomes once institutional development is controlled for.

Another evidence shows that institutional quality has positive effects on the accumulation of human, physical, and intangible capital, as well as on the productivity gains from investing in different forms of capital [126, 134, 135]. Hall and Jones [126] find that differences in institutions and government policies cause large differences in the accumulation of physical and human capital between countries and help explain variations in productivity. Égert [134] looks at the relationship between product and labor market regulations, institutions, and TFP for a group of 34 OECD countries. A more favorable business environment and higher-quality institutions (proxied by a measure of the rule of law) increase the positive effect of R&D on TFP. Coe, et al. [135] study a broad measure of institutional quality, capturing contract enforcement and indicators, of the ease of starting or winding up a business, registering property, hiring workers, or trading across borders. They find that in countries where it is easy to do business, there are bigger TFP gains from local R&D, human capital investment, and international R&D spillovers.

Social Capital

A separate branch of the literature examines the effects of trust, cooperation, and social cohesiveness; often called social capital; on growth and factor accumulation. Abramovitz [136] emphasizes the role of 'social characteristics' in explaining why some countries fail to attain the levels of productivity observed in more advanced economies. He notes the problem, though, is that 'no one knows just what it (social capability) means or how to measure it.' Temple and Johnson [137] show that an index of socioeconomic development explains significant variations in growth rates between countries. The index they study is based on indicators of variables including social mobility; social and political participation; mass communications; and social organization, i.e., the primacy of the immediate family relative to extended family and tribal allegiances. Temple and Johnson observe that at higher levels of socioeconomic development, countries tend to invest more in physical capital and schooling. This may help account for the relationship between 'social capability' and growth. They separately find that an index of mass communications, which they interpret as a proxy for community strength, directly affects TFP growth.

La Porta, et al. [138] find that a survey-based indicator of trust has a positive effect on educational attainment, the quality of schools, and income per capita. They obtain evidence suggesting that trust improves the quality of large organizations, arguing that trust supports cooperation between strangers. Knack and Keefer [139] show that trust and civic cooperation positively affect economic growth. They find that the relationship between trust and growth is strongest in poor countries. They suggest trust might matter more in low-income countries because property rights tend to be less secure, financial markets are underdeveloped, and contract enforceability is weaker. This interpretation is consistent with the results of Guiso, et al. [140], who find that social capital has stronger effects in areas where legal enforcement is weaker.

Recent papers appear to confirm earlier evidence of the causal effects of trust on growth (see, for example, [141]). Trust has also been shown to affect underlying determinants of TFP such as financial development [140], entrepreneurship [142], the functioning of institutions [143], and government regulation [144–146].

Income inequality may also affect social cohesiveness and economic development. However, the relationship between inequality and TFP is uncertain. Inequality might lower investment in human capital and physical capital, thereby reducing output and income [147–150]. Great inequality in incomes could also harm growth by eroding trust and social cohesiveness, causing exclusion and sociopolitical instability [147]. On the other hand, increased inequality can create incentives for hard work or encourage innovation [151, 152].

Recent empirical evidence of the relationship between inequality and growth is mixed. Berg, et al. [153] and Cingano [154] find evidence of a negative relationship between growth and inequality, which appears to be due in part to effects on human capital accumulation. Gründler and Scheuermeyer [150] show that inequality has negative effects on growth in developing and middle-income countries but not in high-income countries. They argue that this may be due to capital market imperfections and inadequate supply of public goods in poorer countries. Breunig and Majeed [155] argue that econometric analysis of the relationship between inequality and growth should control for poverty rates as well as average incomes. They show that inequality reduces growth in areas with high rates of absolute poverty, suggesting that concentrated disadvantage has negative effects on growth that are distinct from effects due to inequality.

Conclusion

An important general finding that emerges from the productivity literature is that the immediate and underlying determinants of productivity are interrelated. For instance, strong institutions and a favorable business environment help attract FDI, which in turn brings new knowledge and capital. A country's openness to foreign investment and trade thus also affects its productivity performance, as do the regulatory settings and institutions that shape the environment in which firms operate. However, these ingredients, i.e., FDI, trade, regulations, and institutions, are not entirely separate. They interact in important ways. For example, countries can achieve higher productivity by easing restrictions on trade in services. This benefits firms that use services as inputs to production. It will also attract foreign investment, but only if a country has strong institutions [114].

In seeking to support higher aggregate productivity growth through policy change, governments are confronted by a complicated problem with multiple dimensions. A strategy to sustainably lift productivity growth requires a long-term commitment to improving the education system, infrastructure services, the institutional environment, and taxation and regulatory settings. Evidence of interactions between the drivers of productivity, and the overarching importance of institutions and the business environment, implies that a piecemeal approach to reform will be less effective than a strategy that recognizes these interdependencies.

Policy makers must also contend with a degree of uncertainty. While multiple factors influence a country's productivity performance, empirical research can usually only control for determinants that are observable and measurable. Few studies attempt to analyze and account for the effects of all potentially relevant determinants of productivity, thus meaning that much empirical uncertainty remains.

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APPENDIX C

CATCH-UP AND CONVERGENCE

The catchup-and-convergence framework could provide some explanation for past growth patterns of APO countries and some suggestions for the future. The framework posits that less-developed or low-income countries achieve relatively rapid growth in per capita income and thereby catch up over time to the income levels of more-advanced or high-income countries. As a corollary, it is said, countries tend to converge toward a similar level of per capita income.

It is reasoned that catchup can occur because capital growth in developing countries is not subject to the same diminishing returns as those in advanced economies and because emerging countries can achieve relatively rapid productivity growth by emulating and accessing developed countries' technologies and production methods.

The two issues investigated in this appendix are the extent to which catchup and convergence apply in APO region and whether catchup occurs as a matter of course or whether it is conditional, requiring certain determinants to be in place before catchup can get underway [1].

Extent of Catchup

This section looks at the extent to which APO countries have caught up to the per-capita-income level of the USA. The USA is generally regarded to be the benchmark for international comparisons.

The APO countries are examined in three average-income groups as defined by the World Bank (see Table C-1). Fiji has only been elevated to the upper-middle-income group in recent years.

TABLE C-1

GROUPINGS OF APO COUNTRIES ACCORDING TO WORLD BANK CLASSIFICATION.

High income	Upper-middle income	Lower-middle income
Hong Kong	Fiji	Bangladesh
Japan	IR Iran	Cambodia
ROK	Malaysia	India
ROC	Sri Lanka	Indonesia
Singapore	Thailand	Lao PDR
		Mongolia
		Nepal*
		Pakistan
		Philippines
		Vietnam

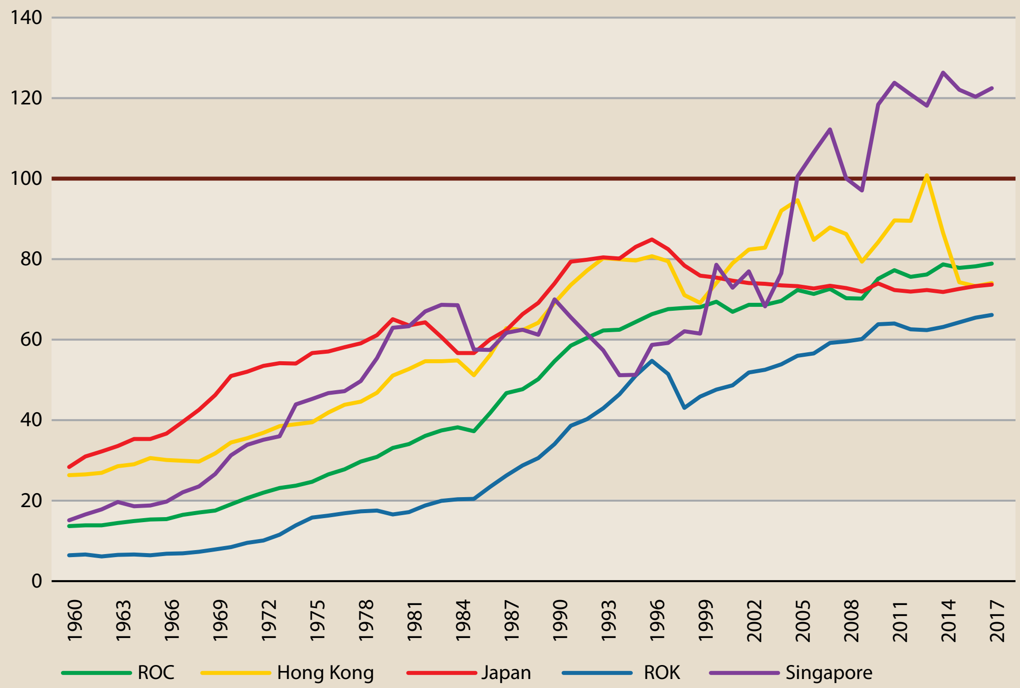
Source: The World Bank [3].
Note: The World Bank classifies Nepal as a low-income country

High-income Countries

Five APO countries have achieved the high-income status. The World Bank classifies Japan and the Asian Tigers, namely, Singapore, Hong Kong, the Republic of Korea (ROK), and the Republic of China (ROC) as high-income countries. These countries underwent a transformation process in the second half of the 20th century that propelled their catchup towards the international frontier. Figure C-1 shows how these APO countries have caught up toward, and even overtaken, the level of USA's GDP per capita.

FIGURE C-1

CATCHUP TO USA'S AVERAGE INCOME BY HIGH-INCOME APO COUNTRIES.
(IN % OF USA'S LEVEL OF GDP PER CAPITA)



Source: Penn World Tables 9.1 [2].

Contributions to catchup in average income can be examined in more detail by taking advantage of the fact that GDP is a measure of both output (production) and income.

$$\mathit{Average\ income} = \frac{GDP}{population} = \underbrace{\frac{GDP}{hours\ worked}}_{\text{productivity}} \cdot \underbrace{\frac{hours\ worked}{population}}_{\text{utilization}} \qquad \text{(C1)}$$

The first term on the right-hand side, output per hour worked, is a broad measure of labor productivity in an economy, while the second term, the ratio of hours worked to population numbers, is a measure referred to as labor utilization.

Using this expression, the income catchup to the USA can be decomposed into contributions from productivity catchup and utilization catchup. If the rate of utilization in Asian countries remains stable with respect to the USA, income catchup will be entirely due to productivity catchup.

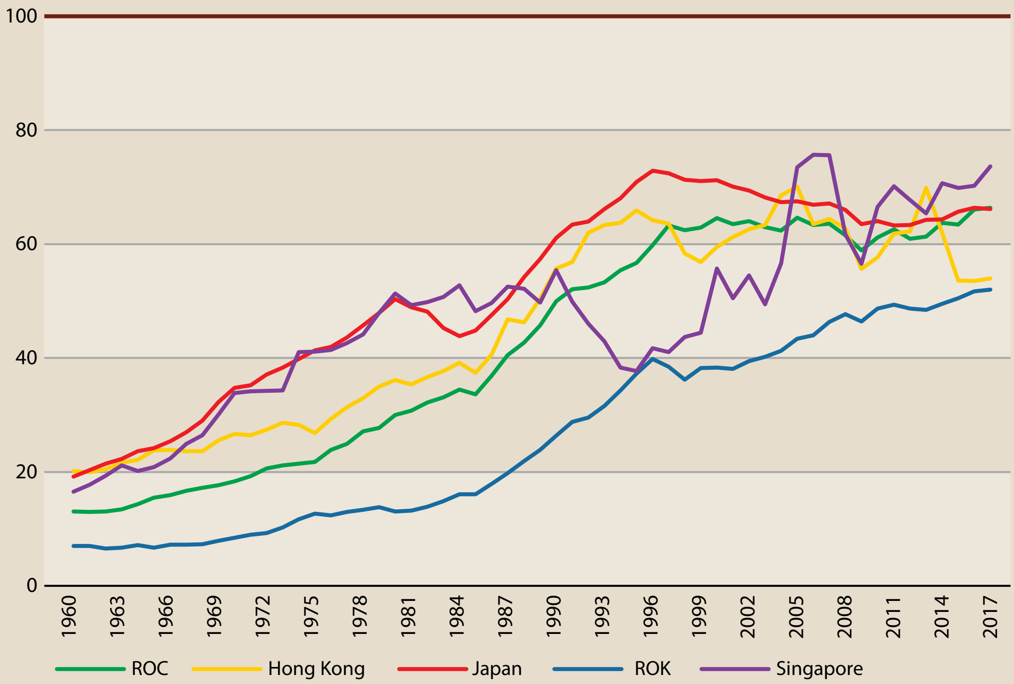
It turns out that productivity catchup has been pivotal in bringing about income catchup. Figure C-2 shows that the high-income countries went from starting points in the range of 7–20% of the USA's productivity level in 1960 to finish up in a range of 52–75% of the level in 2017. That is a catchup of 45–55 percentage points.

Most of the catchup took place up until the mid-1990s. After that, catchup was generally weaker and even went into reverse in the case of Japan. Singapore fell back against the USA in the first half of the 1990s but then climbed to have the productivity level closest to the USA's level by the mid-2010s.

FIGURE C-2

CATCHUP TO USA'S PRODUCTIVITY BY HIGH-INCOME APO COUNTRIES.

(% OF USA'S LEVEL OF GDP PER HOUR)



Source: Penn World Tables 9.1 [2].

The levels of labor utilization are higher in the high-income APO countries than in the USA (see Figure C-3). In other words, more people in these APO countries have worked per head of population and for longer hours than in the USA. Average hours worked in Japan have drifted back to levels similar to those in the USA [2].

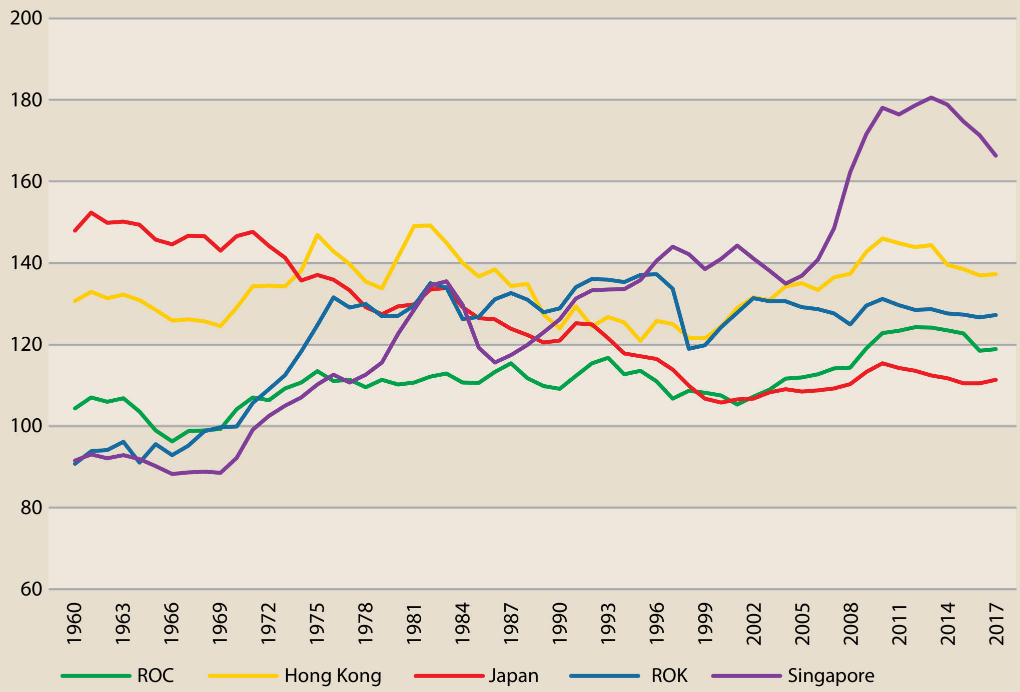
This has had the effect of lifting the general level of average income relative to the USA, which is why the levels of average income relative to the USA (Figure C-1) are higher than the levels of relative productivity (Figure C-2).

However, there was not a lot of change in the relative rates of utilization, except for the large increase in Singapore and the decline in Japan.

The extent to which the high-income APO countries have caught up to the USA on average income, productivity, and labor utilization is summarized in Table C-2. The numbers presented show the

FIGURE C-3

CATCHUP TO USA'S LABOR UTILIZATION BY HIGH-INCOME APO COUNTRIES.
(% OF USA'S RATIO OF HOURS WORKED TO POPULATION)



Source: Penn World Tables 9.1 [2].

percentage point changes the countries have achieved in lifting their levels relative to the USA between 1960 and 2017.

TABLE C-2

CATCHUP OF HIGH-INCOME APO COUNTRIES TO USA'S LEVELS BETWEEN 1960 AND 2017.
(PERCENTAGE POINTS)

	Average income	Productivity	Utilization
ROC	65	53	14
Hong Kong	48	34	7
Japan	45	47	–37
ROK	60	45	37
Singapore	107	57	75

Source: Penn World Tables 9.1 [2].

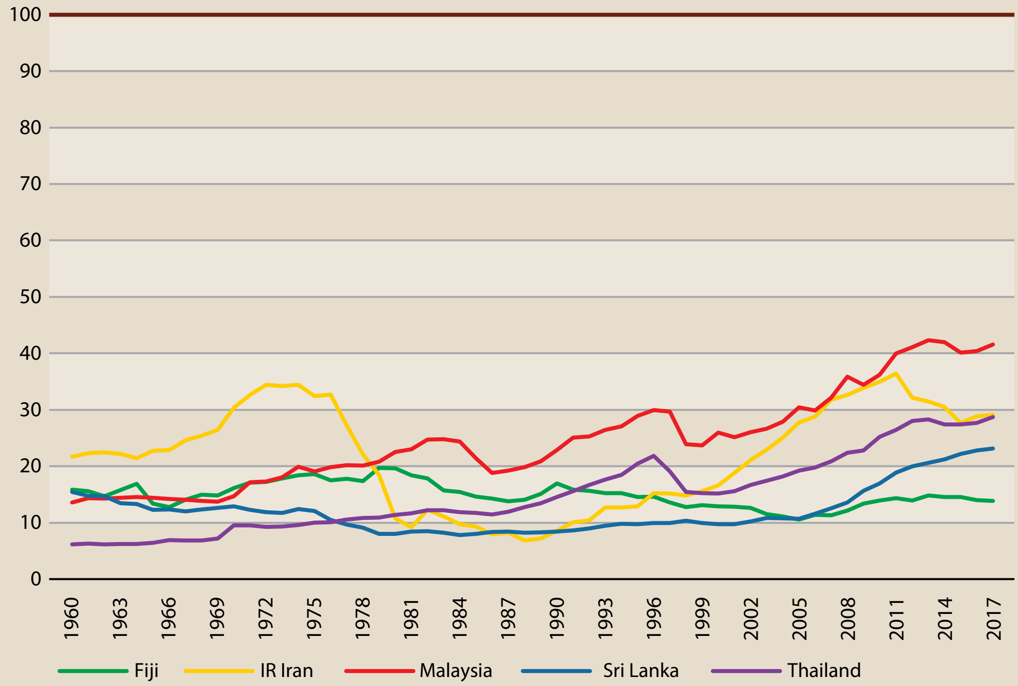
Upper Middle-income APO Countries

The upper-middle-income countries have achieved much less catchup to USA's levels (see Figure C-4). The clearest evidence of sustained catchup emerged in the 2000s, when all countries except Fiji rose above the relative levels of per capita income previously achieved. However, catchup for this group stalled in the 2010s.

Malaysia showed the strongest catchup, moving from around 14% in the late 1950s to peak at around 42% in the mid-2010s. Thailand has caught up nearly 15 percentage points since the late 1980s while Sri Lanka has caught up just over 12 percentage points since 2005.

FIGURE C-4

CATCHUP TO USA'S AVERAGE INCOME BY UPPER-MIDDLE-INCOME APO COUNTRIES.
(% OF USA'S GDP PER CAPITA).



Source: Penn World Tables 9.1 [2].

Productivity was also pivotal in the income catchup among the upper-middle-income countries. For this group, labor input was measured by employment numbers, due to the absence of hours-worked data for some countries or periods. The clearest period of productivity catchup took place between 2000 and 2017 (see Figure C-5).

The rate of utilization, as represented by the employment ratio, has been below the USA's rate throughout the period from the 1960s, with the exception of Thailand (see Figure C-6). Aside from Thailand, lower utilization has reduced the level of average income in Asian countries, in comparison with the USA. There have not been substantial changes in the relative rate of utilization, although Malaysia rose to meet the USA's rate in the mid-2010s.

Table C-3 summarizes the extent to which the upper-middle-income countries have caught up to USA's levels of average income, productivity, and utilization between 1960 and 2017.

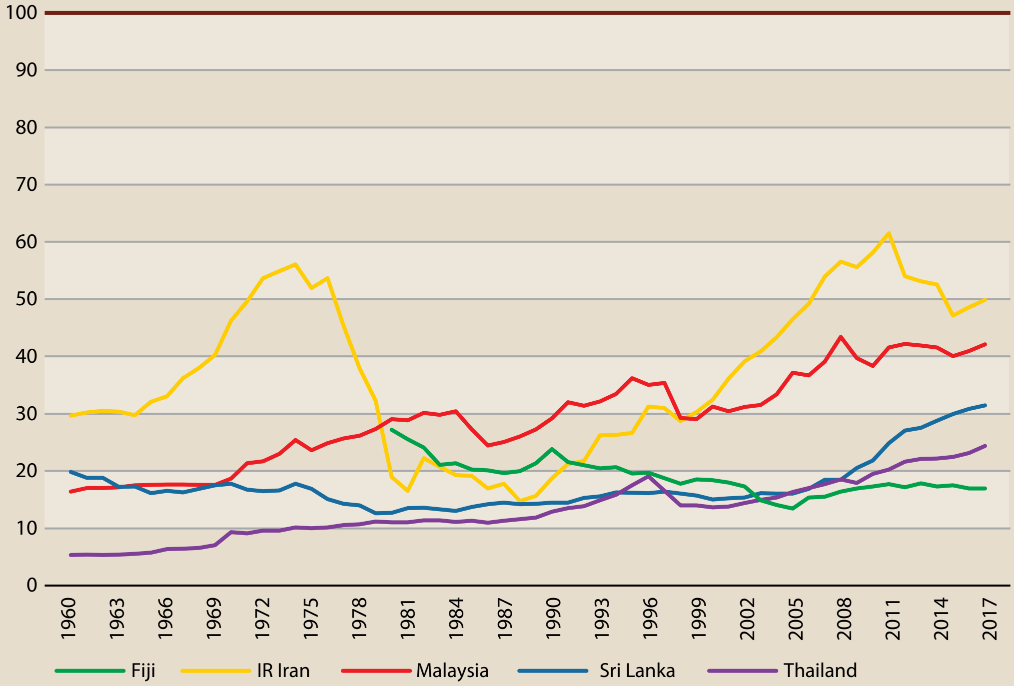
Lower-middle-income APO countries

The lower-middle-income countries have achieved comparatively little catchup, at least until the 2000s (see Table C-4 for all countries and Figure C-7 for Indonesia and Mongolia, which recorded the most catchup). All countries achieved most of the catchup after 2000.

FIGURE C-5

CATCHUP TO USA'S OUTPUT PER EMPLOYEE BY UPPER-MIDDLE-INCOME APO COUNTRIES.

(% OF USA'S GDP PER EMPLOYEE)



Source: Penn World Tables 9.1 [2].

FIGURE C-6

CATCHUP TO USA'S EMPLOYMENT RATIO BY UPPER-MIDDLE-INCOME APO COUNTRIES.

(% OF USA'S RATIO OF EMPLOYMENT TO POPULATION).

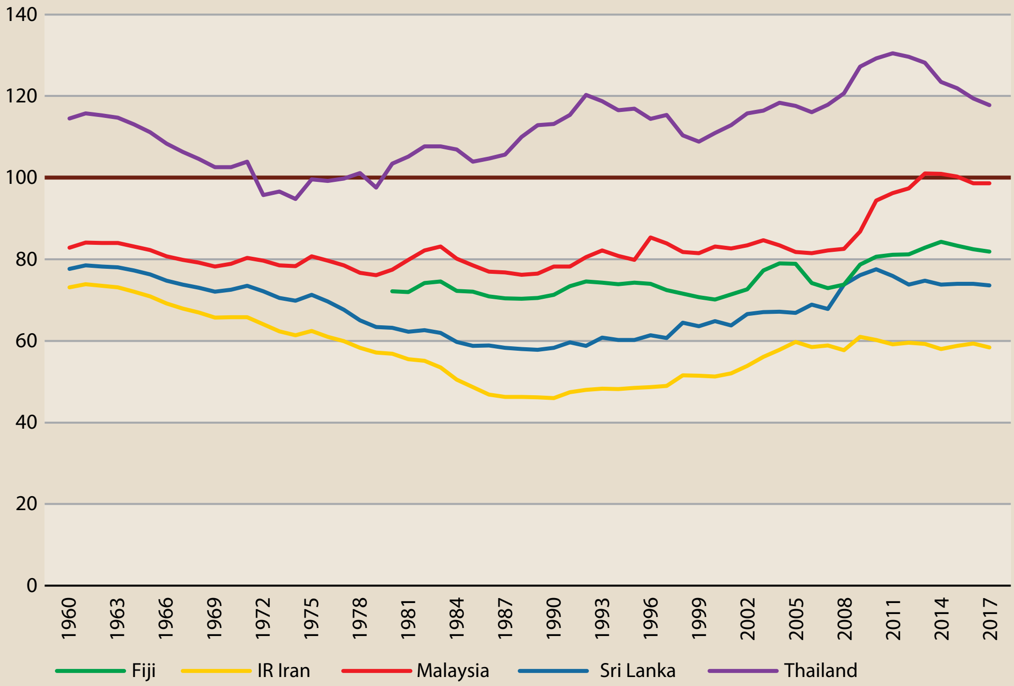


TABLE C-3

UPPER-MIDDLE-INCOME APO COUNTRIES' CATCHUP TO USA'S LEVELS BETWEEN 1960 AND 2017.

(PERCENTAGE POINTS)

	Average income	Productivity	Utilization
Fiji	–2	NA	NA
IR Iran	7	20	–15
Malaysia	28	26	16
Sri Lanka	8	12	–4
Thailand	23	19	3

TABLE C-4

LOWER-MIDDLE-INCOME COUNTRIES' CATCHUP TO USA'S LEVELS BETWEEN 1970 AND 2017.

(PERCENTAGE POINTS)

	Average income	Productivity	Utilization
Bangladesh	0	1	–9
Cambodia	–1	–2	20
India	6	8	–11
Indonesia	14	13	20
Lao PDR	9	8*	11*
Mongolia	14	16*	12*
Nepal	2	2*	17*
Pakistan	2	3	–2
Philippines	4	4	9
Vietnam	7	6	14

Source: Penn World Tables 9.1 [2].
Note: * From 1980.

There was also little, if any, productivity catchup among lower-middle-income APO countries until the 2000s. Since there were no large overall changes to rates of utilization (using employment numbers rather than hours worked), the relative per capita GDP of countries tended to follow relative productivity.

Productivity catchup since 2000 in individual countries is shown in Table C-5, with the largest increases evident from Mongolia, Indonesia, and India. The Philippines showed stronger productivity catchup from the mid-2000s.

Utilization has been above the USA's rate in Cambodia, Lao PDR, Nepal, and Vietnam. By the 2010s, the Indonesian utilization rate was nearly on par with that of the USA. The rates in Bangladesh, Indonesia, and Mongolia were about 20% below USA rates and the rates in Pakistan and the Philippines were about 35% below USA rates.

FIGURE C-7

CATCHUP TO USA'S AVERAGE INCOME BY INDONESIA AND MONGOLIA.
(% OF USA'S GDP PER CAPITA).

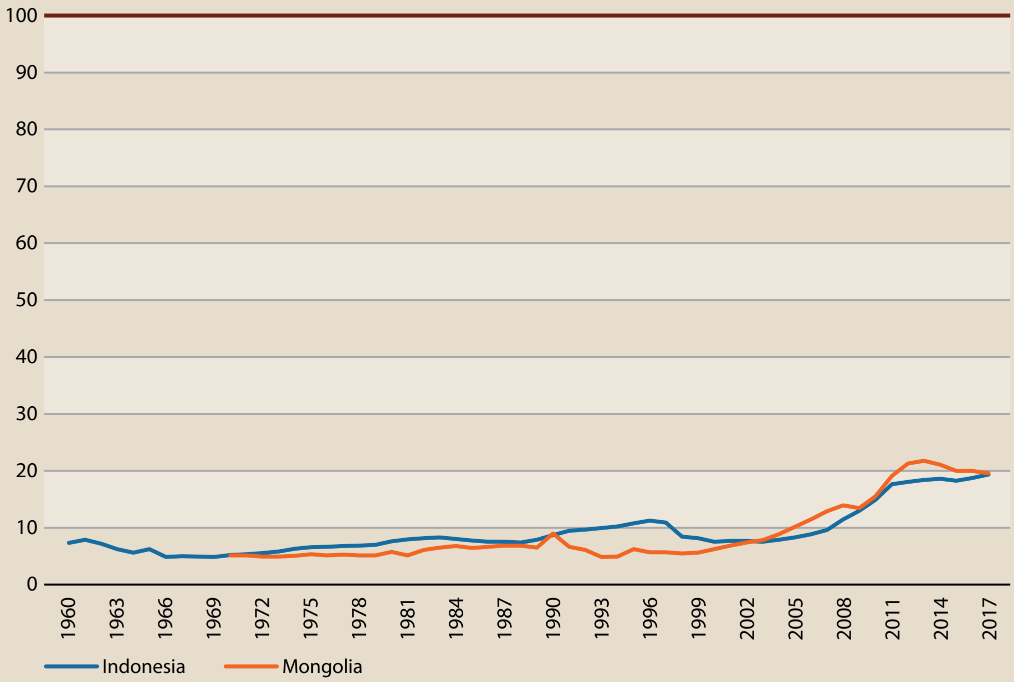


TABLE C-5

PRODUCTIVITY CATCHUPS OF LOWER-MIDDLE- AND LOW-INCOME APO COUNTRIES SINCE 2000

	Percent of USA'S level in		Difference (% points)
	Average income	Productivity	
Bangladesh	4.4	7.7	3
Cambodia	3.1	4.8	2
India	5.3	13.9	9
Indonesia	8.7	19.8	11
Lao PDR	4.2	10.9	7
Mongolia	8.6	24.0	15
Nepal*	3.0	4.2	1
Pakistan	11.5	14.9	3
Philippines	16.5	21.8	5
Vietnam	4.6	9.1	4

Source: Penn World Tables 9.1 [2].
Note: Nepal is classified by the World Bank as a low-income country.

Is Catchup Automatic?

Does catchup happen automatically, or does it require policy efforts to put certain preconditions in place?

Intuitively, the evidence just presented suggests that catchup does not happen automatically. While the high-income countries achieved considerable catchup in income and productivity, the catchup was weaker among the upper-middle-income countries and weak among the lower-middle-income countries. There seemed to be little propelling the lower-middle-income countries to start to catch up until the 2000s.

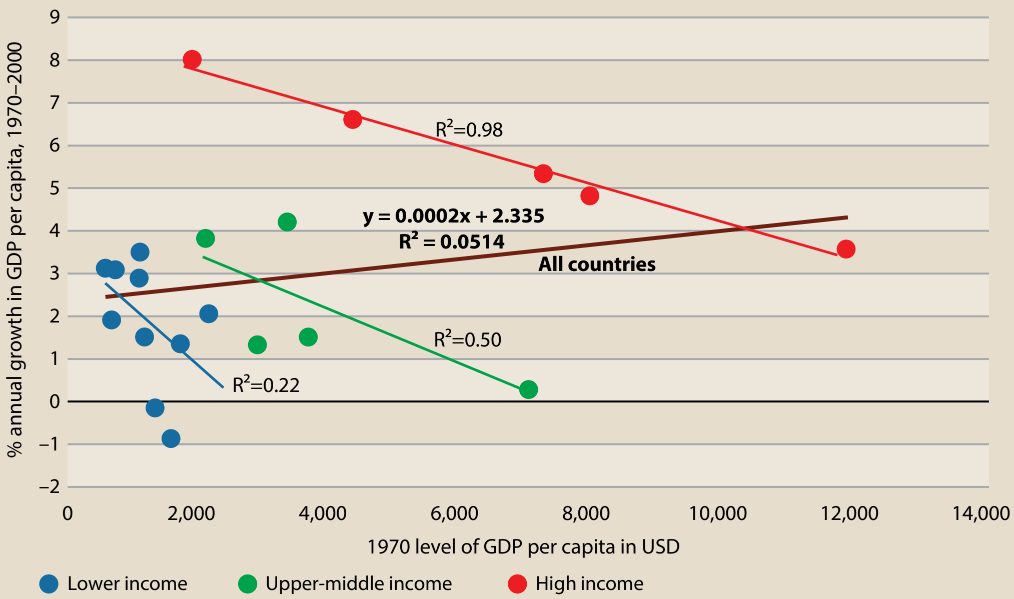
If there is unconditional catchup, a strong (and negative) relationship between initial level of average income and subsequent growth would be observed. So, a lower starting point would be associated with higher subsequent growth, and conversely, a higher starting point would mean lower subsequent growth. If a strong relationship between the initial level and the subsequent growth is not found, it would suggest that catchup is not automatic, simply because catchup is not occurring.

Pre-2000

There is a different evidence on the catchup relationship among APO countries before and after 2000. The pattern before 2000 is shown in Figure C-8, which plots the growth in average income between 1970 and 2000 (vertical axis) against the initial level of average income in 1970 (horizontal axis).

FIGURE C-8

EVIDENCE OF CATCHUP AND CONVERGENCE IN APO COUNTRIES FROM 1970 TO 2000.



Source: Author's calculations.

Figure C-8 suggests there was no catchup among the entire group of APO countries in this period. The black line in the figure, fitted to all countries, shows a very weak fit to the dispersed observations (the R2 value is extremely low) and the line slopes upward rather than in the expected downward direction of a negative relationship.

However, there is an interesting segmentation according to income groups. The high-income countries showed a strong convergence relationship as shown by the red line in Figure C-8. For the upper-middle-income group (depicted in green), the relationship between the initial level and the subsequent growth was weaker and did not deliver as much growth in income (for any given level of initial income, growth was well below the red line). The convergence relationship was weaker for the lower-income group too. There was also much less growth at any given income level than the high-income countries achieved.

This experience suggests that, while there was no convergence overall for APO countries pre-2000, there was a 'convergence club' comprising Japan and the Asian Tiger economies. These countries exhibited a clear convergence pattern, while the other APO countries did not. The other countries had not undertaken the preconditions to enter the convergence club.

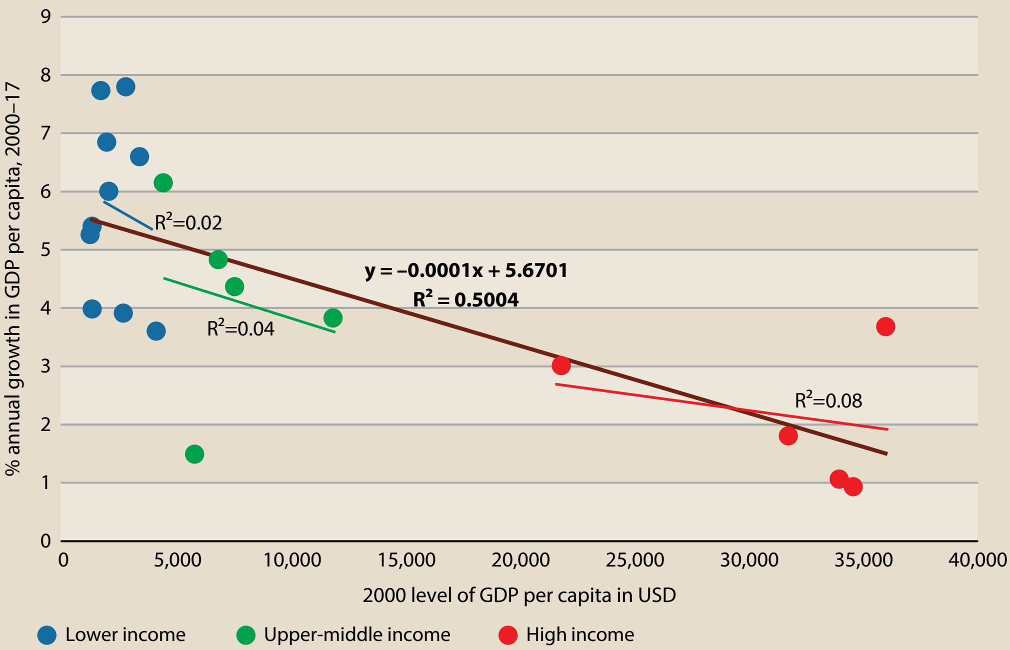
Post-2000

A different pattern among all APO countries emerged after 2000. Figure C-9 shows a stronger overall catchup and convergence relationship (compared with the pre-2000 experience), which has the predicted negative slope. In this period, the high-income countries showed relatively weak growth, the upper-middle-income countries showed relatively moderate growth, and the lower-income group showed a combination of moderate and high growth.

In a further departure from the pre-2000 experience, there was little or no convergence relationship within each of the income groups, including the high-income convergence club.

FIGURE C-9

EVIDENCE OF UNCONDITIONAL CONVERGENCE IN APO COUNTRIES FROM 2000 TO 2017.



Source: Author's calculations.

The stronger evidence of a catchup-and-convergence pattern has arisen because the low-income countries have lifted their growth rates and the high-income countries have lowered theirs. As noted elsewhere (see chapter, Productivity Trends, and Appendix A), the lower-productivity Asian countries have performed better than countries in other regions in recent years.

A few other points are worth making. First, while the relationship between initial level of average income and subsequent growth is stronger post-2000 than it was pre-2000, it is still less than perfect. The fitted line explains about half the variation in observations. Explanation of the lower-middle income countries is relatively weak.

Second, some of the improved explanatory power of the fitted line came from the lower growth of the high-income countries, which has been at least in part due to 'temporary' negative effects of the Global Financial Crisis. The relationship may not hold in the longer term.

Third, it does not necessarily follow that the catchup has been happening automatically. The lower-productivity and lower-income economies have been putting in place at least some of the policy and institutional factors necessary for stronger growth. (Explanations for growth performance in individual countries are canvassed in the country studies in Part B of this report.)

The evidence in this appendix of weak or absent catchup among the less advanced APO economies suggests that catchup is not automatic. Rather, some preconditions need to be in place to enter a rapid-growth phase.

This conclusion sits well with the extensive review of the literature on catchup and convergence by Johnson and Papageorgiou [1]. By covering studies of many countries, they came to the conclusion that there was, at best, limited evidence of catchup. There was some evidence of convergence and divergence occurring in different places and at different times. Their review did not support automatic convergence. They say:

"We have come to the conclusion that with the exception of a few (high-income) countries in Asia that exhibited transformational growth, most of the economic achievements in developing economies have been the result of removing inefficiencies, especially in governance and political institutions."

Key Point Summary

- Income catchup has been closely aligned with productivity catchup. Emulating and accessing developed countries' technologies and production methods appear to have been instrumental in allowing some countries to catch up.

- However, deeper reforms to policy and institutional settings are required before these catchup mechanisms can gather pace.

- While some countries have relatively high rates of labor utilization (above USA rates), there have been few increases in the relative rate of utilization that would assist income catchup. Income catchup has been predominantly through productivity catchup.

- The evidence of catchup and convergence among APO countries at large is not strong. Large differences in average income and productivity levels have persisted for a very long time.

- Japan and the Asian Tiger economies were very successful in catching up toward USA's levels of per capita GDP, at least up until the mid-1990s. They formed a convergence club.

- However, in other countries, catchup has been more elusive. It has either not happened to the same degree or has been much late in coming.

- There is little evidence to support the notion that catchup occurs automatically. Rather, some initial conditions need to be in place. These revolve around removing inefficiencies, especially in governance and political institutions.

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APPENDIX D

SECTORAL MIX AND REALLOCATION

The stage of development of APO countries, reflected in their industry structures, provides an important perspective on their productivity differences. This appendix shows that, because productivity levels and rates of growth vary across sectors, industry structures can have implications for both aggregate productivity levels and growth rates. However, countries do not follow a single development path in the evolutionary mix of their industry structures. Country-specific factors remain important.

Sectoral and Industry Mix

An examination of the industry structures of APO countries is the starting point. Because industries have different productivity levels and opportunities for productivity growth, differences in industry structures have implications for overall productivity levels and growth across APO countries.

For simplicity, the four-sector aggregation of industries as used in the *APO Productivity Databook 2019* is adopted. The 'services' sector is made up of wholesale and retail trade, and hotels and restaurants; transport, storage, and communications; finance, real estate, and business activities; and community, social, and personal services. 'Agriculture' and 'manufacturing' are single-industry sectors, and the 'other' sector refers to mining; electricity, gas and water supply; and construction.

The 2017 distribution of industry sectors in Table D-1 reveals a diversity of industry structures across APO countries. Countries are presented in order of productivity levels in 2017, with Singapore at the top having the highest productivity level.

It is immediately apparent that the lower-productivity countries have larger agriculture sectors. Agriculture forms over 20% of the economies of Nepal, Cambodia, Pakistan, and Lao PDR. The high-productivity countries have essentially either transitioned out of agriculture or only have small remaining agriculture sectors.

Manufacturing industries are often a first evolution away from agriculture as economies develop. There is less disparity in the relative sizes of manufacturing across countries (see Table D-1). Most have manufacturing sectors with shares above 15%. Hong Kong is an exception, with only 1% of activity in manufacturing, as it has transitioned further to become almost entirely a services economy. Even though shares are not too dissimilar, there would be differences in the sophistication of manufacturing across countries. High-productivity countries tend to manufacture advanced manufacturing products, whereas lower-productivity countries like Bangladesh and Cambodia produce more light manufacturing such as food products, beverages, and tobacco products; textiles, wearing apparel, and leather products; and coke, refined petroleum products, chemicals, rubber, and plastic products [1].

TABLE D-1

APO COUNTRIES AND THEIR INDUSTRY SECTOR SHARES OF GDP IN 2017.

(IN %)

	Agriculture	Manufacturing	Services	Other
Singapore	0	20	75	5
Hong Kong	0	1	92	6
ROC	2	32	62	5
Japan	1	21	70	8
IR Iran	8	18	50	24
ROK	2	30	58	9
Malaysia	9	23	51	17
Sri Lanka	8	18	61	12
Mongolia	11	10	47	32
Thailand	8	27	56	8
Indonesia	14	21	46	20
Fiji	15	13	66	6
Philippines	10	19	60	11
Pakistan	24	13	57	6
India	16	14	59	11
Lao PDR	24	8	37	31
Vietnam	17	17	46	19
Nepal	28	5	58	9
Bangladesh	14	18	57	11
Cambodia	25	17	42	16

Source: Derived from the APO Productivity Database 2019.

All countries have large services sectors, with the higher-productivity countries generally having larger sectors (over 60%) than the lower-productivity countries. Having transitioned earlier from agriculture to manufacturing, the high-productivity countries have transitioned further into services.

Some countries have more prominent ‘other’ sectors due to mining (IR Iran and Mongolia) and electricity generation (Lao PDR).

Table D-2 shows the industry sector-wise distribution of employment. The skew toward agriculture is even more prominent in the lower-productivity countries. Agriculture accounts for 40% or more of employment in seven countries.

TABLE D-2

APO COUNTRIES AND THEIR INDUSTRY SECTORS' SHARES OF EMPLOYMENT IN 2017.
(IN %)

	Agriculture	Manufacturing	Services	Other
Singapore	0	13	74	13
Hong Kong	0	3	88	9
ROC	5	27	59	9
Japan	4	15	73	8
IR Iran	18	17	50	15
ROK	5	17	70	8
Malaysia	11	17	62	10
Sri Lanka	26	19	46	9
Mongolia	29	8	52	12
Thailand	32	16	45	7
Indonesia	30	15	48	8
Fiji	8	16	61	16
Philippines	26	8	58	8
Pakistan	40	16	36	9
India	46	13	31	11
Lao PDR	71	3	22	4
Vietnam	40	17	34	8
Nepal	69	7	19	5
Bangladesh	40	16	37	6
Cambodia	40	9	43	8

Source: Derived from the APO Productivity Database 2019.

Changes in Industry Structure

As economies develop, the activity typically moves away from the agricultural sector toward a broader base of industries. As is shown in the next section, agriculture is a low-productivity industry, and so shifting resources from agriculture into other industries leads to productivity increases. In addition, diversification of the industry base reduces the vulnerability of an economy to shocks and volatilities.

Changes in sectoral mix are presented in Table D-3 for each APO country for two periods: from 1980 to 2000; and from 2000 to 2017. The high-productivity countries had almost completed their transitions out of agriculture by 1980. There were small reductions in the agriculture sector's shares thereafter up to 2000 but there were no changes after 2000. The major expansions in their services sectors came in the 1980 to 2000 period. Countries in the middle of the productivity distribution tended to complete their transitions out of agriculture in the earlier period, with small changes in agriculture shares in the latter period. The lower-productivity countries had transitions out of agriculture in both periods.

TABLE D-3

CHANGES IN INDUSTRY SECTORS' SHARES OF GDP IN PRE-2000 AND POST-2000 PERIODS.

(PERCENTAGE POINTS)

	1980 to 2000				2000 to 2017			
	Agriculture	Manufacturing	Services	Other	Agriculture	Manufacturing	Services	Other
Singapore	−2	0	3	−2	0	−8	10	−2
Hong Kong	−1	−16	17	0	0	−4	5	−1
ROC	−6	−9	20	−5	0	6	−4	−1
Japan	−2	−6	10	−2	0	−1	4	−2
IR Iran	−2	2	−1	2	−3	4	1	−3
ROK	−12	5	9	−2	−2	1	1	0
Malaysia	−15	12	6	−3	0	−7	5	1
Sri Lanka	−9	−1	12	−2	−3	−3	1	4
Mongolia	17	−9	−4	−3	−13	3	−6	17
Thailand	−12	6	4	1	0	−1	2	0
Indonesia	−7	10	6	−9	1	−1	−6	5
Fiji	−5	3	4	−2	−1	0	3	−2
Philippines	−8	−3	16	−5	−4	−5	8	1
Pakistan	−5	1	4	0	−5	2	4	−1
India	−13	−3	12	3	−7	−1	8	0
Lao PDR	−13	7	1	5	−29	−3	13	19
Vietnam	−16	−5	7	13	−9	4	4	1
Nepal	−16	4	9	3	−9	−4	12	1
Bangladesh	−6	1	2	3	−10	4	5	1
Cambodia	−6	7	−2	1	−13	0	3	9

Source: APO Productivity Database 2019.

Changes in the allocation of labor resources are shown for the same two periods in Table D-4. The declines in agricultural employment are evident. Cambodia and Vietnam shed the most labor resources in the agricultural sector in the period 2000–17, by 33 and 25 percentage points, respectively. However, it is striking that there are only small corresponding changes in the shares of manufacturing employment across countries. The shares released from agriculture have tended to be taken up by services.

TABLE D-4

CHANGES IN INDUSTRY SECTORS' SHARES OF EMPLOYMENT IN PRE-2000 AND POST-2000 PERIODS.

(PERCENTAGE POINTS)

	1980 to 2000				2000 to 2017			
	Agriculture	Manufacturing	Services	Other	Agriculture	Manufacturing	Services	Other
Singapore	−1	−8	5	3	0	−7	9	−2
Hong Kong	−1	−32	31	2	0	−7	8	−1
ROC	−12	−5	17	0	−3	−1	5	−1

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	1980 to 2000				2000 to 2017			
	Agriculture	Manufacturing	Services	Other	Agriculture	Manufacturing	Services	Other
Japan	−7	−4	11	0	−2	−4	8	−2
IR Iran	−11	2	10	−1	−4	−1	3	2
ROK	−23	−1	24	0	−6	−2	8	0
Malaysia	−16	7	8	1	−6	−7	11	1
Sri Lanka	−13	5	8	1	−11	2	7	2
Mongolia	4	−3	1	−2	−14	−2	11	6
Thailand	−26	7	16	3	−13	1	10	1
Indonesia	−11	4	6	1	−15	2	11	3
Fiji	−11	7	11	−7	−4	−6	2	8
Philippines	−15	−1	14	1	−10	−2	11	2
Pakistan	−4	−3	7	1	−9	4	2	2
India	−8	2	5	1	−10	−1	6	5
Lao PDR	3	1	−4	0	−13	2	8	2
Vietnam	−9	0	8	0	−25	9	11	5
Nepal	−29	9	16	4	5	−2	−3	1
Bangladesh	−13	1	10	2	−11	6	2	3
Cambodia	−6	4	2	1	−33	2	25	6

Source: APO Productivity Database 2019.

Sectoral Productivity

Production activity and labor resources moving out of agriculture is a common theme. On its own, this would have contributed to productivity growth, because agriculture is a relatively low-productivity sector, at least in terms of labor productivity. A comparison of Table D-1 and Table D-2 makes this apparent, with agriculture's share of employment being greater than the output share for all countries except Fiji. The low relative productivity of agriculture is more readily apparent in Table D-5. This shows that productivity in manufacturing, services, and other industries are generally multiples of the productivity level in agriculture.

A shift out of agriculture into other sectors would also raise overall productivity growth if productivity growth in nonagricultural sectors is stronger than in agriculture. Table D-6 provides some evidence for APO countries for periods 2000–10 and 2010–17, based on rates of growth in output per person.

The indications are somewhat mixed. Manufacturing productivity growth was stronger than agricultural productivity growth or close to it in the earlier period in all countries except Lao PDR, where manufacturing productivity was negative. In the later period, the superiority of manufacturing productivity was not as universal, as some countries in the middle order of productivity levels (such as Mongolia, Thailand, and Vietnam) had combinations of stronger agricultural productivity growth and weaker manufacturing productivity growth than in the earlier period. Productivity growth in services has tended to be reasonably close to productivity growth in agriculture.

TABLE D-5

RATIO OF OUTPUT PER PERSON BY INDUSTRY SECTORS RELATIVE TO AGRICULTURE IN 2017.

	Manufacturing	Services	Other
Singapore	27.1	18.8	7.6
Hong Kong	1.2	3.4	2.2
ROC	3.2	2.8	1.4
Japan	4.5	3.2	3.0
IR Iran	2.2	2.1	3.4
ROK	3.9	1.8	2.6
Malaysia	1.6	1.0	1.9
Sri Lanka	2.8	4.1	4.2
Mongolia	3.3	2.3	6.9
Thailand	6.4	4.8	4.7
Indonesia	3.1	2.1	5.3
Fiji	0.5	0.6	0.2
Philippines	6.4	2.8	3.7
Pakistan	1.3	2.6	1.2
India	3.0	5.4	2.9
Lao PDR	6.9	5.1	22.9
Vietnam	2.3	3.2	5.4
Nepal	1.9	7.4	4.6
Bangladesh	3.3	4.3	4.9
Cambodia	2.9	1.6	3.2

Source: Author's calculations based on data from the APO Productivity Database 2019.

TABLE D-6

GROWTH RATES IN INDUSTRY SECTORS' PRODUCTIVITY IN PRE-2000 AND POST-2000 PERIODS.

PER CENT PER YEAR

	1980 to 2000				2000 to 2017			
	Agriculture	Manufacturing	Services	Other	Agriculture	Manufacturing	Services	Other
Singapore	−10.0	3.9	1.3	2.2	−9.7	4.0	1.7	0.6
Hong Kong	−2.7	5.4	3.2	0.2	−0.4	2.3	1.8	2.2
ROC	3.4	6.3	1.4	1.1	−1.2	3.1	0.8	−1.1
Japan	0.0	2.8	−0.2	−0.7	−0.2	1.9	−0.1	1.2
IR Iran	2.7	6.8	3.7	−1.5	2.2	0.5	1.0	−1.7
ROK	4.9	6.5	1.7	1.5	3.2	1.8	0.9	1.0
Malaysia	3.0	4.1	2.1	−2.8	1.9	2.3	2.6	1.5
Sri Lanka	2.9	2.5	2.9	6.4	5.2	1.6	4.7	5.3

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	1980 to 2000				2000 to 2017			
	Agriculture	Manufacturing	Services	Other	Agriculture	Manufacturing	Services	Other
Mongolia	0.8	9.7	1.6	–2.5	9.2	2.0	3.0	1.7
Thailand	2.3	4.6	1.3	1.9	3.8	–0.2	3.6	3.1
Indonesia	3.1	2.6	3.5	–0.9	5.8	1.1	2.6	–0.8
Fiji	1.9	1.4	0.6	–5.4	1.9	1.9	1.9	1.4
Philippines	0.9	2.9	1.8	2.0	3.7	5.7	3.2	1.3
Pakistan	0.1	2.1	1.3	–1.5	1.6	–0.8	2.0	0.5
India	2.8	8.8	6.9	–1.4	4.3	4.6	4.7	4.6
Lao PDR	1.9	–3.9	3.0	5.0	1.5	10.4	3.7	4.7
Vietnam	3.9	3.0	1.9	–4.3	4.5	5.3	3.4	1.2
Nepal	1.1	2.8	6.5	1.9	1.2	1.1	0.8	1.2
Bangladesh	2.4	2.6	3.6	1.4	3.9	4.2	3.4	3.5
Cambodia	3.7	2.4	–0.2	–4.7	4.7	8.2	–0.9	2.9

Shift–share Analysis

Overall productivity growth can come from shifting of resources from lower- to higher-productivity sectors and from productivity growth within sectors. Shift–share analysis is a method for decomposing observed productivity growth into 'within-sector' and 'between-sectors' contributions. For labor productivity in terms of output per worker, the formula is given by:

$$\Delta y_t = \sum_{i=1}^{n} \{s_{i0} \times \Delta y_{it} + \Delta s_{it} \times y_{i0} + \Delta s_{it} \times \Delta y_{it}\},$$

where Δ is the difference operator (from the previous year); y_t is labor productivity; y_{it} is sectoral labor productivity; and s_{it} is the sectoral employment share in sector *i* at time *t* [2]. The zero subscript refers to the baseline period. To convert this equation to growth-rate form, divide both sides by y_0.

The three terms in this formula are (respectively), the 'intra-sectoral effect' (contribution of labor productivity growth within sectors to aggregate labor productivity growth); the 'static-shift effect' (contribution from changes in allocation of labor between sectors with low labor productivity levels to those with high labor productivity levels); and the 'interaction effect' (contribution from changes in allocation of labor between sectors with low productivity growth to those with high labor productivity growth). Together, the static-shift effect and the interaction effect constitute the between-sectors effect.

Table D-7 shows total percentage growth in labor productivity in 2000–17, as well as a decomposition of these growth rates via shift–share analysis into within-sector and between-sectors percentage contributions.

Within-sector productivity growth has contributed much more to aggregate growth than between-sectors structural change, especially in higher-productivity countries. This may be partly due to higher-income countries having already experienced large productivity improvements from structural change that many lower-income countries are yet to experience. It does not preclude the possibility of further productivity growth from additional between-sectors structural changes, including in higher-productivity countries.

A further level of detail can be provided by decomposing the within-sector and between-sectors contributions into contributions from individual sectors. The results from this supplementary analysis show that within-sector contributions from agriculture tend to be much higher for lower-productivity countries, whereas contributions from services tend to be highest for higher-productivity countries. Between-sectors contributions from agriculture are negative for all countries considered, and the same is observed for contributions from manufacturing in high-productivity APO countries. The OECD [2] notes that the aggregate between-sectors-interaction effects tend to be attenuated due to the effect of high-labor-productivity-growth sectors with both output and employment growth being offset by the effect of sectors that have growing relative productivity and are shedding workers to attain faster labor productivity growth. These effects may also not be fully measured due to the limitation that shift–share analysis is static and partial. The services sector has an overall much higher between-sectors contribution, which is likely due to a concurrent increase in productivity and in employment share.

TABLE D-7

WITHIN-SECTOR AND BETWEEN-SECTORS CONTRIBUTIONS TO LABOR PRODUCTIVITY GROWTH, 2000–17.

	Labor productivity growth (%)	Within-sector contribution (% pts)	Between-sector contribution (% pts)
Singapore	37.9	41.2	–3.2
Hong Kong	54.4	46.7	7.7
ROC	51.3	47.9	3.4
Japan	12.1	12	0.1
Japan	57.7	50.7	7
IR Iran	51.5	51.7	–0.1
ROK	51.5	55.8	–4.3
Malaysia	107.2	85.2	22.1
Sri Lanka	114.6	70	44.5
Mongolia	76.7	53.3	23.4
Thailand	76	51.8	24.2
Indonesia	17.8	27.8	–10
Fiji	64.7	57	7.7
Philippines	27.7	23.2	4.5
Pakistan	168.3	138	30.3
India	135.4	59	76.4
Lao PDR	122	62.3	59.7
Vietnam	56.7	70.1	–13.4
Nepal	95.4	74.4	21
Bangladesh	108.3	62.2	46.1
Cambodia	37.9	41.2	–3.2

Industry Contributions to Productivity Growth

Finally, the contributions of industry sectors to overall growth in productivity in a country can be examined. This is done by subtracting a sector's contribution to employment growth from the sector's contribution to output growth. Contributions are calculated as the average of a sector's shares at the beginning and the end of the period multiplied by the rate of growth in the sector's output or employment over the period.

Approximate industry contributions to total productivity growth are displayed in Table D-8. These should be taken as rough orders of magnitude as there are differences in treatment of industry data and aggregate data in the database, as well as approximations in the calculations.

TABLE D-8

CONTRIBUTIONS FROM INDUSTRY SECTORS TO OVERALL PRODUCTIVITY GROWTH.

(IN % PER YEAR)

	Agriculture		Manufacturing		Services		Other		Total	
	% pts	% of total	% pts	% of total	% pts	% of total	% pts	% of total	% pa	% of total
Singapore	0.0	0	1.0	50	1.1	55	–0.1	–5	2.0	100
Hong Kong	0.0	0	0.4	15	2.4	85	0.1	0	2.9	100
ROC	0.1	5	1.5	60	0.8	35	0.0	0	2.4	100
Japan	0.1	20	0.5	100	–0.1	–25	0.0	5	0.5	100
IR Iran	0.2	10	0.6	30	1.3	65	–0.1	–5	2.0	100
ROK	0.3	10	1.4	60	0.6	25	0.1	5	2.5	100
Malaysia	0.2	10	0.9	45	0.9	40	0.1	5	2.1	100
Sri Lanka	0.6	15	0.4	10	2.6	60	0.7	15	4.3	100
Mongolia	0.7	20	0.6	20	1.2	35	0.8	25	3.3	100
Thailand	0.7	20	0.9	25	1.6	45	0.2	10	3.3	100
Indonesia	0.7	20	0.6	20	1.7	50	0.3	10	3.4	100
Fiji	0.2	30	0.3	30	0.8	90	–0.4	–50	0.8	100
Philippines	0.2	5	1.0	35	1.4	50	0.3	10	2.9	100
Pakistan	–0.1	–10	0.0	0	1.5	115	–0.1	–5	1.3	100
India	0.7	15	1.0	15	3.9	65	0.3	5	5.9	100
Lao PDR	0.2	5	0.6	10	1.7	35	2.5	50	4.9	100
Vietnam	1.2	30	0.7	20	1.8	40	0.5	10	4.1	100
Nepal	–0.3	–10	0.2	5	2.3	95	0.2	10	2.4	100
Bangladesh	0.5	10	0.7	20	2.3	55	0.5	15	4.0	100
Cambodia	1.4	35	1.2	30	0.7	20	0.6	15	3.9	100

Source: Author's calculations based on data from APO Productivity Database 2019.

Services provided the largest contribution to growth in output per employee in 14 APO countries from 2000 to 2010. Large contributions in absolute terms were in India (about 4 percentage points) and Sri Lanka, Hong Kong, Nepal, and Bangladesh (2–2.5 percentage points each). Manufacturing made the next most-important contribution in general. There were contributions of 1–1.5 percentage points in the high-productivity countries, i.e., Singapore, the ROC, and the

ROK. Contributions of around 1 percentage point came in the Philippines, India, and Cambodia. Contributions from agriculture were smaller in both absolute and relative terms in all countries apart from Vietnam and Cambodia.

Perhaps the main message to come out of this overview is that there is no single path to productivity growth. Lower-productivity countries have often been thought of as undergoing a process of structural transition resembling established paths that advanced economies have previously taken. However, the variation in the significance of manufacturing and other sectors across APO countries, regardless of income levels, suggests that there is no one prescribed path toward a productivity catchup. In this respect, it is important that countries pursue policies that take advantage of country-specific comparative advantages and country-specific conditions. Governments can help by identifying areas of emerging comparative advantage and investing in human capital and infrastructure that support these areas of emerging comparative advantages [3].

Key Point Summary

- A country's level of development affects its industry structure, which in turn has important consequences for productivity levels and growth. Countries diversify their industry compositions as they develop, which usually means transitioning away from the agricultural sector.

- Over time, manufacturing and services have grown in APO countries at the expense of agriculture. The high-productivity countries completed the extent of their transitions out of agriculture before 1980 and the middle-order countries completed transitions before 2000. The lower-productivity countries are still transitioning and some still have large agricultural sectors.

- There is no single path to follow in transitioning from agriculture to manufacturing or to services or to resources. Nor is there a single destination. It makes sense for countries to be guided by comparative advantages and patterns of demand.

- Output per employee in manufacturing, services, and other industries is generally multiples of the productivity level in agriculture, in all but one country, Fiji.

- The shift from agriculture, where productivity is relatively low, to higher productivity sectors, contributes to productivity growth.

- Much of the labor released from agriculture has been taken up in services.

- Relative rates of productivity growth have been more even across industry sectors. While manufacturing has often had a superior rate of productivity growth than agriculture, this has not always been the case.

- The services sector has been a key driver of recent labor productivity increases.

- A shift–share analysis suggests that, while the move from low-productivity to high-productivity sectors has contributed to productivity growth, increases in within-sector productivity have contributed more to productivity than movements of labor across sectors.

References

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APPENDIX E

GLOBAL VALUE CHAINS

APO economies have participated increasingly in global value chains (GVCs), in which production of goods is split up into elements produced in different countries. They have provided opportunities for countries to industrialize and improve productivity. Asia is a major center for participation in GVCs. This appendix examines the evolution of GVCs in APO countries and explores the implications of GVCs for productivity growth.

The Nature of GVCs and how they became so Important

GVCs can be defined as arrangements that split production processes into discrete activities across countries to gain a cost advantage. The box below provides an example of how the production of the Boeing 787 is split across several countries. This cross-border dispersion of production processes within vertically integrated global firms has been an increasingly important structural feature of economic globalization in recent decades [1–3].

GVCs are also known as global production sharing, network trade, global production networks, production fragmentation, parts and components trade, vertical specialization, value chains, production sharing, intra-product specialization, and slicing up the value chain.

There are two forms of participation in GVCs:

- backward GVC participation, in which inputs are imported to produce goods or services that are then exported; and

- forward GVC participation, in which domestically produced inputs are exported to partners for the production of goods or services that are subsequently exported.

This process of this international division of labor opens up opportunities for countries to specialize in different slices (tasks) of the production process in line with their relative cost advantages. The splitting up of the production process across a wide range of industries creates new opportunities for specialization within GVCs [1].

The rapid growth of GVCs has been underpinned by three mutually reinforcing developments.

- Rapid advancements in production technology have enabled industries to slice the value chain into finer 'portable' components.

- Innovations in information and communications technology (ICT) and transportation have shrunk the distance that once separated nations and improved the speed and efficiency with which firms can coordinate across geographically dispersed production locations.

- Liberalization policy reforms in both home and host countries have considerably removed barriers to trade and investment [1–2, 5–8].

GLOBAL VALUE CHAINS ILLUSTRATED: THE CASE OF THE 787 DREAMLINER 'PRODUCED' BY THE BOEING CORPORATION.

The Boeing Corporation in the USA illustrates, through the production of its 787 Dreamliner, how GVCs have changed the production processes and how countries and companies operating in GVCs are engaging in the production processes [4].

Most of the value added to the 787 Dreamliner is undertaken by 40 partners around the world, with Boeing itself responsible for adding only 10% of the total value.

To bring the 787 Dreamliner to a final product, there are 43 parts-and-components suppliers spread across 135 production sites around the world. The engines are produced in the UK and the USA; the wings in Japan; the flaps and ailerons in Australia and Canada; the fuselage in Japan, Italy, and the USA; the horizontal stabilizer in Italy; and the doors in Sweden and France.

This contrasts with the 1950s when only 1% of Boeing's parts and components were procured from overseas. Boeing now focuses on its own specific advantages, including headquarter functions like design, supply chain management, and marketing and branding. Airbus, Boeing's competitor, followed Boeing's lead for its A350 jet.

The innovations in ICTs have facilitated the establishment of 'services links' that combine various fragments of a production process in a timely and cost-efficient manner. There is an important two-way link between the improvement in communication technology and the expansion of fragmentation-based specialization within global industries. The latter results in the lowering of the cost of production and rapid market penetration of the final products through enhanced price competitiveness. In turn, scale economies resulting in market expansion encourage new technological efforts, thus enabling further product fragmentation. This two-way link has set the stage for 'fragmentation trade' to increase more rapidly, compared with conventional commodity-based trade.

There is evidence that GVCs and trade in parts and components go back to the early twentieth century [9]. The exceptional aspect of contemporary GVCs is the ever-increasing product coverage and rapid spread from mature industrial countries to emerging economies. Over the past five decades, production networks have gradually evolved, encompassing many countries and industries. Some of the industries exposed to GVC trade include sports footwear, automobiles, aircraft manufacturing, televisions and radio receivers, sewing machines, office equipment, electrical machinery, machine tools, cameras, watches, mobile phones, computers, light-emitting diodes, solar panels, and surgical and medical devices [1].

Drivers of GVCS from the Perspective of Firms and Countries

Apart from the global trends of technological development, reduction in communication costs and liberalization of investment and trade policies, several country- and firm-level factors have fostered GVC participation. Size of the domestic economy, factor endowments, domestic technology, geography, institutional quality, and connectivity infrastructure are key drivers for participation in GVCs. This section looks at each of these in more detail.

FIRM-LEVEL DETERMINANTS OF GVC PARTICIPATION.

While country-level factors are important for GVC participation, firm-level variables can distinguish which firms ultimately gain access to GVCs.

Some of the variables shown to be important for firms participating in GVCs include high-labor productivity, large firm size, foreign ownership, and high technological capability. Technological capability has been shown to increase the likelihood of SMEs participation within GVCs [11].

Access to finance can be a significant factor in terms of upgrading within GVCs. Credit constraints have been shown to restrict firms to low-value-added stages in the GVCs (including pure assembly). More complex roles in GVC production require higher fixed and upfront costs, which in turn need access to finance [12].

The role of service linkage costs, in connecting the various production units located across countries, has played a critical role in the expansion of GVCs [10]. As these service linkage costs have declined due to reductions in transport and communications costs, technological breakthroughs, and trade liberalization, production fragmentation has further facilitated GVC-related trade.

Factor endowments also matter for GVCs [13]. The abundance of low-skilled workers means that countries can participate in less complex aspects of manufacturing within GVCs. For instance, Samsung set up production plants in Vietnam where labor cost was around 50% less than in PR China. This low price of labor signaled an abundance of low-skilled workers. A report by the World Bank found that countries with a larger low-skilled labor force in the 2000s were more likely to be among the countries specializing in backward GVC participation.

This was across all areas, including limited manufacturing, advanced manufacturing, and services in 2011. Participation in more complex and innovative GVCs often needs investments in human capital and technology [1, 13]. Sectors that used skills with higher intensity also saw faster growth of GVCs [13].

The effect of market size on GVC participation is crucially mediated by links with domestic industries. Markets with larger manufacturing sectors are characterized by larger forward GVC participation and smaller backward GVC participation, thereby highlighting the importance of domestic suppliers for GVC participation (see Box above). A larger manufacturing sector in the 2000s also increased the likelihood of countries participating in advanced manufacturing and services GVCs or in innovative GVC activities in 2011.

Higher domestic technological capabilities are strongly linked with GVC-related trade [1, 6]. The size and scale of the domestic economy in terms of GDP and manufacturing base can be more important for traditional foreign investment and trade compared with GVC-related trade. This is in part because GVC trade may go through several countries before reaching its final destination [1]. However, a larger manufacturing sector in the 2000s increased the likelihood of countries participating in advanced manufacturing and services GVCs or in innovative GVC activities in 2011. Similarly, markets with larger manufacturing sectors are typically characterized by larger forward GVC participation and smaller backward GVC participation, thus highlighting the importance of domestic suppliers for GVC participation [13].

Geography, in terms of remoteness and being landlocked, can add substantially to trade costs, hampering participation in GVCs [1, 13]. Investments in logistical infrastructure and connectivity can help overcome some of these costs [1, 13]. Proximity to the hubs in the global trade network can augment chances of GVC participation. Many value chains are not global but regional. For instance, Vietnam's proximity to its regional suppliers of electronic inputs, such as PR China, Japan, the ROK, and Singapore, clearly helped increase its electronics-related GVC trade [13].

Strong institutions are imperative for GVC-related trade. GVCs often rely on intellectual property and trademarks; and institutions can help assure firms that their intellectual property will not be misappropriated [13–15]. Further, GVCs require high fixed costs in terms of setting up of production plants. For this kind of foreign capital investments, multinationals often need the assurance of strong institutions in terms of intellectual property (IP), law and order, governance, and macroeconomic stability [1, 6]. Trade policies are vital for GVC participation. Reduction in tariffs is seen as a necessary but not a sufficient condition to attract GVCs. Mitigating nontariff barriers, simplifying customs procedures and opening the country to foreign investment are central to attracting GVCs [16].

In addition to the factors listed above, tariff liberalization, export processing zones (EPZs), and foreign direct investment (FDI) policies have also fostered GVCs. Manufacturing trade in Asia is mostly dominated by semi-processed products, which have the lowest applied tariffs in the region. Asian economies continue to decrease the applied tariffs to liberalize trade and have also used regional trade agreements to support GVCs and help integration [17, 18]. Due to these reforms and infrastructure development, trade costs within Asia have declined. As a proxy for overall trade-cost reductions, Table E-1 shows how trade costs have substantially reduced between PR China and other major Asian countries.

TABLE E-1

INTERNATIONAL MANUFACTURING TRADE COSTS WITH PR CHINA.

INDEX.

Reporter	1995	2000	2005	2010	2013
Singapore	142.0	134.6	110.1	110.7	109.4
Malaysia	73.9	74.2	51.1	50.9	53.0
Hong Kong	26.0	21.4	6.0	35.4	13.9
Philippines		114.3	83.4	97.2	93.0
ROK	82.5	74.5	58.1	52.3	53.9
Thailand	105.1	97.3	77.7	75.5	72.9
Vietnam		103.0	89.0	58.9	
Indonesia	123.0	107.2	98.9	99.5	96.3
Japan	78.6	73.6	59.5	61.2	64.6
India	166.4	151.8	112.1	98.6	93.1
Bangladesh	154.2	178.9	156.4	145.9	131.0
Pakistan			123.5	113.2	106.9

Source: The World Bank UNESCAP Trade costs Database.
Notes: (1) 2013 is the latest available year in the series.
(2) The Trade Costs Dataset provides estimates of bilateral trade costs in agriculture and manufactured goods. It is built on trade and production data collected in over 200 countries. Symmetric bilateral trade costs are computed using the Inverse Gravity Framework [20, 21] which estimates trade costs for each country pair using bilateral trade and gross national output.

GVC-related trade has also been augmented by EPZs. The number of countries with an EPZ increased from 25 in 1975 to 130 in 2006, showing that the importance of EPZs has increased over time [19]. EPZs accounted for around 20% of total exports from developing countries [17].

In recent decades, FDI has become an important strategy for multinationals involved in GVCs. Increases in FDI have paralleled increases in exports for Asian countries. The Asian share of FDI doubled between 1985 and 1995, with PR China becoming the most attractive destination for FDI. This doubling of FDI share has further increased GVC-related trade in Asia. FDI flows have also improved human capital through investments in the tertiary sector, which in turn has benefited GVCs [17].

Trends in GVCs

As mentioned in the first section, GVCs are not a new phenomenon. What is unique about the recent wave of globalization is its extent and coverage [1, 6, 9, 22].

A handful of countries in Asia, Europe, and North America have been mostly responsible for the significant expansion in GVCs over the past four decades. Between 1990 and 2015, GVC participation worldwide grew by about 7 percentage points, reflecting the increased ability of firms to fragment their production processes. GVC intensification was driven in large part by high-tech manufacturing industries. In addition, upstream mining and other primary industries accounted for most of the scale effect, consistent with their high share of GVC integration and growing share of world trade [13].

Over the past four decades, GVC-related trade has grown at a much faster rate than total world manufacturing trade [6]. The Global Financial Crisis in 2008–09 adversely affected trade in GVCs. 2010 to 2011 saw a renewed expansion in GVC-related trade, followed by the slowing down of GVC trade growth [11]. As a result of these trends, GVCs' share of trade increased from less than 25% in the 1990s to above 30% in 2007. Following the Global Financial Crisis, this share declined to below 25% by 2019 [23].

The nature of GVC trade can be dynamic and nonlinear. How firms and countries participate in GVCs changes over time and is linked with technological advances, the ability to upgrade, and global competition [13, 24, 25]

Some major countries in Asia, Europe, and North America have been mostly responsible for the significant expansion in GVCs over the past four decades, including sourcing of parts and components, setting up of production facilities, and transferring technical knowhows [13]. Furthermore, a handful of large firms account for most of the GVC trade around the world. Europe, East Asia, and Southeast Asia remain the regions with the highest levels of GVC participation. North America is also seen as a hub for GVCs, though 'factory Asia' (especially PR China) has gained in prominence in terms of GVCs.

Asian trade shares demonstrate the importance of GVC-related trade, with a high content of GVC intermediate products. For example, 43.2% of exports and 38.3% of imports comprised GVC intermediate products [18]. Leading export economies across Asia in 2017 by GVC participation rates were: Singapore (76%); Hong Kong (73%); Malaysia (64%); PR China (62%); the Philippines (58%); the ROK (58%); the ROC (54%); Thailand (52%); Vietnam (51%); Indonesia (50%); Japan (48%); India (42%); Macao (39%); and Bangladesh (31%) [26].

In terms of traditional and simple GVC trade, PR China has emerged as an important hub in terms of both production and linking of other regional countries to network trade, while the USA and Germany remain the most important hubs for complex GVC networks [22]. Even though most of the Asian GVC activities have been restricted to low-value-added production, PR China and some other Asian economies have made progress in climbing the GVC technology ladder [27, 14].

The expansion of intraregional GVC activities were a significant factor in increased GVC-related trade within Asia. The share of complex intraregional GVCs as a percentage of total forward and backward GVC activities increased from 38.5% and 36.9%, respectively, in 2000 to 43.9% and 46.2%, respectively, in 2017 [22].

In 2013, the Asia–Pacific region accounted for about 45% of global GVC-related exports of final goods, with PR China representing half of the region's GVC-related final exports. In terms of percentage share of total exports, the following countries had the highest proportions in this category: PR China (23.1%); Germany (8.7%); the USA (6.6%); Mexico (3.6%); France (3.2%); the Netherlands (3.1%); the UK (2.8%); Spain (2.7); Italy (2.7%); and Canada (2.5%). GVC-related trade from Asia–Pacific; excluding PR China, accounted for around 21.9% of total exports [28].

Asia–Pacific's GVC-intermediate products exports as a percentage of total exports in 2013 was 43.2%. For individual countries, this share was: PR China (16.6%); Japan (7.0%); the ROK (4.9%); Malaysia (2.8%); and Thailand (1.9%). For Asia–Pacific, around 90% of these trade flows are concentrated in just 10 countries: Australia, PR China, Japan, India, Indonesia, Malaysia, the ROK, Singapore, Thailand, and Turkey. For some of the other big players in the world, this share was: the USA (10.1%); Germany (9.3%); and France (4.0%) [28].

While several Asian countries produce a variety of products, some countries are more prominent in certain industries. For instance, PR China specializes in exports of electronics; Turkey and Thailand in automotive and agricultural products; and Malaysia in electronics and automotive products [18]. PR China is one of the largest exporters of electronic goods [18]. The Association of Southeast Asian Nations (ASEAN) also saw a massive increase in electronic goods since 1990. Within the ASEAN nations, Malaysia and Singapore are the largest exporters (one-third each of the ASEAN total), followed by the Philippines (14%), Indonesia (10%), and Thailand (9%) [29]. PR China has also seen major upgrades in the apparel industry, allowing it to become the largest exporter of textile and apparel products in the world [30, 22]. Bangladesh, Vietnam, and Cambodia also export sizeable shares of the apparel-and-footwear industry [31, 18].

Trade in GVCs in not just limited to products, as services also play a vital role within this trade network [13]. The fragmentation of production processes has been accompanied by outsourcing both manufacturing tasks and service tasks. Asia's successes in GVCs to date have been mainly in the manufacturing sector [32]. However, as shown in the first section, GVC participation can be dynamic and nonlinear. Changes in productivity, export sophistication, and wage increases can change the composition of GVC-related trade [12, 13, 22, 30].

The services sector for most of Asia has seen low productivity growth. Hong Kong and Singapore are the success stories in terms of services activities within the Asian GVCs. The Philippines has also had some success in gaining a share of some of the service sector activities within GVCs, although most of this has been in low value-added goods like call centers [27].

Although GVC-related exports have increased in the last four decades, there may be limits on further increases. Rising nationalism, labor saving techniques including automation, artificial intelligence and 3D printing are likely to pose challenges to future GVC-related trade [30, 33, 34].

Productivity Growth, Exports and Middle-income Traps

Generally, trade has been linked with productivity growth. Knowledge spillovers and competition from foreign firms boost productivity growth for domestic firms [35, 36]. Trade related to GVCs has been linked with higher welfare gains, compared with traditional trade [12, 13, 22, 30]. These welfare gains come from economic growth, productivity growth, cost savings, better-quality inputs, and sophistication and diversification of exports.

GVC participation can lead to technology transfer, inducing productivity gains [14]. A country's ability to absorb technology and upgrade depends in part on its educational infrastructure, innovation system, R&D investment, FDI, scientific publications, and IP systems [37], as discussed in the box below. Being part of GVCs increases the probability of a firm accessing new types of production and upgrading toward higher-value-added activities [28].

One of the ways in which GVCs raise economic efficiency is through a more efficient allocation of resources. This allows firms to focus on the core parts of production and services that they are most efficient in, thereby leading to productivity gains [38]. A 10% increase in GVC participation has been linked with a 1.6% increase in productivity [28].

Backward participation in GVCs showed a positive linkage with enhancing productivity in the manufacturing sector, while supplying to other countries that are participating in forward participation has a much stronger positive effect on enhancing services activities [12]. The research literature has also shown strong productivity spillover effects for firms that integrate with firms that are technologically more advanced [15].

A further source of productivity growth comes from cost savings and investments in innovation. GVCs allow firms to take advantage of better quality and cheaper parts and components as inputs for their production processes [14, 39]. Firm-level evidence from Denmark has suggested that participating in GVCs lowers firm costs, while increasing their capacity to invest in innovation. By accessing cheaper inputs, firms have been able to increase their return on R&D, thereby incentivizing R&D investment [11]. There is also evidence that firms participating in GVCs are pressured to undertake more innovation and become more competitive. Part of this push comes from exports, by being exposed to competition from other multinationals and by operating in markets exposed to a high degree of imports [28].

Impact of GVCs on Asian Economies

As discussed above, GVCs can be key vehicles for productivity and job creation [13, 54, 55] but lack of innovation capabilities, total factor productivity growth, strong institutions, human capital, and high-tech products in exports can still lead to the middle-income trap [56]. This section explores the impact of GVCs on Asian economies and looks at examples of countries that have benefitted substantially from GVCs as well as of countries that have either failed to participate within GVCs or have become stuck in the middle-income trap.

There is evidence that GVCs' impact on manufacturing productivity in East and Southeast Asian economies is significantly higher than in other regions. This is possibly linked to countries in this region interacting differently with global GVCs. These countries are more likely to be involved in buying sophisticated intermediate goods, while other regions may be more focused on upstream supplies [32].

ESCAPING THE MIDDLE-INCOME TRAP REQUIRES INVESTMENT IN INNOVATION AND INSTITUTIONS.

The middle-income trap can be seen as the stagnation of economic growth for a middle-income country, to the extent that it is unable to reach the cohort of high-income economies [40].

Productivity growth is seen as the main driver of long-term economic growth [14, 15, 41, 42]. As such, limits on innovation and productivity growth are prime reasons for the middle-income trap [43].

There is also evidence from the international literature that open economies tend to grow faster and have higher incomes compared with closed economies [35, 39]. Part of this is a result of a technological flow leading to innovation [14, 44]. GVC trade not only brings the benefits of an open economy, but there are also additional benefits of GVC trade compared to traditional trade [12, 13, 22, 30].

The previous section showed that there is considerable evidence linking GVC trade with economic and productivity growth. Given that GVCs can be associated with innovation and productivity growth, participation in GVCs can help less developed economies industrialize and upgrade [30]. However, GVC participation does not always lead to escaping the middle-income trap.

GVC participation can lead to higher output and productivity through backward and forward linkages, resulting in increased competition, technology spillovers, and labor market effects. These effects include creating demand for skilled labor, training of workers, and turnover when workers move to local firms [45]. Exports, foreign direct investments, and imports of parts and components are also linked with productivity growth for firms and countries participating in GVCs [46].

Results in the literature suggest that countries that are less developed and further from the technological frontier benefit more from participating in GVCs [15, 28]. Using data dating back to the 1970s on a large set of developing countries, Pahl and Timmer [32] found a strong and robust effect (of participation in GVCs) on productivity growth. Their results show that relatively less productive countries benefit the most from GVC participation in terms of productivity growth.

Participating in GVCs opens up opportunities for even small developing economies with limited capacities. By linking to less complicated sections of a GVC, these countries gain the ability to produce and operate tasks previously done in more advanced countries, thereby opening up opportunities for job creation and economic growth [28].

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However, there are caveats for linking GVC related trade with sustained economic expansion. GVC participation increases GDP per capita, but only at a diminishing rate. This raises two key questions. First, is GVC participation a remedy to escape the middle-income trap? Second, can GVCs help countries upgrade and increase technological sophistication? The answer to these questions is complex and there is substantial variation linking GVCs to escaping from the middle-income trap. While GVC integration can support economic growth, advances in the level of development and industrial complexity are seen as prerequisites for more sophisticated GVC value-added exports [25, 30, 47].

The middle-income trap can occur when rapidly growing countries with rising wages try to sustain labor-intensive manufacturing and export-led growth strategies [48]. After initial success in achieving exports and economic growth, some Asian countries have found it difficult to reach the status of high-income countries. These countries include Malaysia, the Philippines, and Thailand [36, 49, 50, 51].

Examples of PR China and the ROK show that country-level and firm-level factors play large roles in helping countries upgrade. Boosting productivity, increasing absorptive capacity, developing comparative advantage in new export products, diversifying exports, investing in human capital and innovation, building institutions (including strong IP system), and flexible labor markets are seen as factors that can help a country escape the middle-income trap [15, 30, 37, 52, 53]. Given the desire to escape the middle-income trap, upgrade, and climb the technology ladder, some Asian countries recognize the need to adopt a reforms agenda to attract and expand GVC activities [27].

Since the 1950s, several Asian countries have managed to upgrade their GVC activities and become world-class exporters, e.g., Japan in 1950s and 1960s; the ROK, the ROC, Hong Kong, and Singapore in the 1970s and 1980s; and PR China in the 1990s. These countries expanded their exports within the GVC networks by becoming masters of buyer-driven commodity chains. The key to their success was moving away from mostly assembly of products to a more domestically integrated and higher-value-added form of exporting (also known as full-package supply or original equipment manufacturing). These countries managed to transition to full-package supply by establishing close links with lead firms' buyer-driven chains, which allowed them to procure material inputs and participate in technology transfer and knowledge absorption [29].

Some of the Asian economies have continued to upgrade within GVCs. Between 2000 and 2017, intraregional GVC trade continued to increase within Asia, in part due to upgrading within GVCs [22]. As a result of upgrading, domestic content in Chinese exports increased from 65% in 2000 to 70% in 2007 [57, 58]. Similarly, GVCs in Indian software companies have been involved in advanced innovation capabilities, including high-level development of product and services [58]. At the same time, participation in within-Asia GVCs has grown. Since 2000, the share of complex intraregional GVCs has grown from around 37% to around 46% of all GVC activities.

The biggest increases in income growth have come when countries like Bangladesh, Cambodia, and Vietnam have broken out of commodities or agriculture and ventured into basic manufacturing. GVC participation can help these countries achieve this transition. Participation in GVCs can yield substantial initial gains, with countries potentially becoming 20% richer within three years of joining a manufacturing GVC [13].

Moreover, in the last three decades, Asian countries have become major exporters within several sectors, including electronics, automotive, garments, agribusiness, and information and communications technology. The total value-added exports relating to electronics from the Association of Southeast Asian Nations (ASEAN) countries reached USD384 billion in 2015, a sharp rise from USD36 billion in 1990. Within this category, Malaysia and Singapore are the largest exporters (one-third each of the ASEAN total), followed by the Philippines (14%); Indonesia (10%); and Thailand (9%) [29].

ASEAN nations also saw a major increase in automotive exports, with value-added transport equipment generating up to USD55 billion in value-added production, up from around USD5 billion in 1990. Thailand was the biggest exporter at USD28 billion in 2015, followed by Malaysia at USD3 billion. Automotive firms in Indonesia, Malaysia, and Thailand are well established and drive value-chain production activities in the region, while also procuring parts and components from various domestic and international suppliers [29].

GVCs in the garments industry have created significant jobs and seen major investments undertaken in several Asian economies. PR China has seen major upgrades in the apparel industry, allowing it to become the largest exporter of textile and apparel products in the world. PR China occupies activities in both simple and complex GVC trade within the apparel industry, making it a major hub in the region for both production and sourcing of intermediates from other countries [22, 30].

IMPACT OF GVCS ON SOCIOECONOMIC FACTORS.

As GVCs have become pervasive in the Asian economies, they have had both positive and negative socioeconomic impacts. Borin and Mancini [60] have showed that regions in Vietnam that had a higher intensity of GVCs, were associated with greater reductions in poverty. In Bangladesh, young women exposed to the GVC-dominated garments sector were likely to gain an additional 1.5 years of schooling and delay getting married and having children [60]. GVC participation also nudged some firms in Sri Lanka to comply with higher environmental standards [62]. On the other hand, lack of proper labor markets and institutions has meant that much of Pakistan's labor force employed in the football manufacturing industry has been exploited for low wages [63].

GVCs have had a mixed impact on the environment. Rapid growth of GVC activity (or the scale effect) has increased emissions, while absorption of new techniques has reduced environmental impact per unit of output [13].

GVCs have also helped Vietnam to become a major exporter in this sector. In 2015, Vietnam exported USD39 billion worth of goods in garments, textiles, and shoes. Garment production created around 850,000 jobs and USD1.4 billion in value-added exports in 2015 for Cambodia. Spillovers from FDI in the garment industry are responsible for both product-scope expansion and productivity gains within domestic firms [31].

However, some Asian nations have either failed to take advantage of GVC opportunities or they have not yet been able to transition to high-income economies. Countries like Mongolia, Nepal, and Pakistan have not generated value-added exports from GVCs. Reasons for this underutilization include higher delivery costs, lack of infrastructure development, underdeveloped institutions, and ineffective industrial and trade policies [64–66].

After initial success in achieving exports and economic growth, some Asian countries are in danger of becoming stuck in the middle-income trap. Some analysts have found that GVC participation yielded initial success in terms of productivity gains and development of local technical competencies in countries such as Malaysia, the Philippines, and Thailand [36, 49, 50, 67]. However, scarcity of R&D scientists and technical engineers, inadequate innovation, and insufficient R&D activities have meant that upgrading within GVCs has become harder for these countries and their economic growth have slowed [36, 49–51].

In contrast, firms in the ROK and PR China have continued to upgrade, innovate, and increase exports in sophisticated value-added products. In the ROK, several firms including Samsung, LG, and Hyundai have also managed to become global leaders for final products and leading firms within GVCs. These firms have captured and maintained a strong global position by continually investing in process-and-product upgrading and R&D activities [68]. While PR China's upgrade within GVCs and increased value-added exports are partly linked with trade and FDI liberalization, steps such as investing in innovation and increasing domestic product varieties have also been important [57, 58, 69, 70].

Given these examples, it can be argued that while GVCs offer opportunities to develop and upgrade, avoiding the middle-income trap often requires continuous investment in technological growth and an environment where innovation can thrive, supported by advanced human capital, strong institutions, and effective trade and FDI policies [13, 36, 68, 70, 71].

In more recent times, COVID-19 has shown both the strengths and weaknesses of GVCs. According to the OECD, resilient global production sharing can be achieved through better management strategies, risk management, stockpiling strategies, and agility [72].

Key Point Summary

- Over the past four decades, GVC-related trade has become an important component of the manufacturing trade. More recently, opportunities in services trade have also opened up.

- Some major countries in Asia, Europe, and North America have been mostly responsible for the significant expansion in GVCs over the past four decades, including sourcing of parts and components, setting up of production facilities, and transferring technical knowhows.

- Rapid advancements in production technologies, innovations in information and communications technologies, and openness to trade and investment have been key drivers of growth in GVCs. A strong institutional base is important for long-term investments in GVC facilities.

- GVC participation can lead to knowledge transfer and cost savings, thereby facilitating productivity gains.

- There is evidence that GVCs' impact on manufacturing productivity in East and Southeast Asian economies is significantly higher than in other regions.

- While GVCs offer opportunities to develop and upgrade, avoiding the middle-income trap often requires continuous investment in technological growth and an environment where innovation can thrive, supported by advanced human capital, strong institutions, and effective trade and FDI policies.

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APPENDIX F

TRADE IN SERVICES

The growing trade in services warrants more attention. It is a potentially important path to productivity improvement. However, realizing the productivity potential from this source will require countries to reduce their barriers to services trade.

Growth in Services and Services Trade

Producing and exporting goods has been crucial to the success of many of Asia's fastest-growing economies. Labor-intensive manufacturing opened a way to rapid development for the Republic of Korea (ROK), the Republic of China (ROC), Hong Kong, and Singapore in the 1960s, just as it did for Cambodia and Vietnam in the 1990s and 2000s. There are of course exceptions. India's rapid growth in the 2000s reflected a large expansion in services production. In the Philippines, growth in business process outsourcing, including call center services, has contributed to significant improvement in living standards since 2010. Even in economies dependent on jobs, investments, and incomes generated from trade in goods, services still account for a large share of employment and activity. For APO countries, services, defined to include all industries except agriculture, mining, manufacturing, utilities, and construction, represented an average 59% of GDP in 2017 and roughly 40% of total employment [1].

Services' share of GDP and employment has increased over the past 40 years in most APO economies. Some countries have experienced a dramatic shift in industry composition since 1980. Services' share of activities rose by more than 20 percentage points in each of Hong Kong, India, Nepal, and the Philippines from 1980 to 2017. Mongolia is the only APO economy to register a decline in the share of services in GDP since 1980 (see Figure F-1).

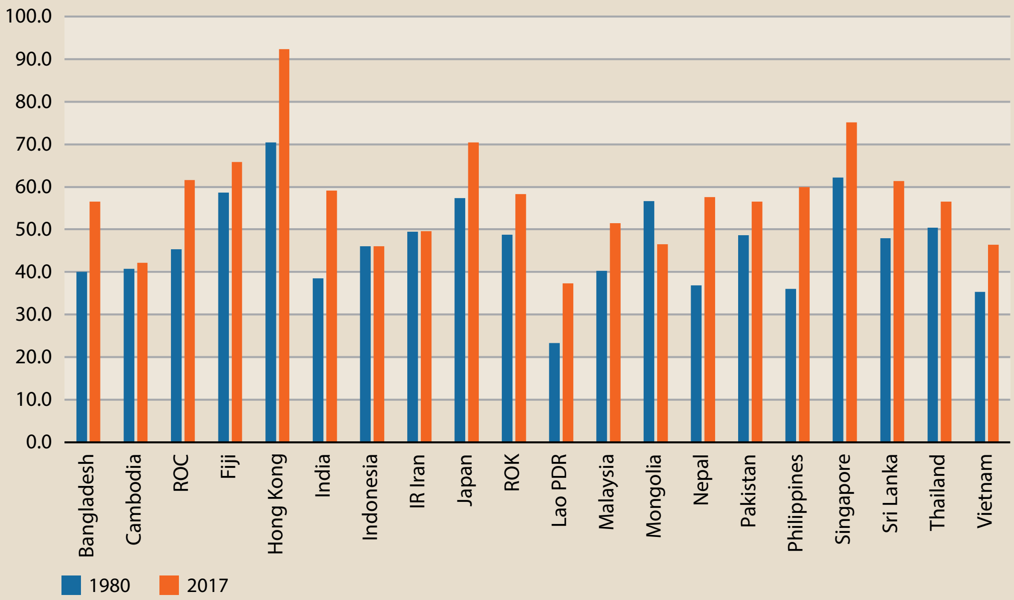
Trade in services has also increased. In many APO economies, services account for a significant share of total exports (see Figure F-2). In Nepal and Fiji, where tourism is an important driver of GDP growth, services represent over 60% of exports according to data published by the World Bank. Services also make up a large share of exports in many high-income countries. In 2019, services comprised a third of the total exports of Singapore, a financial-services hub. In Japan, services represented 23% of exports in 2019, up 10 percentage points on levels in 2009, with travel services accounting for a fifth of services exports.

In other APO economies, services have declined as a proportion of total exports in the past ten years. However, this has tended to reflect large expansions in exports of goods as opposed to shrinking services' output. In Mongolia, for example, services exports grew at an average annual rate of 11% from 2009 to 2019 but the services' share of exports fell 3.5 points amidst a boom in mineral exports. In Lao PDR, a large expansion in exports of hydroelectric power saw the goods' share of exports rise 13 percentage points since 2009. Yet exports of services increased by more than 8% a year over the same period, driven by a growth in tourism. Cambodia and Vietnam also

FIGURE F-1

SERVICES' SHARE OF VALUE ADDED IN APO ECONOMIES.

(IN %)

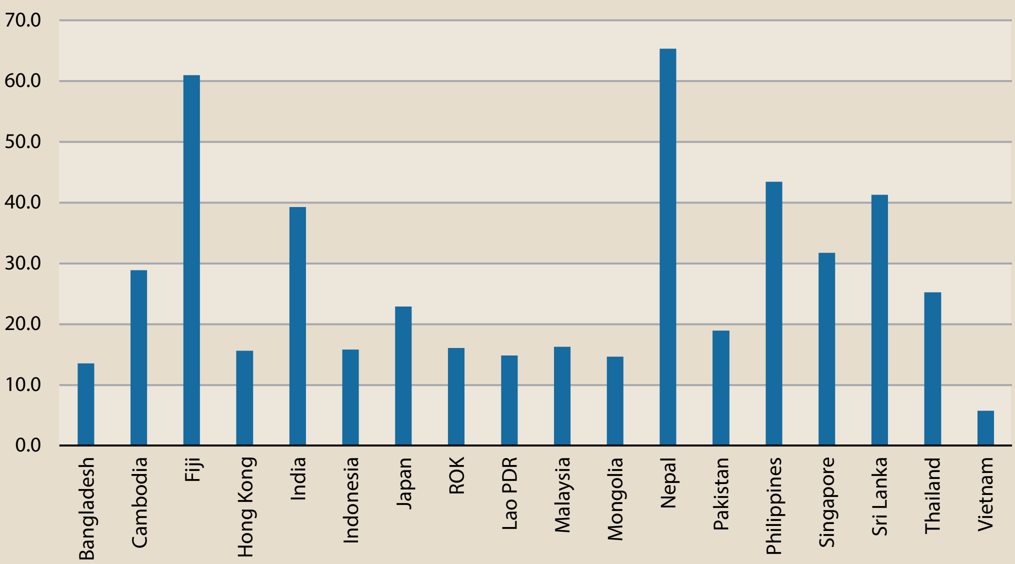


Source: APO Productivity Databook 2019.
Note: Services includes all industries except agriculture, mining, manufacturing, utilities, and construction.

FIGURE F-2

SERVICES' SHARE OF EXPORTS IN APO ECONOMIES.

(IN %)



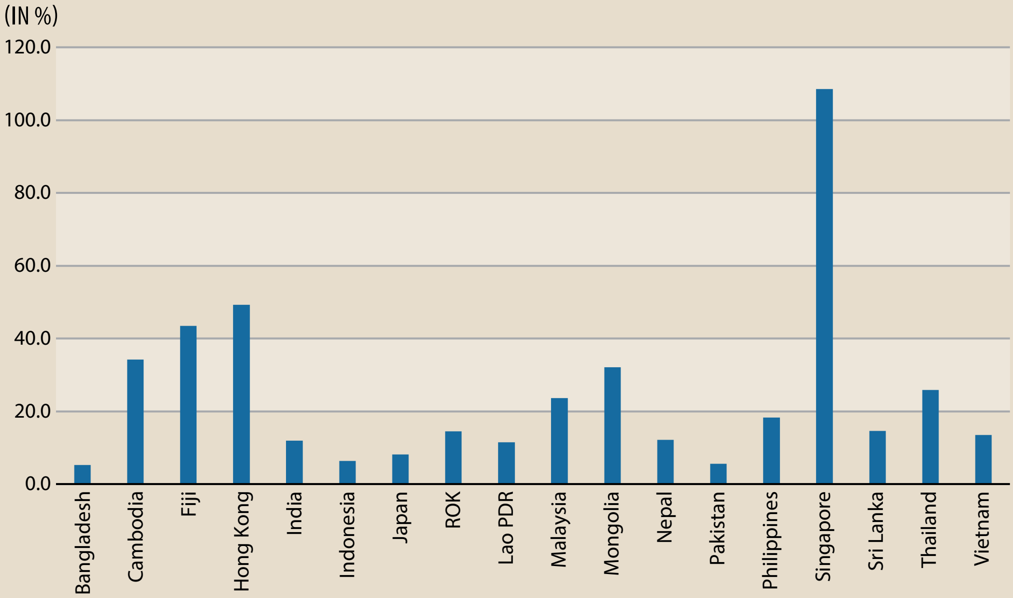
Source: World Bank World Development Indicators.
Note: 2019 data are shown for all economies except Lao PDR, Malaysia, Nepal, Sri Lanka, and Vietnam, where the most recent data available are for 2018.

saw rapid growth in services exports of over 12% and 9% a year, respectively, though exceeded by still greater increases in sales of goods to foreign purchasers.

Even in these four fast-growing economies, total trade in services (encompassing both exports and imports) increased faster than GDP in the past decade. There remain significant differences of scale across APO economies. Balance-of-payments data show that the value of trade in services ranges from 5% of GDP in Bangladesh to 109% of GDP in Singapore (see Figure F-3).

FIGURE F-3

SERVICES TRADE IN PROPORTION TO GDP.



Source: World Bank World Development Indicators.
Note: 2019 data are shown for all economies except Lao PDR, Malaysia, Nepal, Sri Lanka, and Vietnam, where the most recent data available are for 2018.

Official Data Obscure the Important Role of Services

Official trade data report total flows of goods and services each time they cross a border between two countries. In these total or gross data, the sale of a bicycle, for example, assembled in the ROC is recorded as an export of the manufacturing industry. No value is attributed to services used as intermediate inputs to produce the bicycle (e.g., financial, legal and accounting, or transport services). Such inputs, while crucial to the production of manufactured goods (and directly traded services), are not included in the official balance-of-payments data.

Estimates of value-added trade, in contrast, attempt to capture the value generated at all stages of the production of goods and services ultimately exchanged in cross-border trades. Recent estimates constructed using input–output data suggest that the share of services in total value-added trade is large. Heuser and Mattoo [2] calculate that services accounted for more than 40% of value-added exports globally in 2009, with a significant contribution due to indirect value added (input–output analysis is unable, however, to isolate services produced in-house by goods-producing industries; e.g., lawyers working in mining companies). They also find that services 'embodied' in final manufactured exports have increased as a proportion of total production costs (or equivalently, total value) since 1995.

Other research finds that in recent years (2000–14), trade in services' value added increased at a faster rate than trade in manufacturing's value added [3]. Services represent a significant share of production costs in many goods-producing industries.

Barriers to Trade in Services Remain Significant

Several APO economies have taken steps to liberalize trade in goods and services since the 1980s, including in the leadup to their accession to the World Trade Organization as well as through preferential trade agreements and national reforms (see the country studies in Part B).

Despite this progress, services industries in many APO economies remain highly protected. Additionally, laws and regulations introduced for reasons other than limiting competition can have the effect of shutting foreign businesses out of local industries. This includes regulations designed to safeguard strategic assets and industries from foreign involvement. Laws protecting consumer interests, or regulations implemented to improve the way markets function, can also increase businesses' costs in circumstances where rules do not align with those in place in other jurisdictions [4].

Much work has been done in the past decade to produce quantitative estimates of restrictions on trade in services [5–7]. Indices of services' trade restrictiveness, such as those produced by the World Bank and the OECD, provide industry- and country-level measures of such barriers. These indices, which cover limits on cross-border trade as well as restrictions on the presence of foreign firms and individuals in host countries, enable comparisons of constraints on trade in services in different countries.

Recent estimates published by the World Trade Organization in collaboration with the World Bank reveal that India and Indonesia have the tightest restrictions on services trade among 14 APO economies for which data are reported (see Figure F-4). The index scores of India and Indonesia (65 and 64, respectively) are well above the APO average of 46, which is itself higher than the 68-country average of 42, for all economies in the database. It may be noted that the averages cited in this section are not weighted by the value of total trade in different economies.

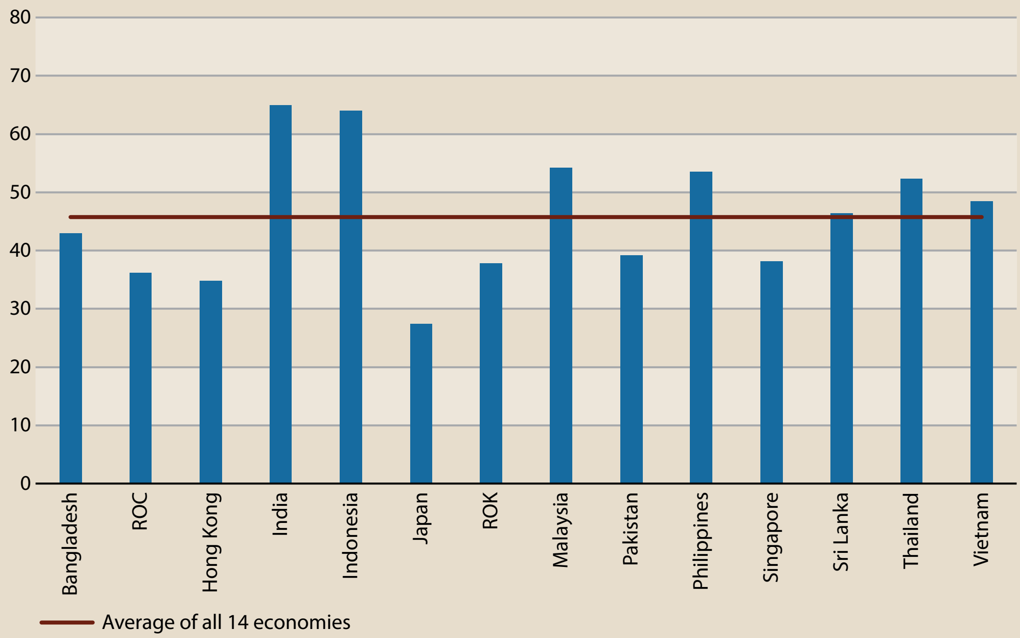
Six APO economies have scores below the 68-country average, indicating lighter-than-average restrictions on services trade. Japan has the lowest STRI of this group, which includes five high-income economies and one lower-middle-income economy, Pakistan. Barriers to services trade in Pakistan are lower than those in place in the upper-middle-income economies of Indonesia, Thailand, and Malaysia in professional services, distribution services, and transport services.

Hong Kong and Singapore, both high-income economies, are the biggest services producers in the APO and both have relatively low STRIs. In contrast, in the ROK and Pakistan, the services share of GDP is below the APO's average but services industries in both these countries are relatively open compared with other APO economies (see Table F-1).

Among the APO economies included in the database, Hong Kong has the least restrictive barriers to trade in telecommunications services (STRI of 18.2) and transport services (STRI of 19.6). Japan has the lowest STRIs for distribution services (16.8) and financial services (34.6). At the other end of the spectrum, India and Indonesia have strong barriers to trade in distribution services (STRIs of 62.8 and 71.1, respectively) and professional services (STRIs of 79.5 and 76.4,

FIGURE F-4

WORLD BANK SERVICES TRADE RESTRICTIONS INDEX 2016.



Source: 2016 World Bank Services Trade Restrictions Index [6].
Note: The Services Trade Restrictions Index (STRI) ranges from 0 to 100. A score of 0 indicates that none of the restrictions underlying the index is applied. A score of 100 means that the subsector is completely closed to trade.

respectively). The Philippines has the tightest restrictions on professional services (88.2), while barriers to trade in transport services are highest in Malaysia (68.8).

Average STRIs for APO economies in the database are lowest in distribution services (37.7), indicating that this is a relatively open sector. APO-average STRIs are highest in professional services (60.2) and financial services (51.2), indicating that these industries are more protected. This is in line with average results for all 68 countries in the database.

The average STRI for APO economies is about in line with the 68-country average in telecommunications and transport services. Professional and distribution services are more tightly restricted in APO economies than in the other economies in the database. In contrast, the average APO STRI is slightly below the 68-country average in financial services.

The Services Trade Policy Database, which houses the WTO-World Bank STRI data, also contains information at subindustry level on the restrictiveness of policies affecting supply of foreign-produced services through different means. These data provide insights into the ways different industries are regulated in different counties. For instance, financial services is among the most protected industries. Financial markets have an important effect on business performance in multiple sectors (see Appendix B). By determining access to credit, the financial sector influences how much businesses invest, the ease or difficulty of starting and growing new businesses, and thus the overall rate of productivity growth in an economy. The Services Trade Policy Database includes STRIs for the commercial banking subindustry by three modes of supply: cross-border (mode 1); via the presence on the national territory of foreign establishments (mode 3); and natural

TABLE F-1

WORLD BANK SERVICES TRADE RESTRICTIONS INDEX 2016.

	Professional services	Telecommunications services	Distribution services	Financial services	Transport services	Whole economy	Rank
Japan	42.9	33.3	16.8	34.6	30.8	27.4	1
Hong Kong	62.4	18.2	27.0	44.6	19.6	34.8	2
ROC	39.0	39.8	30.2	42.1	41.2	36.2	3
ROK	72.2	37.8	22.5	36.1	49.7	37.8	4
Singapore	45.0	35.0	35.0	42.3	35.3	38.1	5
Pakistan	43.6	38.9	28.9	59.2	38.7	39.2	6
Bangladesh	53.9	42.1	26.8	56.5	61.1	42.9	7
Sri Lanka	70.5	55.3	28.3	56.2	57.8	46.4	8
Vietnam	42.9	45.3	48.8	52.0	50.0	48.5	9
Thailand	72.3	35.1	41.4	58.5	63.0	52.3	10
Philippines	88.2	54.3	38.5	49.3	67.4	53.5	11
Malaysia	53.7	28.9	49.5	62.1	68.8	54.2	12
Indonesia	76.4	41.8	71.1	58.5	48.3	64.0	13
India	79.5	47.4	62.8	64.6	64.9	65.0	14
14-economy average	60.2	39.5	37.7	51.2	49.8	45.7	–
68-economy average	52.3	39.3	36.6	45.8	43.9	42.1	–

Source: 2016 World Bank Services Trade Restrictions Index [6].
Note: The Services Trade Restrictions Index (STRI) ranges from 0 to 100. A score of 0 indicates that none of the restrictions underlying the index is applied. A score of 100 means that the subsector is completely closed to trade.

persons from other countries (mode 4). A fourth category of supply, capturing consumption by a country's consumers while abroad (mode 2), is not covered by the STRI.

The data show that cross-border supply of commercial banking services (mode 1) is very tightly regulated in many APO countries, with an STRI of 100 (indicating that the subsector is completely closed to foreign services) in five economies, namely, Bangladesh, Hong Kong, Pakistan, Thailand, and Vietnam. The average STRI for cross-border trade in commercial banking is 71.2 for 14 APO economies in the database.

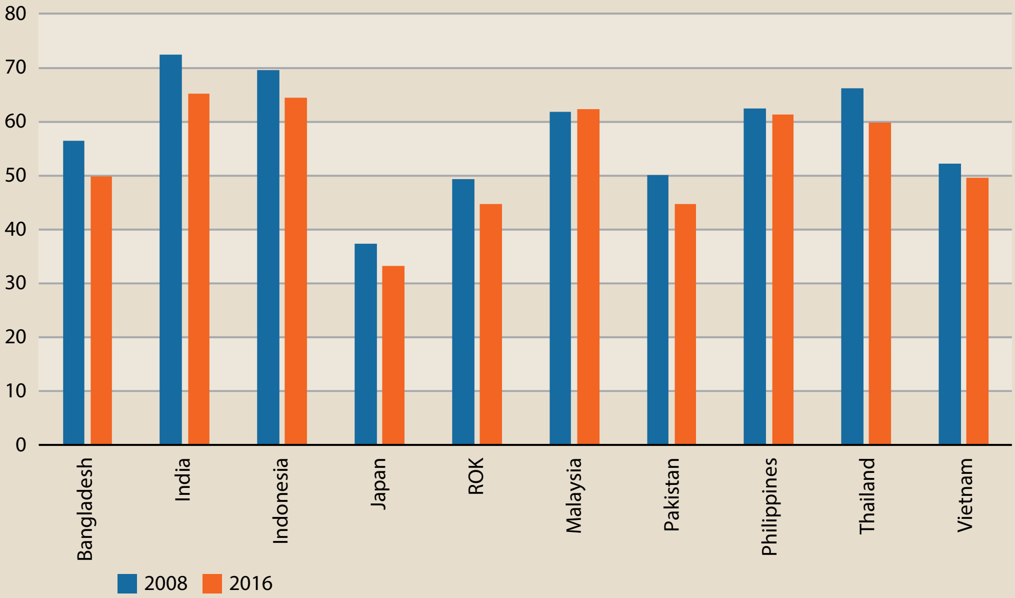
Many countries have less stringent restrictions on the supply of banking services via the local presence of a foreign establishment (mode 3). This is the case for Hong Kong (100 for cross-border versus 43.1 for commercial presence); Japan (76.0 versus 25.0); and the ROK (75.9 versus 36.1).

Four APO economies have very open regimes covering the supply of banking services via the presence of foreign individuals (mode 4). The ROK, Malaysia, Pakistan, and the ROC each have an STRI of 0 for this category, indicating that none of the restrictions underlying the index are applied to this type of service. On an average, this category is the most lightly regulated of all modes of supply of commercial banking services, with an average STRI of 30.0 for APO economies in the database.

It is also possible to track changes in services' trade restrictiveness over time. For 10 APO economies, data exist for 2008 as well as 2016. In all but one of these economies (Malaysia), services trade restrictiveness has declined over the intervening years.

FIGURE F-5

WORLD BANK SERVICES TRADE RESTRICTIONS INDEX: 2008 AND 2016.



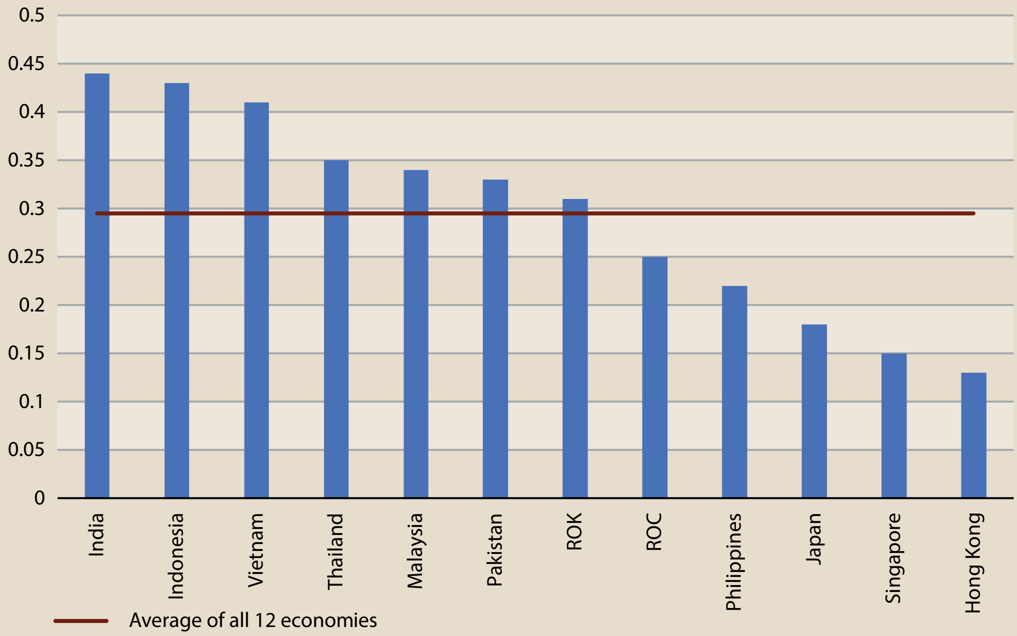
Source: 2016 World Bank Services Trade Restrictions Index [6].
Note: The 2016 STRI is adjusted to remove measures and subsectors that were not part of the 2008 STRI. As a consequence, STRI values shown in this graph differ from those in the 2016 STRI shown in Figure F-4.

A separate database, maintained by the European Centre for International Political Economy (ECIPE), tracks restrictions on digital trade, which can be important for innovation and research and development. The Digital Trade Restrictiveness Index (DTRI) covers restrictions on content access, use and movement of data, investment in the information and communications technology (ICT) sector, and the cross-border movement of ICT employees. It also tracks barriers to digital trade resulting from intellectual property rights, competition rules, tariffs on digital products, and other policies.

Twelve APO economies are included in ECIPE's database. Of these, India and Indonesia have the greatest measured restrictions on trade in digital goods and services, including restrictive policies on public procurement and standards in India's case and restrictions on foreign ownership in online retailing in Indonesia's. ECIPE notes, however, that India's data policies are relatively open, facilitating growth of ICT services exports [17]. Hong Kong, Singapore, and Japan have the smallest restrictions (see Figure F-6). The Philippines is the only lower-middle-income country with a DTRI below the average of 12 APO economies in the database.

FIGURE F-6

DIGITAL TRADE RESTRICTIVENESS INDEX.



Source: European Centre for International Political Economy.
Note: DTRI scores range from 0 to 1, 0 being completely open, 1 being virtually restricted.

Barriers Increase Costs and Reduce Trade and Productivity

Restrictions on services trade reduce the variety of services available to individuals and businesses while increasing input costs for local industries and limiting competition [8, 9]. Further, services trade barriers can impede knowledge transfers enabled by foreign direct investment (FDI) and cross-border trade.

High-performing services sectors are also crucial to participation in global value chains, which have been an important driver of export growth in some APO economies (see chapter Focus Issues, and Appendix E). Moving goods and coordinating production across borders requires good infrastructure but also a combination of effective transport, communication, financial, and logistics services [10]. APO economies need efficient services to capitalize natural advantages, either in producing goods or in facilitating cross-border production processes. Having access to low-cost, high-quality imported services benefits manufacturing firms participating directly in global value chains as well as their local suppliers, who may produce largely or solely for the domestic market. Trade barriers raise the costs of these imported services. Relaxing unnecessary services trade restrictions can make it easier for APO economies to participate in global value chains, thereby making their exporting and domestic-focused industries more competitive.

A growing number of empirical studies find that liberalizing services trade contributes to improved economic performance not only in services, but also in goods-producing industries [11]. Competition-enhancing liberalization of services trade is associated with greater export volumes and higher productivity in manufacturing firms [12, 13, 14, 15], including high-productivity firms in sectors that use ICT intensively [16]. FDI provides an important channel for such productivity gains, which also depend on effective institutions [12, 14, 15].

Reform of Restrictions Supports Productivity Growth

Some regulation of services industries is essential to avoid market failures and to protect national interests. However, excessive regulation impedes competition, trade, and productivity. This matters not only for a country's services sectors but also for its goods-producing industries, which rely on inputs of services in production. Achieving productivity-enhancing reform requires an evaluation of existing regulations. Opening services industries to trade puts pressure on low-productivity producers, ultimately contributing to higher aggregate productivity. In many sectors, however, supplying services requires firms to maintain a presence in the local market. Reducing services trade restrictions should, thus, have a smaller effect on employment than liberalizing trade in goods [4]. An evaluation of current services trade barriers should identify laws and regulations that obstruct competition, raise businesses' costs and restrict FDI and imports, including through restrictions on digital goods and services vital for innovation. By lowering barriers that both undermine the long-run productivity agenda and are unnecessary for achieving other valid policy ambitions, APO economies can remove important obstacles to growth.

Key Point Summary

- Services have grown to be more important to APO economies in the past 40 years, accounting for a rising share of GDP, exports, and total trade.

- Services are also an essential input to the production of manufactured goods, both locally and as part of cross-border production processes.

- While steps have been taken to liberalize trade in services, countries continue to impose significant restrictions in a number of industries.

- Barriers to services trade raise the costs and reduce the range of inputs available to local consumers and firms.

- Some restrictions are needed to achieve important policy objectives. Others are unnecessary, disproportionate to policy goals, or degrade the business environment due to misalignment with regulations in other countries.

- Removing unnecessary barriers to services trade should be part of a broader agenda aimed at reducing businesses' costs, enhancing competition, and lifting the productivity of services and goods-producing industries.

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APPENDIX G

DATA SOURCES AND DESCRIPTION

This appendix sets out sources and descriptions for indicators of productivity determinants used in the study. It comes in three sections:

- currently available indicators of immediate determinants;
- currently available indicators of underlying determinants; and
- supplementary indicators used in country studies.

CURRENTLY AVAILABLE INDICATORS OF IMMEDIATE DETERMINANTS.

Indicator	Source	Elements/Description
Capital intensity:		
Capital/GDP ratio	[1]	Ratio of capital stock (all assets including land) to GDP
Capital deepening	[1]	Contribution of capital deepening to labor productivity growth
IT capital deepening	[1]	Contribution of IT capital deepening to labor productivity growth
Human capital:		
WEF Current Workforce	[2]	**A. Education of current workforce** 1. Mean years of schooling **B. Skills of current workforce** 1. Extent of staff training 2. Quality of vocational training 3. Skillset of graduates 4. Digital skills among active population 5. Ease of finding skilled employees
WEF Entrepreneurial Culture	[2]	1. Attitudes toward entrepreneurial risk 2. Willingness to delegate authority 3. Growth of innovative companies 4. Companies embracing disruptive ideas
Knowledge:		
NRI Technology pillar	[3]	**A. Access** 1. Mobile tariffs 2. Handset prices 3. Internet access 4. 4G Mobile network coverage 5. Fixed-broadband subscriptions 6. International internet bandwidth 7. Internet access in schools **B. Content** 1. Digital participation and content creation 2. Mobile app development 3. Intellectual property receipts **C. Future technologies** 1. Availability of latest technologies 2. Company investment in emerging technology 3. Government procurement of advanced technology products 4. ICT PCT patent applications 5. Computer software spending 6. Robot density

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Indicator	Source	Elements/Description
NRI People pillar	[3]	**A. Individuals** 1. Internet users 2. Active mobile broadband subscriptions 3. Use of virtual social networks 4. Tertiary enrolment 5. Adult literacy rate 6. ICT skills **B. Businesses** 1. Firms with websites 2. Internet shopping 3. Professionals 4. Technicians and associate professionals 5. Extent of staff training 6. R&D expenditure by businesses **C. Governments** 1. Government online services 2. Publication and use of open data 3. ICT use and government efficiency 4. R&D expenditure by governments and higher education
Products and markets		
Agriculture share	[1]	Derived
Manufacturing share	[1]	Derived
Medium- and high-tech share of manufacturing	[4]	Extracted
Exports/GDP	[1]	Derived
Imports/GDP	[1]	Derived

CURRENTLY AVAIALABLE INDICATORS OF UNDERLYING DETERMINANTS.

Indicator	Source	Elements/Description
Education system		
WEF Future Workforce	[2]	**A. Education of future workforce** 1. School life expectancy **B. Skills of future workforce** 1. Critical thinking in teaching 2. Pupil-to-teacher ratio in primary education
Innovation system		
WEF Innovation Capability	[2]	**A. Diversity and collaboration** 1. Diversity of workforce 2. State of cluster development 3. International co-inventions 4. Multi-stakeholder collaboration **B. Research & development** 1. Scientific publications 2. Patent applications 3. R&D expenditures 4. Research institutions prominence index **C. Commercialization** 1. Buyer sophistication 2. Trademark applications

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Indicator	Source	Elements/Description
KOF Informational Globalisation, de facto	[6]	1. Used internet bandwidth 2. International patents 3. High technology exports
Infrastructure		
WEF Infrastructure	[2]	A. Transport infrastructure 1. Road connectivity and quality 2. Railroad density and efficiency 3. Air connectivity and efficiency 4. Sea connectivity and efficiency B. Utility infrastructure 1. Electricity access and quality 2. Water quality and reliability
Business environment		
THF Business Freedom	[7]	Derived from numbers, cost and time to 1. Start a business 2. Obtain a license 3. Close a business and 4. Get electricity. Component data sourced from World Bank, Doing Business
WEF Administrative Requirements	[2]	1. Cost of starting a business 2. Time to start a business 3. Insolvency recovery rate 4. Insolvency regulatory framework. Component data sourced from World Bank, Doing Business.
WEF Domestic Competition	[2]	1. Distortive effect of taxes and subsidies on competition 2. Extent of market dominance 3. Competition in services
Business environment (continued)		
THF Tax Burden	[7]	1. Top marginal tax rate on personal income 2. Top marginal tax rate on corporate income 3. Total tax collections in proportion to GDP
WB WGI Regulatory Quality	[8]	Through many indicators, regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
WEF Labour Market	[2]	**A. Flexibility** 1. Redundancy costs 2. Hiring and firing practices 3. Cooperation in Labor-employer relations 4. Flexibility of wage determination 5. Active labor market policies 6. Workers' rights 7. Ease of hiring foreign labor 8. Internal labor mobility **B. Meritocracy and incentivization** 1. Reliance on professional management 2. Pay and productivity 3. Ratio of wage and salaried female to male workers 4. Labor tax rate

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Indicator	Source	Elements/Description
THF Labour Freedom	[7]	1. Minimum wage 2. Hindrance to hiring additional workers 3. Rigidity of hours 4. Difficulty of firing redundant employees 5. Legally mandated notice period 6. Mandatory severance pay 7. Labor force participation
NRI Governance	[3]	**A. Trust** 1. Rule of law 2. Software piracy rate 3. Secure internet servers 4. Cybersecurity 5. Online trust and safety **B. Regulation** 1. Regulatory quality 2. Ease of doing business 3. Legal framework's adaptability to digital business models 4. E-commerce legislation 5. Social safety net protection 6. ICT regulatory environment **C. Inclusion** 1. E-participation 2. Socioeconomic gap in use of digital payments 3. Availability of local online content 4. Gender gap in internet use 5. Rural gap in use of digital payments
Financial system		
WEF Financial System	[2]	**A. Depth** 1. Domestic credit to private sector 2. Financing of SMEs 3. Venture capital availability 4. Market capitalization 5. Insurance premium **B. Stability** 1. Soundness of banks 2. Non-performing loans 3. Credit gap 4. Banks' regulatory capital ratio
IMF Financial Markets	[9]	Depth, access and efficiency of financial markets
THF Financial Freedom	[7]	1. Extent of government regulation of financial services 2. Intervention through ownership 3. Government influence on allocation of credit 4. Extent of financial and capital market development 5. Openness to foreign competition
Health system		
UNDP Life Expectancy at Birth	[10]	

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Indicator	Source	Elements/Description
Foreign investment		
KOF Financial Globalisation	[6]	**A. Financial Globalization, de facto** 1. Foreign direct investment 2. Portfolio investment 3. International debt 4. International reserves 5. International income payments **B. Financial Globalization, de jure** 1. Investment restrictions 2. Capital account openness 3. International investment agreements
KOF Financial Globalisation, de jure	[6]	see above 'KOF Financial Globalisation'
FDI stock/GDP	[11]	Inward foreign direct investment in proportion to GDP
THF Investment Freedom	[7]	Restrictions on foreign investment, land ownership, sectoral investment. Expropriation of investments without fair compensation. Foreign exchange controls.
Trade		
WEF Trade Openness	[2]	1. Prevalence of non-tariff barriers 2. Trade tariffs 3. Complexity of tariffs 4. Border clearance efficiency
THF Trade Freedom	[7]	1. Trade-weighted average tariff 3. Non-tariff barriers
KOF Trade Globalisation	[6]	**A. Trade Globalization, de facto** 1. Trade in goods 2. Trade in services 3. Trade partner diversity **B. Trade Globalization, de jure** 1. Trade regulations 2. Trade taxes 3. Tariffs 4. Trade agreements
KOF Trade Globalisation, de jure	[6]	see above 'KOF Trade Globalisation'
Demand		
WEF Macroeconomic Stability	[2]	1. Inflation 2. Debt dynamics
THF Monetary Freedom	[7]	1. Inflation over three years 2. Extent of government manipulation of prices through direct controls or subsidies
Savings		
Gross savings	[5]	Gross savings as a percentage of GDP

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Indicator	Source	Elements/Description
Institutions		
WEF Institutions	[2]	**A. Security** 1. Organized crime 2. Homicide rate 3. Terrorism incidence 4. Reliability of police services **B. Social capital** **C. Checks and balances** 1. Budget transparency 2. Judicial independence 3. Efficiency of legal framework in challenging regulations 4. Freedom of the press **D. Public-sector performance** 1. Burden of government regulation 2. Efficiency of legal framework in settling disputes 3. E-participation **E. Transparency** 1. Incidence of corruption **F. Property rights** 1. Property rights 2. IP protection 3. Quality of land administration **G. Corporate governance** 1. Strength of auditing and accounting standards 2. Conflict of interest regulation 3. Shareholder governance **H. Future orientation of government** 1. Government adaptability (ensuring policy stability, responsiveness to change, legal framework's adaptability to digital business models, long-term vision) 2. Commitment to sustainability (energy efficiency regulation, renewable energy regulation, environment-related treaties in force)
IMF Financial Institutions	[9]	Depth, access and efficiency of financial institutions
WB WGI Political Stability	[8]	Through many indicators, Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.
WB WGI Rule of Law	[8]	Through many indicators, Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
WB WGI Control of Corruption	[8]	Through many indicators, Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

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Indicator	Source	Elements/Description
WB WGI Government Effectiveness	[8]	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Social capital		
WEF Social Capital	[2]	Performance in three areas: social cohesion and engagement (bridging social capital), community and family networks (bonding social capital), and political participation and institutional trust (linking social capital)
WB WGI Voice & Accountability	[8]	Through many indicators, Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

SUPPLEMENTARY INDICATORS USED IN THE COUNTRY STUDIES.

Indicator	Source	Elements/Description
Immediate indicator		
Availability of latest technology	[12]	Original source: World Economic Forum, Global Competitiveness Report
Education system:		
Quality of education system	[12]	Original source: World Economic Forum, Global Competitiveness Report
Quality of primary education	[12]	Original source: World Economic Forum, Global Competitiveness Report
Government expenditure on education/GDP	[5]	Original data from UNESCO source
Health		
Infant mortality	[5]	Mortality rate, under 5 years old, per 1000 live births
Trade:		
Services Trade Restrictions Index	[13]	A measure of the restrictiveness of an economy's regulatory and policy framework with respect to trade in services. A value of 0 signifies complete freedom and 100 signifies complete restriction.

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APPENDIX H

COMPLETE LISTING OF DIAGNOSTIC INDICATOR VALUES

This appendix lists the indicators used in the country studies and the Focus Issues chapter. These are

- contextual indicators;
- productivity quick view indicators;
- indicators for immediate determinants; and
- indicators for underlying determinants.

CONTEXTUAL INDICATORS.

	Population million 2017	Population growth rate 2000–17 (%pa)	Rural population proportion (%) 2010	Rural population proportion (%) 2017	GDP USD billion at PPP in 2017	GDP growth rate 2000-17 (%pa)	GDP per capita USD '000 at PPP in 2017
Bangladesh	161.8	1.34	69.5	64.1	638.4	6.4	3.9
Cambodia	15.6	1.62	80.6	77.0	66.3	6.9	4.2
ROC	23.6	0.16	29.6	29.6	1192.6	2.5	50.6
Fiji	0.9	0.74	47.8	44.3	8.7	3.1	9.6
Hong Kong	7.4	0.73	0.0	0.0	456.1	2.9	61.7
India	1339.2	1.20	69.1	66.4	9511.0	6.5	7.1
Indonesia	258.7	1.21	50.1	45.3	3252.5	5.3	12.6
IR Iran	80.8	1.19	31.1	25.4	1772.3	2.2	21.9
Japan	126.7	-0.15	5.4	8.5	5427.1	1.1	42.8
ROK	51.4	0.54	18.1	18.5	2034.9	3.0	39.6
Lao PDR	7.0	1.53	69.9	65.6	49.3	7.4	7.1
Malaysia	32.0	1.63	29.1	24.6	933.3	5.1	29.1
Mongolia	3.1	1.80	37.0	31.7	40.1	7.9	12.8
Nepal	28.4	1.08	83.0	80.7	91.7	4.7	3.2
Pakistan	200.3	2.05	63.4	63.6	1091.3	4.4	5.4
Philippines	104.2	1.72	54.7	53.3	877.2	6.0	8.4
Singapore	5.6	1.43	0.0	0.0	536.0	4.1	95.5
Sri Lanka	21.4	0.52	79.0	78.8	273.4	5.3	12.7
Thailand	67.7	0.38	56.1	50.8	1247.7	3.2	18.4
Vietnam	93.7	1.06	69.5	65.0	658.6	6.0	7.0

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	GDP per capita growth rate 2010-17 (%pa)	Employ-ment rate (%) in 2010	Employ-ment rate (%) in 2017	Age dependen-cy ratio (%) in 2010	Age depen-dency ratio (%) in 2017	Old-age dependen-cy ratio (%) in 2010	Old-age dependen-cy ratio (%) in 2017
Bangladesh	5.0	38.0	38.6	58.2	50.3	7.4	7.7
Cambodia	5.3	58.1	60.2	58.4	55.2	6.6	7.6
ROC	2.3	46.2	49.4	35.8	37.0	14.6	19.0
Fiji	2.4	36.5	37.6	51.1	53.1	7.3	9.5
Hong Kong	2.2	49.3	51.3	33.5	38.6	17.5	22.8
India	5.3	38.7	37.5	56.3	51.0	8.0	9.0
Indonesia	4.0	45.5	47.5	51.1	48.5	7.3	7.9
IR Iran	1.0	27.7	28.9	40.6	42.8	7.0	9.0
Japan	1.2	49.0	51.5	56.8	66.8	36.1	46.3
ROK	2.4	49.8	53.2	36.9	36.8	14.8	18.8
Lao PDR	5.8	49.7	50.6	70.4	63.8	6.4	6.8
Malaysia	3.5	42.7	46.5	47.8	44.3	7.4	9.1
Mongolia	6.1	37.5	39.6	45.9	50.3	5.8	6.0
Nepal	3.6	37.9	41.0	68.6	55.9	8.5	9.5
Pakistan	2.3	30.4	30.7	68.4	64.7	7.4	7.4
Philippines	4.3	39.0	38.7	59.6	56.1	7.7	8.8
Singapore	2.6	60.0	63.3	35.8	38.7	12.2	17.9
Sri Lanka	4.8	38.9	38.3	48.3	49.4	9.3	11.7
Thailand	2.8	58.6	55.2	39.1	40.2	12.4	15.9
Vietnam	4.9	56.9	57.8	43.3	43.3	9.4	10.2

PRODUCTIVITY QUICK VIEW INDICATORS.

	LP level USD at PPP in 2010	LP level USD at PPP in 2017	LP growth rate 2000-10 (%pa)	LP growth rate 2010-17 (%pa)	TFP growth rate 2000-10 (%pa)	TFP growth rate 2010-17 (%pa)
Bangladesh	2.6	3.8	3.3	5.8	0.0	0.6
Cambodia	2.0	2.7	3.6	5.7	0.9	1.3
ROC	43.9	47.7	3.7	5.6	1.6	1.1
Fiji	10.6	11.5	0.5	5.4	0.1	1.2
Hong Kong	44.9	54.0	3.3	5.3	2.0	1.5
India	5.6	8.3	5.8	5.3	2.4	1.3
Indonesia	9.9	12.9	2.8	4.7	0.3	–1.5
IR Iran	30.8	32.2	4.8	4.3	1.8	–0.1
Japan	42.7	45.0	1.3	4.1	0.3	0.7

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	LP level USD at PPP in 2010	LP level USD at PPP in 2017	LP growth rate 2000-10 (%pa)	LP growth rate 2010-17 (%pa)	TFP growth rate 2000-10 (%pa)	TFP growth rate 2010-17 (%pa)
ROK	27.1	31.8	4.4	3.8	1.0	0.5
Lao PDR	4.0	5.8	4.4	3.3	2.5	1.9
Malaysia	23.0	27.3	2.7	2.6	1.1	0.5
Mongolia	10.3	15.0	3.9	2.5	2.4	2.0
Nepal	3.3	3.9	2.5	2.3	−0.2	0.6
Pakistan	7.0	8.8	1.2	2.3	0.9	2.4
Philippines	7.2	9.5	2.1	2.1	1.1	1.5
Singapore	53.8	63.2	2.2	1.2	1.2	0.3
Sri Lanka	11.7	16.3	4.4	1.2	1.6	0.2
Thailand	10.0	14.5	3.8	0.7	1.2	0.6
Vietnam	3.5	5.2	5.1	0.6	−0.3	1.8

INDICATORS FOR IMMEDIATE DETERMINANTS

	Capital to GDP ratio 2010	Capital to GDP ratio 2017	Capital deepening (pp) 2017	Capital deepening average (pp) 2010-17	IT capital deepen-ing (pp) 2017	IT capital deepening average (pp) 201 0-17	Labor quality contrib. (pp) 2017
Bangladesh	2.4	2.7	4.6	4.1	0.24	0.27	1.8
Cambodia	2.1	2.7	1.9	2.1	0.09	0.10	−0.1
ROC	6.8	8.6	1.3	−0.5	0.05	0.01	0.5
Fiji	3.7	3.1	1.5	−0.4	0.29	0.11	0.4
Hong Kong	6.3	8.1	0.5	0.5	−0.08	0.12	0.7
India	2.7	2.6	3.4	3.6	0.15	0.19	0.3
Indonesia	3.4	3.6	2.9	3.5	0.12	0.16	0.4
IR Iran	2.7	2.6	−1.8	0.5	−0.02	0.05	0.0
Japan	5.8	5.4	−0.6	−0.1	−0.05	0.03	0.2
ROK	6.9	7.0	2.0	1.2	0.10	0.06	0.4
Lao PDR	2.2	2.6	3.3	3.2	0.14	0.46	0.0
Malaysia	2.7	3.5	1.4	1.7	−0.12	0.12	0.4
Mongolia	2.6	2.5	−4.5	2.1	−0.10	0.12	−0.4
Nepal	2.9	3.5	2.2	1.5	0.14	0.12	0.0
Pakistan	2.0	1.8	1.0	0.1	0.09	0.05	1.1
Philippines	2.8	2.9	5.1	2.0	0.44	0.19	0.7
Singapore	7.6	8.3	3.3	1.5	0.71	0.33	1.0
Sri Lanka	2.3	2.5	1.7	4.1	0.00	0.03	0.5
Thailand	4.0	4.4	5.1	3.1	0.45	0.62	2.8
Vietnam	2.7	2.6	3.8	3.2	0.39	0.29	0.7

	Labor quality contrib. average (pp) 2010-17	WEF Current work-force	WEF Entrepre-neurial culture	Availability of latest technolo-gies	NRI Technol-ogy pillar	NRI People pillar	Agriculture share GDP (%)
Bangladesh	1.0	40.7	41.3	4.1	27.7	25.1	14.2
Cambodia	0.8	37.2	49.6	4.3	36.2	21.3	24.9
ROC	0.5	71.6	60.2	NA	NA	NA	1.8
Fiji	0.3	NA	NA	NA	NA	NA	14.9
Hong Kong	0.6	74.3	68.3	5.6	69.1	57.1	0.1
India	0.7	46.5	55.5	4.7	42.8	35.9	16.3
Indonesia	1.8	56.3	60.8	4.8	41.6	34.8	13.5
IR Iran	0.2	54.3	39.1	4.1	35.7	39.3	8.3
Japan	0.2	73.5	56.9	6.3	72.9	74.2	1.2
ROK	0.5	71.8	52.1	5.8	67.9	76.4	2.2
Lao PDR	0.3	44.2	49.4	3.9	28.2	25.2	23.7
Malaysia	0.3	68.6	70.4	5.5	59.5	55.6	9.0
Mongolia	1.2	52.4	44.7	4.3	31.9	35.8	11.4
Nepal	0.0	37.6	44.7	3.8	26.1	24.4	27.6
Pakistan	0.8	43.1	51.5	4.7	32.5	21.1	24.4
Philippines	0.7	64.9	64.1	4.6	38.9	42.2	9.7
Singapore	0.5	76.1	64.2	6.1	78.5	73.6	0
Sri Lanka	0.4	59.7	50.8	4.3	40.5	28.4	8.5
Thailand	1.6	51.4	57	4.9	49.6	41.2	8.3
Vietnam	0.7	48.3	50.4	4.0	44.8	37.7	17

	Manufactur-ing share of GDP (%)	Agriculture share employment (%)	Manufactur-ing share of employment (%)	Medium & hi-tech share of manufac-turing (%)	Exports share of GDP (%)	Imports share of GDP (%)
Bangladesh	18.3	40.3	16.0	9	15.0	20.3
Cambodia	17.3	40.2	9.5	0	59.9	63.2
ROC	32.0	4.9	26.8	68	64.9	52.1
Fiji	13.5	8.3	15.5	8	50.3	55.5
Hong Kong	1.1	0.2	2.9	38	188.8	187.7
India	13.9	45.7	12.9	39	19.0	22.2
Indonesia	20.7	29.8	14.6	39	20.4	19.1
IR Iran	17.8	17.6	16.9	46	23.3	14.9
Japan	20.8	3.8	15.2	56	17.8	16.8
ROK	30.4	4.8	17.1	61	43.1	37.7
Lao PDR	8.1	70.5	3.5	4	33.6	40.6

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	Manufacturing share of GDP (%)	Agriculture share employment (%)	Manufacturing share of employment (%)	Medium & hi-tech share of manufacturing (%)	Exports share of GDP (%)	Imports share of GDP (%)
Malaysia	22.7	10.7	16.9	43	71.4	64.4
Mongolia	10.0	28.9	7.5	2	59.9	57.5
Nepal	5.4	68.6	6.9	8	8.6	44.5
Pakistan	12.8	39.9	15.9	25	8.2	17.6
Philippines	19.5	25.9	8.1	46	31.0	40.9
Singapore	19.6	0.5	13.3	85	170.1	145.6
Sri Lanka	17.6	26.1	19.3	12	21.9	29.2
Thailand	27.2	31.8	16.3	44	67.8	54.0
Vietnam	17.0	40.2	17.3	25	100.3	97.5

INDICATORS FOR UNDERLYING DETERMINANTS.

	Quality of education system	Quality of primary education	WEF Future work-force	Education expenditure share of GDP (%)	WEF Innovation Capability	KOF Informational Globalisation, de facto	WEF Infrastructure
Bangladesh	3.4	3.1	51.5	2.0	30.7	63.9	51.1
Cambodia	NA	3.0	48.1	2.2	30.9	70.3	54.9
ROC	4.5	5.4	80.8	NA	80.2	NA	86.7
Fiji	NA	NA	NA	3.9	NA	78.0	NA
Hong Kong	4.7	5.2	80.8	3.3	63.4	97.9	94
India	4.6	4.5	54.5	3.8	50.9	77.1	68.1
Indonesia	4.4	4.5	71.7	3.6	37.7	78.9	67.7
IR Iran	3.3	4.0	61.5	4.0	38.0	74.0	64.8
Japan	4.4	5.4	73	3.2	78.3	96.2	93.2
ROK	3.5	4.6	76.2	4.6	79.1	97.2	92.1
Lao PDR	4.0	3.5	58.4	2.9	28	71.1	59.2
Malaysia	5.2	5.1	76.5	4.5	55	93.3	78
Mongolia	NA	3.8	60.7	4.1	32.3	81.4	56.6
Nepal	3.7	3.8	61	5.2	29.4	62.3	51.8
Pakistan	3.8	3.3	38.4	2.9	35.8	66.4	55.6
Philippines	4.2	4.1	62.5	2.7	38.0	83.1	57.8
Singapore	5.8	6.2	81.4	2.9	75.2	99.7	95.4
Sri Lanka	3.8	4.5	67.8	2.1	34.9	74.0	69.2
Thailand	3.7	3.5	73.2	4.1	43.9	89.8	67.8
Vietnam	3.6	3.4	65.6	4.2	36.8	87.6	65.9

	THF Business Freedom	WEF Administrative Requirements	WEF Domestic Competition	THF Tax Burden	WB WGI Regulatory Quality	WEF Labor Market	THF Labor Freedom
Bangladesh	52.3	56.7	45.1	72.7	−0.83	51.2	68.4
Cambodia	31.2	43.5	46.2	89.4	−0.50	60.3	62.5
ROC	93.9	85.9	67.9	75	1.38	72.7	60.3
Fiji	62.6	NA	NA	80.5	−0.22	NA	76.2
Hong Kong	96.2	82.5	74.8	93	2.23	75.8	89.1
India	65.6	64.6	56.9	79.4	−0.23	53.9	41.2
Indonesia	70.0	78.4	57	83.4	−0.14	57.7	49.2
IR Iran	57.3	49.6	43.4	81	−1.38	41.3	50.7
Japan	81.4	93.1	72	68.3	1.34	71.5	78.7
ROK	90.5	88.8	53.5	63.9	1.10	62.9	56.2
Lao PDR	54.3	24.2	48.3	87	−0.78	57	58.6
Malaysia	87.8	78.9	68.8	85.7	0.70	70.2	74.5
Mongolia	63.6	61.9	38.3	87.4	0.03	64	75.7
Nepal	61.6	66.8	43.7	83.4	−0.74	49.1	53.7
Pakistan	54.9	75.1	49.5	80.4	−0.64	51.3	41.3
Philippines	59.5	67.4	52.1	76.7	0.06	64.9	57.4
Singapore	92.8	86.9	73.8	90.3	2.13	81.2	90.9
Sri Lanka	76.5	69.2	48.1	84.8	−0.17	51.8	58.6
Thailand	83.0	86.9	53.6	80.7	0.10	63.4	63.7
Vietnam	65.6	62.6	53.7	79.5	−0.35	58.2	62.5

	NRI Governance	WEF Financial System	IMF Financial Markets	THF Financial Freedom	Life expectancy at birth (years)	Infant mortality	KOF Financial Globalization
Bangladesh	47.8	52.1	0.15	30	72.3	30.2	30.5
Cambodia	32.9	56.4	0	50	69.6	28	70.5
ROC	NA	88.4	NA	60	NA	NA	NA
Fiji	NA	NA	0	50	67.3	25.6	42.9
Hong Kong	79.6	91.4	0.77	90	84.7	NA	90.2
India	63.7	69.5	0.48	40	69.4	36.6	40.0
Indonesia	60.6	64	0.29	60	71.5	25	52.8
IR Iran	55.8	47.5	0.26	10	76.5	14.4	33.8
Japan	80.1	85.9	0.82	60	84.5	2.5	77.3
ROK	77.1	84.4	0.77	70	82.8	3.2	61.4

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	NRI Gover-nance	WEF Financial System	IMF Financial Markets	THF Financial Freedom	Life expec-tancy at birth (years)	Infant mortality	KOF Financial Globaliza-tion
Lao PDR	26.3	55.2	0.11	20	67.6	47.3	48.3
Malaysia	75.9	85.3	0.61	50	76	7.8	71.0
Mongolia	53.8	50.5	0.15	60	69.7	16.3	71.3
Nepal	48.2	66.4	0	30	70.5	32.2	25.5
Pakistan	43.4	55	0.16	40	67.1	69.3	33.8
Philippines	51.8	68.3	0.34	60	71.1	28.4	56.5
Singapore	88.2	91.3	0.72	80	83.5	2.8	91.6
Sri Lanka	54.7	56.9	0.16	40	76.8	7.4	40.4
Thailand	61.6	85.1	0.71	60	76.9	9.1	57.8
Vietnam	56.6	63.9	0.38	50	75.3	20.7	58.2

	KOF Fin. globaliza-tion, de jure	FDI Stock/ GDP	THF Investment Freedom	WEF Trade Openness	THF Trade Freedom	Services Trade Restrictive-ness Index	KOF Trade Globaliza-tion
Bangladesh	37.4	5.4	45	49	63.6	42.9	29.0
Cambodia	65.3	127.0	50	50.8	65.4	NA	65.4
ROC	NA	16.4	60	64.8	86	36.2	NA
Fiji	21.0	93.9	55	NA	52.8	NA	64.2
Hong Kong	82.3	506.5	80	88.4	95	34.8	86.3
India	42.5	14.0	40	43.9	73.4	65	43.5
Indonesia	54.7	20.5	50	59.5	80.8	64	43.5
IR Iran	46.2	9.7	5	39.8	54.6	NA	22.6
Japan	78.6	4.4	70	68.8	80	27.4	56.0
ROK	67.4	14.3	70	58.6	80	37.8	67.1
Lao PDR	35.8	52.7	35	60	82	NA	50.2
Malaysia	63.8	46.1	60	60.7	82	54.2	82.5
Mongolia	58.2	166.0	50	61.8	74	NA	59.9
Nepal	23.5	0.6	10	42.3	60.4	NA	38.6
Pakistan	35.4	13.5	55	41.5	64.8	39.2	34.2
Philippines	58.1	24.1	60	63.5	81.6	53.5	58.5
Singapore	85.9	469.3	85	88.7	94.8	38.1	96.4
Sri Lanka	37.2	15.3	40	38.4	67.6	46.4	44.5
Thailand	47.2	46.9	55	53.3	83	52.3	76.3
Vietnam	53.3	61.0	40	54.3	79.6	48.5	62.6

	KOF Trade Globalization, de jure	WEF Macroeconomic Stability	THF Monetary Freedom	Gross savings/ GDP	WEF Institutions	IMF Financial Institutions	WB Political Stability
Bangladesh	31.5	72.8	70	35.7	45.9	0.31	−0.99
Cambodia	46.5	74.9	74.8	23.6	41.9	0.31	0.11
ROC	NA	100	82.7	NA	68.6	NA	0.85
Fiji	51.4	NA	72.5	NA	NA	0.43	0.88
Hong Kong	88.5	100	80.7	25.1	77.6	0.76	0.79
India	50.1	90	73	29.4	56.8	0.38	−0.98
Indonesia	58.6	90	78.4	31	58.1	0.43	−0.54
IR Iran	24.0	52.2	49	37.7	42.5	0.61	−1.34
Japan	82.3	94.9	84.4	27.8	71.7	0.93	1.06
ROK	71.6	100	82.1	37.4	65.8	0.82	0.60
Lao PDR	59.9	69.7	76.8	17.6	42.8	0.25	0.42
Malaysia	78.7	100	81.6	25.7	68.6	0.67	0.26
Mongolia	51.4	66.7	74.2	22.9	49.8	0.64	0.84
Nepal	43.6	73.9	71.2	48.2	47.9	0.41	−0.60
Pakistan	44.1	68.7	72.5	21.1	47.7	0.31	−2.26
Philippines	52.9	90	66.9	31.5	50	0.38	−1.08
Singapore	93.6	99.7	85.6	42.8	80.4	0.76	1.49
Sri Lanka	44.5	68	71.1	27.3	51.6	0.38	−0.14
Thailand	67.9	90	74	31.5	54.8	0.74	−0.79
Vietnam	53.6	75	68.2	22.6	49.8	0.42	0.11

	WB Rule of Law	WB Control of Corruption	WB Government Effectiveness	WEF Social Capital	WB Voice & Accountability
Bangladesh	−0.64	−0.91	−0.75	47.2	−0.73
Cambodia	−1.11	−1.33	−0.57	43.9	−1.22
ROC	1.11	1.03	1.36	57.4	0.98
Fiji	−0.13	0.38	0.26	NA	0.22
Hong Kong	1.77	1.68	1.9	53.5	0.47
India	0.03	−0.19	0.28	46.8	0.38
Indonesia	−0.32	−0.25	0.18	63.2	0.18
IR Iran	−0.69	−0.96	−0.43	52.8	−1.32
Japan	1.53	1.42	1.68	46.9	1.02
ROK	1.24	0.6	1.18	49.2	0.8
Lao PDR	−0.84	−0.98	−0.67	40.4	−1.74
Malaysia	0.62	0.31	1.08	56.7	−0.08
Mongolia	−0.27	−0.43	−0.23	55.9	0.26

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	WB Rule of Law	WB Control of Corruption	WB Government Effectiveness	WEF Social Capital	WB Voice & Accountability
Nepal	−0.48	−0.67	−0.9	47.9	−0.13
Pakistan	−0.67	−0.79	−0.63	46.1	−0.8
Philippines	−0.48	−0.54	0.05	56.1	0.04
Singapore	1.84	2.17	2.23	61.8	−0.06
Sri Lanka	0.03	−0.34	−0.24	56	0.01
Thailand	0.02	−0.4	0.35	53.2	−1.01
Vietnam	0	−0.49	0	48	−1.44

APPENDIX I

COINTEGRATION ANALYSIS OF THE LONG-RUN DETERMINANTS OF PRODUCTIVITY

This appendix builds on the modelling of productivity determinants in the chapter titled Productivity Readiness. The statistical analysis there was limited to the years 2007–17, which enabled consideration of a wide range of indicators and countries, as significantly more information is available for these recent years. In particular, it allowed most APO countries to be included in the analysis. This tradeoff is now shifted by analyzing a longer time period for a smaller number of indicators and countries. This allows examination of the way that values of underlying indicators move and influence TFP over time. The long panel nature of the dataset motivates the use of panel cointegration techniques, which are particularly well-suited to uncovering long-term relationships between several data series that exhibit potentially quite unpredictable but related behaviors. The approach is similar to that of Egert [1].

This appendix summarizes the investigation of the long-run determinants of productivity using cointegration techniques.

Procedures

Variables were selected based on a combination of precedent in literature, results from the modelling in the Productivity Readiness chapter, and tests of statistical significance and validity. Broadly, variables used focused on the areas of taxation, government spending, regulation, trade, foreign investment, innovation, and technology. The variables are outlined in Table I-1, where coverage for the four overarching productivity themes introduced in the Productivity Determinants chapter are shown.

TFP levels are modelled as relative to the USA. Control for measures of human capital and real GDP are introduced. After selecting an appropriate set of variables, the sample is restricted to ensure there are at least 18 years of data starting in 1996. This is a relatively short panel, but other research suggests that this is sufficiently long to employ panel cointegration techniques [2]. Other specifications with fewer variables but longer time periods are adopted to examine the tradeoff between the time range and variables available. The results from this model are intended to be interpreted as a broad assessment of the long-term drivers of productivity across countries, which may be applied to APO countries. However, the analysis is not tailored to APO sample.

The approach begins with estimation of cross-sectional regression models. This means averaging all data points over time and creating a simple model to explore the relationship between variables from this averaged data, as in Equation (1). Pesaran and Smith [3] show that this simple method provides consistent estimates of long-run effects, and so it provides a rough guide to what to expect from the cointegration modelling. For these models, a sample that is less restricted by concerns about time coverage can be considered, because dynamics are not factored in.

TABLE I-1

VARIABLES USED IN THE COINTEGRATION MODELLING.

Indicator	Units	Contributes to			
		Motivation	Capabilities	Efficiency of markets	Stability
Tax, government spending and regulation					
Tax/GDP ratio	% of GDP	X		X	
Social security spending	% of GDP	X		X	X
Government spending on education	% of GDP		X		
WB WGI Regulatory quality	−2.5 to 2.5	X		X	X
Trade and foreign investment					
KOF Globalisation Index	0 to 100	X		X	X
Innovation and technology					
Total spending on R&D	% of GDP	X	X		
Mobile phone usage	Subscriptions per 100 people		X		
Electricity production	kWh per capita		X		
Controls					
Real GDP	Chained PPPs, mil. 2011 USD	X	X		
Human capital index	NA	X	X		
Additional variables to extend baseline model					
Population over 64	% of popula-tion	X	X		
Patent applications	Count	X	X	X	
Gross savings/GDP	% of GDP		X		

Therefore, a sample of 66 countries is considered in the baseline cross-section regression model, including seven APO countries, namely Singapore, Mongolia, Thailand, Hong Kong, the Republic of Korea, Indonesia, and Japan.

$$\widetilde{TFP_i} = \beta_0 + \sum_{i=1}^{n} \beta_i \widetilde{x_i} + \varepsilon_i, \tag{1}$$

where $\widetilde{TFP_i}$ and $\widetilde{x_i}$ are simple averages over all time periods of TFP and the indicators x_i for country i, respectively.

To perform cointegration modelling, individual models for each country are set up to estimate whether there are meaningful co-movements between variables that are predictive of TFP. As part of this, restrictions are made on the countries that can enter these models on the basis of time periods available (at least 18). These are Fully Modified Ordinary Least Squares (FMOLS) models, which correct for endogeneity and other statistical problems nonparametrically. After estimating individually for each country, we average these models across countries, producing what is known as a mean group estimator. (See Phillips and Hansen [4] for details of the FMOLS procedure and Pedroni [5] for a description of the mean group estimator in the panel data framework.)

A variety of diagnostics are performed before and after the estimation. A cointegrating relationship is defined as a linear relationship between several nonstationary series (that is, where fundamental behavior of a series is changing over time). We conduct panel unit root tests on our variables and, as in Egert [1], most but not all of variables are found to be nonstationary. Those that are not stationary (for example, regulatory quality) are nonetheless incorporated into the model. As expected, cointegration model parameters are robust to removal of stationary variables from the estimation. Additionally, any relationship found by the model requires scrutiny to determine whether it is genuinely one of cointegration. Therefore, as a cointegration test, the residuals from the regressions are tested for unit roots. I the residuals are nonstationary, then there is not a cointegrating relationship, because such a relationship should 'explain' the non-stationarity in the data. In the baseline model outlined below and most of the variants considered, residual series almost never exhibit unit roots. There is thus significant evidence of a cointegrating relationship.

Results

The results of the estimation can be summarized as follows. A significantly negative long-run relationship is found between TFP and tax-to-GDP, as well as for social security spending. However, there is a significantly positive linkage with government spending on education, and a statistically insignificant positive relationship with regulatory quality. This suggests that countries aiming to improve productivity could invest more in education and improving the quality of their institutions, while placing some limits on taxation and social security spending. There is a significantly positive linkage between TFP and the KOF Globalisation Index, which represents a country's overall degree of globalization across economic, social, and political dimensions. This is to be expected given the importance of trade openness indicators as seen in the Productivity Modelling chapter. Surprisingly, a negative relationship is found between TFP and total spending on R&D. One possible explanation is that higher government R&D expenditure could be correlated with lower TFP in a way that offsets the gains from private R&D expenditure. On the other hand, other related indicators which could be seen as proxies for technology uptake (mobile phone usage and electricity production) do have the expected signs and are statistically significant. One other finding that appears surprising is the negative effect on productivity associated with the human capital control. Egert [1] notes a similar effect in some of his estimated models and points out that his findings are relatively robust to the omission of human capital as a control (which is also the case here).

The baseline specification of the model and one extension are presented in Table I-2. Note that some differences between cross-section regression and mean group FMOLS parameters are expected as the cross-section regression includes a larger sample of countries.

To check robustness, some experimentation with removing and adding variables from the baseline model was undertaken. The baseline model seems to be the most comprehensive specification considered, but results are robust to removal of time-stationary variables from the estimation and are somewhat robust to several other variants. Particular attention has been paid to other specifications that allowed an increase in the country and year coverage, e.g., the extended model outlined in Table I-2. This model covers a sample of 47 countries and at most 35 years of data starting from 1980. Variables dropped are, social security spending, regulatory quality, and total spending on R&D; while variables added are population over 64, patent applications, and gross savings to GDP. All effects are statistically significant. Population over 64 is associated with a negative impact on TFP, and patent applications and gross savings to GDP are associated with positive effects.

TABLE I-2

RESULTS OF COINTEGRATION MODELLING.

	Baseline cross-section regression	Baseline mean group FMOLS	Extended mean group FMOLS
Country coverage	**66**	**27**	**47**
Time coverage	**1996–2014**	**1996–2014**	**1980–2014**
Intercept	0.23094	1.47517 **	–1.55463 ***
Tax/GDP ratio	–0.00363	–0.00561 ***	–0.00408 ***
Social security spending	–0.00023	–0.00896 ***	
Government spending on education	0.03343	0.00041 **	0.00128 ***
WB WGI Regulatory quality	0.07418	0.01696	
KOF Globalisation Index	0.01037 **	0.00074 **	0.00064 ***
Total spending on R&D	–0.03936	–0.00603 *	
Mobile phone usage	0.00138	0.00099 ***	0.00021 ***
Electricity production	0.00001	0.00001 *	–0.00007 ***
Log (real GDP)	0.02031	0.19592 ***	0.43404 ***
Human capital index	–0.23463 ***	–0.94586 ***	–0.69485 ***
Population over 64			–0.12219 ***
Patent applications			0.00002 ***
Gross savings/GDP			0.00046 ***

*** significant at the 0.1% level
** significant at the 1% level
* significant at the 5% level

The only unusual result is that electricity production changes sign from the baseline model to a small negative effect, though this does appear to be one of the less influential productivity drivers considered in this section. One caveat that might help to explain this discrepancy is that cointegrating relationships tend by nature to be quite sensitive to removing important regressors. Further relevant insights might be able to be derived by attempting to estimate different models per country income group, which is an area for possible further inquiry.

Overall, this broad and long-run analysis of global productivity drivers reinforces the earlier and more short-run, yet more detailed findings, that institutional strength and trade openness are key areas for governments to focus on in stimulating productivity. Additionally, it highlights the long-term importance of efficiency in the tax system and in social spending, as well as investment in education.

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ABBREVIATIONS

APO	Asian Productivity Organization
ASEAN	Association of Southeast Asian Nations
ICT	information and communications technology
IT	information technology
EPZ	export processing zone
EU	European Union
FDI	foreign direct investment
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GVC	global value chain
ICT	information and communications technology
IMF	International Monetary Fund
KOF	KOF Swiss Economic Institute
LP	labour productivity
NRI	Network Readiness Index
OECD	Organisation for Economic Cooperation and Development
PDR	People's Democratic Republic
pp	percentage point
PPP	purchasing power parity
PRI	Productivity Readiness Index
ROC	Republic of China
TFP	total factor productivity
THF	The Heritage Foundation
UN	United Nations
UNDP	United Nations Development Program
US	United States
WB	World Bank
WEF	World Economic Forum
WGI	Worldwide Governance Indicators

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