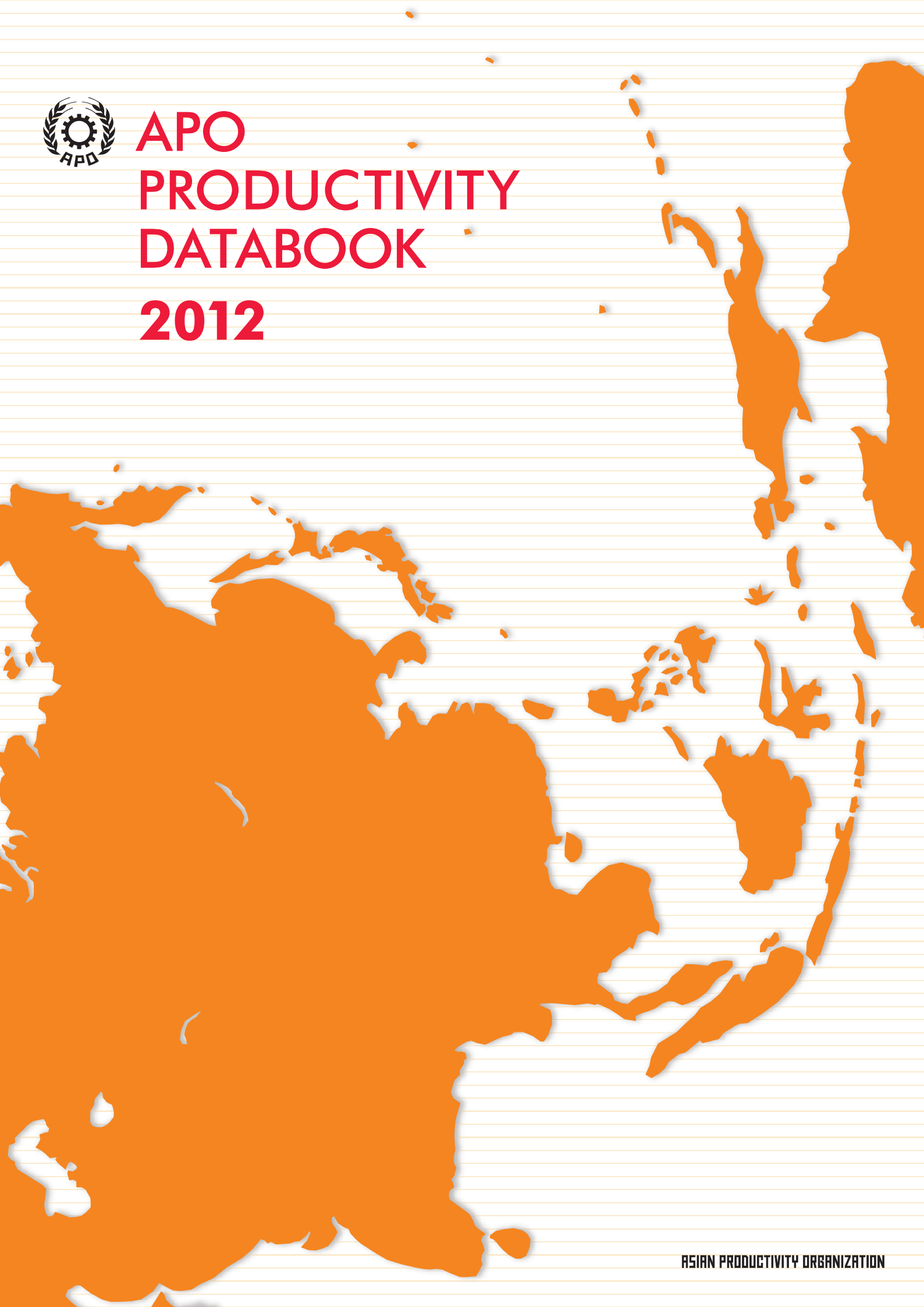
APO PRODUCTIVITY DATABOOK 2012



ASIAN PRODUCTIVITY ORGANIZATION

APO PRODUCTIVITY DATABOOK 2012

ASIAN PRODUCTIVITY ORGANIZATION

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Contents

Box

Table

Figure

Abbreviations

ADB	Asian Development Bank
AEP	age-efficiency profile
AMA	Analysis of Main Aggregate (UNSD database)
APO	Asian Productivity Organization
APO20	20 member economies of the Asian Productivity Organization: Bangladesh, Cambodia, the Republic of China, Fiji, Hong Kong, India, Indonesia, Islamic Republic of Iran, Japan, the Republic of Korea, the Lao PDR, Malaysia, Mongolia, Nepal, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Vietnam
AQGM	Asian quarterly growth map
ASEAN	Association of Southeast Asian Nations: Brunei, Cambodia, Indonesia, the Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam
Asia23	APO20 plus the People's Republic of China, Brunei, and Myanmar
Asia29	Asia23 plus GCC countries
CPI	consumer price index
EU	European Union
EU15	15 member economies of the European Union prior to enlargement: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom
EU27	European Union: EU15 plus Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, and Slovenia
FISIM	financial intermediation services indirectly measured
GCC	Gulf Cooperation Council: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE
GDP	gross domestic product
GFCF	gross fixed capital formation
GFS	Government Finance Statistics
GNI	gross national income
ICP	International Comparisons Program
IMF	International Monetary Fund
ISIC	International Standard Industry Classification
IT	information technology
KEO	Keio Economic Observatory, Keio University
Lao PDR	Lao People's Democratic Republic
LCU	local currency unit
NDP	net domestic product
NPISHs	non-profit institutions serving households
NPO	national productivity organization
NSO	national statistical office
OECD	Organisation for Economic Co-operation and Development
PPI	producer price index
PPP	purchasing power parity
QNA	quarterly national accounts
ROC	Republic of China
SEEA	System of Integrated Environmental and Economic Accounting
SNA	System of National Accounts
TFP	total factor productivity
UAE	United Arab Emirates
UN	United Nations
UNSD	United Nations Statistics Division
US	United States

Foreword

The Asian Productivity Organization (APO) has contributed to the sustainable socioeconomic development of the Asia-Pacific by supporting productivity enhancements in its member economies since 1961. In April 2011, the APO marked its golden jubilee. For the past 50 years, it has undertaken numerous projects to promote and disseminate productivity tools, and witnessed the region's tremendous economic progress. Although the global economy is embroiled in financial turmoil that started in 2007, most APO members have weathered the crisis well and are striving to continue on their paths of growth despite the setbacks.

While recognizing the region's economic achievements over the past five decades, APO member countries have reached a juncture and are ready to adopt a new paradigm in the productivity movement. The APO stands ready to cater to emerging demands for productivity in the interlinked global economy. The APO holds firm to its organizational vision of being the leading international organization on productivity enhancement, thereby enabling its members to be more productive and competitive by 2020. Three strategic directions guide the APO: strengthen NPOs and promote the development of small and medium enterprises and communities; catalyze innovation-led productivity growth; and promote Green Productivity.

There is growing interest in internationally comparable data on productivity growth. In response, we initiated a research project in 2007 to annually publish the *APO Productivity Databook* series, alongside the development of the APO Productivity Database. This publication is the fruit of the APO Productivity Databook Project, implemented by the Research and Planning Department of the APO Secretariat in collaboration with Keio Economic Observatory (KEO), Keio University in Tokyo.

The work includes research efforts to improve the measurement of productivity growth in a way that allows international comparisons as well as to enhance the understanding of sources of economic and productivity growth. I take great pleasure in the release of this edition, and my profound gratitude goes to the research team led by Professor Koji Nomura at the KEO, which has invested great effort in meticulous research. I also wish to thank all the national experts for providing their national economic data to the APO.

I hope that readers will appreciate this publication as a reference and find practical uses for it in their endeavors.

Ryuichiro Yamazaki
Secretary-General
Asian Productivity Organization
Tokyo, July 2012

1 Introduction

1.1 Databook 2012

This is the fifth edition in the *APO Productivity Databook* series. The publication aims to provide a long-term cross-country comparison of economic growth and productivity levels of Asian economies in relation to global and regional economies. Baseline indicators are calculated for 29 Asian economies, representing the 20 Asian Productivity Organization (APO) member economies (referred to as the APO20) – Bangladesh, Cambodia, the Republic of China (hereafter ROC), Fiji, Hong Kong, India, Indonesia, the Islamic Republic of Iran (hereafter Iran), Japan, the Republic of Korea (hereafter Korea), the Lao People's Democratic Republic (hereafter Lao PDR), Malaysia, Mongolia, Nepal, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Vietnam, and nine non-member economies in Asia – the People's Republic of China (hereafter China), Brunei, Myanmar, and the Gulf Cooperation Council (hereafter GCC) that consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (hereafter UAE). In addition, as reference economies, the United States (US), the European Union (EU), and Australia are included. This edition covers the period 1970–2010.

The productivity measures in this report are based on the estimates developed for the APO Productivity Database project conducted since September 2007 as a joint research effort between the APO and the Keio Economic Observatory (KEO), Keio University. The concepts of the estimates in this edition are mainly based on the System of National Accounts in 1993 (1993 SNA). In this edition, some significant revisions on the national accounts were incorporated. Observing new developments for upgrading of statistics systems in APO member economies, in December 2011, Thailand newly published its national accounts based on the 1993 SNA, and Japan published its national accounts with the new benchmark year 2005, which has considerable impacts on its gross domestic product (GDP). In August 2011, the Philippines published its new national accounts based on the 1993 SNA and partly on the 2008 SNA. While there are movements toward upgrading the SNA, some countries, such as Cambodia and Indonesia, still have not fully introduced the 1993 SNA. The variations of data definitions and coverage occur due to these different statuses of SNA adaptions among the member economies, calling for data harmonization for performing comparative productivity analyses. This *Databook* project tries to reconcile the national accounts variations that are based on the different concepts and definitions to provide harmonized estimates for international comparison.

To analyze the overall productivity improvement as well as partial productivity improvement (i.e., labor productivity and capital productivity), the *Databook* project constructs the estimates of capital services appropriate to the concept of capital input introduced in the 2008 SNA. Based on our estimates of capital services, the sources of economic growth in each economy are decomposed to factor inputs of labor and capital and total factor productivity (TFP) for 15 Asian economies – China, the ROC, Fiji, Hong Kong, India, Indonesia, Iran, Japan, Korea, Malaysia, Mongolia, the Philippines, Singapore, Thailand, and Vietnam – along with the US as a reference economy. In addition, TFP estimates for India and Iran are newly presented in this edition.

Another new feature of this edition is that it includes data up to 2010. This was done in response to readers' requests to obtain the latest data and information, wherever possible. By contrast, last year's edition used only 2008 data for comparison purposes. The new achievement to present 2010 data estimates where available was realized by pushing back the publication month of the Databook series from March/April to June/July, so as to await the release of some countries' annual national accounts and thus obtain estimates from the latest year. As such, the latest year's data can principally be based on the annual national accounts rather than the quarterly accounts. This edition reflects the revisions in the official national accounts and other data that were published as of March 2012.

This project is managed by Koji Nomura (KEO, Keio University), with coordination by Yasuko Asano (Research and Planning Department, APO). The source of the data is the respective national accounts and some national statistics on labor and production in each economy. The project has collected raw data and metadata information at KEO and also through the *APO Productivity Databook Questionnaires* from respective national experts in the APO member economies. These experts are listed in Section 1.2. The submitted data were examined and processed by the research team led by Koji Nomura, who in collaboration with senior researcher Eunice Lau, as well as research assistants Kyoko Ishikawa, Shinyoung Oh, Hiroshi Shirane, and Keiko Inoue, prepared the text, tables, and figures presented in this report.

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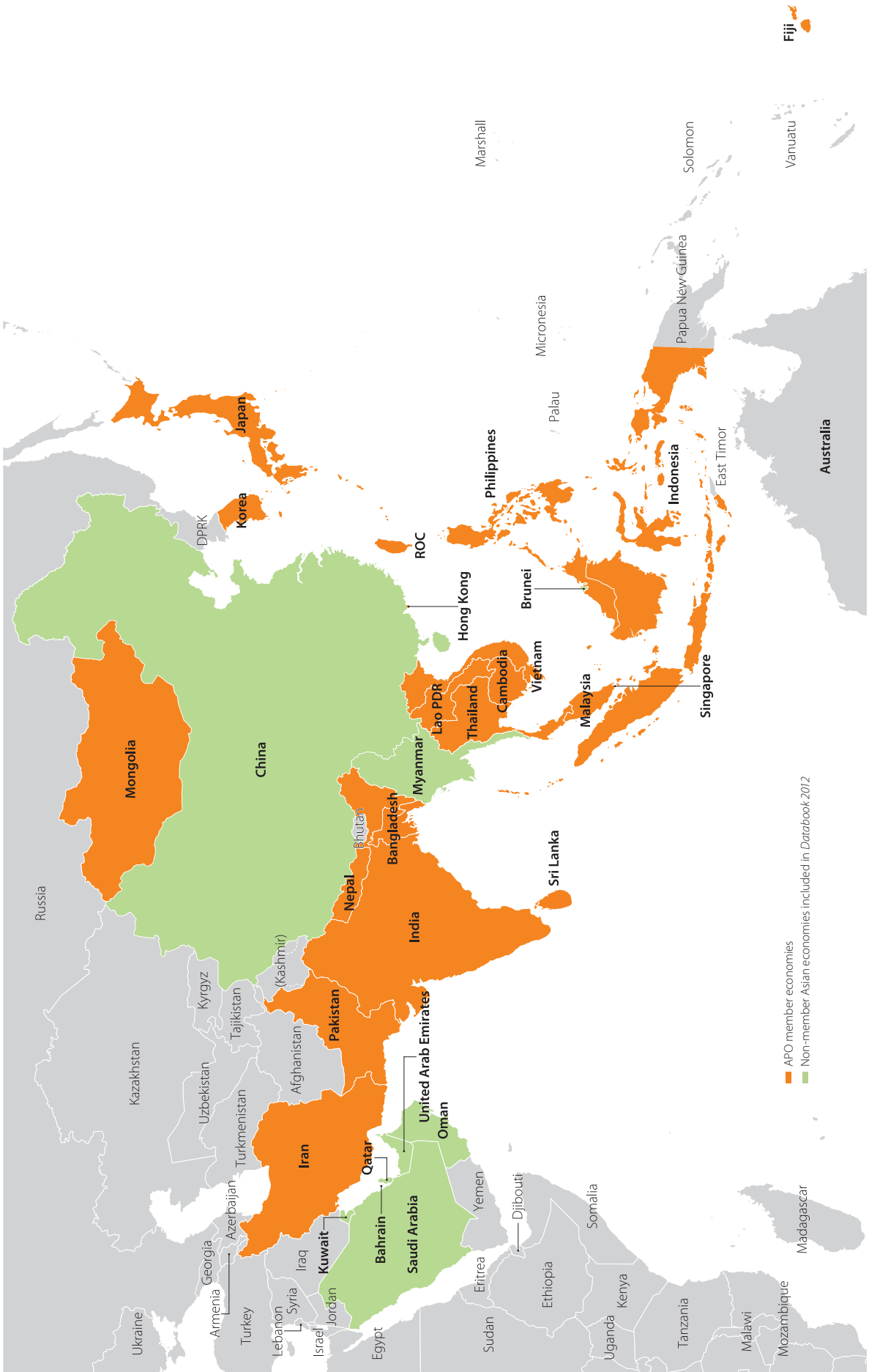
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DPRK
ROC
Hong Kong
Brunei
Vietnam
Cambodia
Lao PDR
Thailand
Malaysia
Singapore
Myanmar
Bangladesh
Bhutan
Nepal
India
Sri Lanka
Mongolia
China
Russia
Kazakhstan
Kyrgyz
Tajikistan
(Kashmir)
Pakistan
Afghanistan
Uzbekistan
Turkmenistan
United Arab Emirates
Oman
Iran
Qatar
Bahrain
Saudi Arabia
Kuwait
Iraq
Azerbaijan
Georgia
Armenia
Turkey
Syria
Lebanon
Israel
Jordan
Egypt
Yemen
Djibouti
Somalia
Eritrea
Ethiopia
Sudan
Kenya
Uganda
Tanzania
Malawi
Mozambique
Madagascar
Ukraine
APO member economies
Non-member Asian economies included in Databook 2012

2 Overview

The year 2010 proved to be a false dawn and the world economy has taken a turn for the worse. Global activity weakened significantly through 2011 from its strong rebound the previous year, and prospects for 2012 do not look promising. World output grew slower at 3.8 per cent in 2011, compared to 5.2 per cent in 2010. Even weaker growth of 3.3 per cent is forecast for 2012, assuming no unexpected events, but risks are clearly to the downside (IMF 2012).

2011 was a turbulent year plagued by a series of unforeseen, extraordinary events and developments. In the absence of these adverse events, global activity had already been anticipated to slow, as the temporary output boost in 2010 due to the inventory cycle and fiscal stimulation in most major economies started to phase out. Further slowdown can be explained by the unexpected shocks that hit the international economy, from the Great East Japan Earthquake and tsunami to the spreading unrest in the Middle East and North Africa, causing disruptions to supply chains and the oil supply, and oil price hikes. The International Monetary Fund (2011) estimates that the combined effects of these one-time events may have lowered output in advanced economies by 0.5 percentage points, mostly in the second quarter of 2011, but these effects have started to unwind. What proves to be more menacing and worrying over the immediate horizon are two unforeseen adverse developments that have come to the fore in the second half of 2011: a much slower and weaker recovery than anticipated in crisis-hit advanced economies, and a large increase in fiscal and financial uncertainty in the US and in the euro zone. The world economic outlook will depend on how these events pan out individually and interact with one another. Given the intensity of the euro crisis, IMF projections for 2012 have been revised downward to 3.3 per cent, with world economic growth forecasts becoming more uneven. While advanced economies are expected to manage lackluster growth of 1.2 per cent, emerging economies are forecasted to sustain growth of 5.4 per cent, albeit representing a significant slowdown from their recent performance of 6.2 per cent in 2011 and 7.3 per cent in 2010. Developing Asia remains the world's fastest growing region at 7.3 per cent in the coming year, compared with 1.8 per cent in the US, and –0.5 per cent in the euro zone. With divergent growth paths, the shifting of economic balance to the East is set to continue. The risk is that the world economy may underperform these forecasts if the euro sovereign debt crisis is not effectively managed and contained.

Disappointingly, the rebound in 2010 failed to materialize into a strong, balanced, and sustained recovery in the advanced economies due to the stalling of two rebalancing acts. First, domestic demand has not made the successful shift from fiscal stimulus to private demand. Business and consumer sentiment and order books dropped sharply from summer 2011 in most countries (except Japan), dampening private demand (OECD 2011). The reasons vary across countries, but lower equity prices and persistent housing market weakness imply deteriorating household balance sheets. First, together with unrelenting job uncertainty, households are cautious and business confidence is not revived. With fiscal consolidation well under way in most advanced countries (except Japan), private demand has not managed to pick up the slack. Second, global current account rebalancing is needed to compensate weak domestic demand in advanced economies with current account deficits, most notably the US, through an increase in foreign demand. This implies a symmetric shift to take place in countries with current account surpluses, most notably China. Although global current account imbalances shrank temporarily during the crisis in 2008–2009, the required underlying structural adjustments for the trend to sustain have not taken place. Global imbalances look set to widen.

The weak recovery has aggravated the unresolved structural fragilities in advanced economies and exposed the painful political and economic reality that the scope for macroeconomic policies to cushion economies against further adverse shocks is much reduced since the crisis of 2007–2008. In the US, political gridlock over fiscal consolidation plans has increased policy uncertainty and undermined the effectiveness and stability of the policymaking environment. The political brinkmanship to the point of compromising US creditworthiness has greatly tarnished the country's long-standing

reputation for responsible and credible management of its finances, culminating in the decision by Standard & Poor's (S&P) to downgrade the US long-term sovereign credit rating from AAA to AA+ on 5 August 2011. Meanwhile, the deepening of the sovereign debt crisis in the euro zone threatens fiscal and financial contagion. On 13 January 2012, S&P downgraded the credit ratings of nine euro-zone countries, including France, Italy, and Spain. The debts of Portugal and Cyprus are now classed as junk, as is Greece's. For a long time, responsive policy measures have been enough only to buy time. Financial contagion is a real threat to the ailing global economy, and its successful containment is paramount in the euro rescue package. It is vital to the world economy that decisive measures are taken to convince investors and restore financial stability.

Developments in the US and the euro zone have highlighted the extent to which political paralysis can exacerbate uncertainty and make the markets jitter, rapidly dissipating any room for policy maneuver to support growth. Fiscal austerity and growth in a weak economy are two contradictory policy goals. Nervous investors, by demanding high bond yields, can exert tremendous pressure on troubled governments, tilting the balance toward fiscal consolidation to restore credibility at the expense of growth. Falling bond prices also lead to tightening of credit as weakened banks deleverage and recapitalize, putting further brakes on growth. Low growth makes debt sustainability more difficult to achieve, entrapping countries in vicious feedback loops. For the US, the task on hand is to agree on credible back-loaded, medium-term fiscal consolidation plans, which will calm the market on the one hand and not jeopardize the unsteady recovery on the other. The programmed fiscal tightening by 2 per cent and 3 per cent of GDP in 2012 and 2013, respectively, is judged excessive given the relatively weak economic outlook. Japan, with a national debt well over 200 per cent of GDP, also needs to clarify its plans to reduce debts and deficits in the years ahead.

However, the epicenter of downside risks to the world economy is the euro zone. Like all major countries, government budgets of euro zone member states were put under strain during the global financial crisis. Investors had been treating all sovereign bonds within the euro zone the same until Germany signaled that defaults could happen. As a response, markets started to differentiate among the euro zone members, and spreads on bond yields began to widen. First, the bond yields of Greece, which was insolvent, skyrocketed. It required funding to avoid defaults, but the policy response of the European Union (EU) was indecisive and hesitant, unnerving investors. Significant contagion then spread to other fiscally vulnerable, but not insolvent, euro zone members, escalating the crisis and bringing bank solvency into question as well. With the deepening of the crisis, the size of a credible policy commitment snowballs and this has been testing the political resolve of the currency union. Looking ahead, a disorderly default or a euro exit would result in massive wealth destruction, bankruptcies, and a collapse in confidence in European integration and cooperation, with dire consequences first for Europe, followed by the rest of the world. According to a simulation by the OECD (2011), Europe is likely to experience a prolonged and deep recession, while Japan and the US are likely to face a marked decline in activity, and the emerging economies will likely face a 9.5 per cent reduction in world trade over a period of two years and high volatility of capital flows. This worst-case scenario must be avoided through apt policies and commitment. Even still, the troubled euro economies still face a long road to economic health. Fiscal consolidation aside, growth is the more palatable route to debt sustainability if available, and the best recipe for growth is to raise productivity through structural reforms, which is easier said than done.

In contrast, emerging and developing economies are facing challenges quite different from those of advanced economies. Signs of overheating and financial vulnerabilities related to strong credit expansion have prompted policy rate hikes or other measures to reduce credit growth. Headline and core inflation have been on the rise in many parts of the world until recently. Inflationary pressures have stemmed from rising commodity prices, oil prices, and food prices (which affect all economies),

as well as domestic capacity constraints in economies such as China, India, and Brazil. Although these pressures started to moderate in 2011 as demand softened and growth slowed, oil prices have held up in recent months in response to supply developments and rising geopolitical risks. In 2011, consumer prices went up by 5.6 per cent and 9.0 per cent in China and India, respectively.[1] Inflation is projected to decelerate in the emerging and developing economies as a whole to around 6.25 per cent in 2012, down from over 7.25 per cent in 2011, with inflation being persistent in some regions (IMF 2012). Continued high inflation could risk pushing up long-term inflation expectations, and monetary authorities should remain vigilant.

Meanwhile, a number of major emerging and developing economies continue to experience buoyant credit and asset price growth, increasing their vulnerability to losses in confidence and a paring back of expectations at home or by falling demand from abroad. These economies are therefore susceptible to the possibility of a hard landing. China has been tightening its monetary conditions over the past year – real credit growth has receded, to about 10 per cent at an annual rate. Housing market transactions and prices have fallen from exceptionally high levels, although construction is still going strong. The risk now is that activity could slow more than projected with net trade likely to be a drag on growth, reflecting both strong import growth and, in the near term, soft external demand. Growth is projected to slow from 9.2 per cent in 2011 to 8.2 per cent in 2012 (IMF 2012).

Over the medium term, the challenge faced by the fast-growing emerging Asian economies is how to bridge the middle-income trap. After two decades of breakneck growth, emerging Asia, especially China and India, is catching up with the advanced economies (see Figure 5). The scant growth of the heavily debt-laden rich countries since the financial crisis is hastening the pace of convergence. As growth in the rich world is faltering, the emerging world has accounted for the majority of growth in the world economy in recent years and the economic balance has been shifting. At the current juncture, it may appear unthinkable that these economies will one day slow, but past experience has suggested that they will and that day may be more imminent than we think. International data hint that rapidly growing economies slow significantly (defined as a downshift in the growth rate by at least 2 percentage points) when their per capita incomes reach around US$17,000 in 2005 prices, a level that China should achieve by or soon after 2015. Other thresholds are per capita income reaching 58 per cent of that in the leading country, or the share of employment in manufacturing hitting 23 per cent. This slowdown is predominantly explained by a drop-off in total factor productivity (TFP) growth (Eichengreen, Park, and Shin 2011).

Just as one can make much faster progress by following a well-trodden path than being a trailblazer, it seems highly likely that growth will ebb once the easier part of the catching up has been exhausted, even though the precise turning point may vary widely from country to country. At that point, "your economy comes to depend more on innovation and on learning from your own mistakes than on improving on the success of others."[2] An economy that fails to move beyond the brute force of industrialization will struggle to make the jump from middle-income to upper-income status. The research shows that countries with high old-age dependency ratios, low consumption shares of GDP, high and volatile inflation, and undervalued exchange rates make growth slowdowns more likely. These findings highlight China's challenges ahead in avoiding the middle-income trap, and, in turn, social unrest. Korea, having reached an income on par with Europe, by being expert at applying and improving existing technology with a highly skilled and hardworking workforce, may also have come to a point when it needs to reinvent itself beyond its world-class manufacturing, to develop its third-world

1: *The Economist* poll and Economist Intelligence Unit estimate/forecast, 28 January 2012.
2: *The Economist* Briefing: South Korea's economy, 12 November 2011.

services and encourage entrepreneurship. India, which is less well-off than China, should have greater room to catch up. However, it is failing badly in delivering much needed infrastructure to support economic growth at a double-digit pace. Power is its biggest bottleneck. The economy is prone to overheating and runs a current account deficit and sizeable fiscal deficit.

In this report, the impact of the global financial crisis has made its way into our annual data. The inclusion of 2010 data noticeably pulls down the averages for the 2000s as a whole. Productivity analysis will help cast valuable insight into how the long-term growth potential of an economy has been affected. As it stands, prospects for the West look less promising than for the East as far as future capability for productivity growth is concerned. With a focus on long-term analysis, the *APO Productivity Databook* not only looks at a country's productivity performance but also its economic composition and sources of growth in order to provide readers with more comprehensive descriptions and comparisons of a country's economic structure and characteristics. Furthermore, we have been able to expand the number of countries covered in our TFP analysis to 15 Asian countries.

International comparisons of economic performance are never a precise science; instead, they are fraught with measurement and data comparability issues. Despite our best efforts in aligning the data, some data uncertainty remains. As we operate in a reality of incomplete information, some adjustments made are necessarily conjectural, while others are based on assumptions. In addressing this shortcoming, conclusions drawn are cross-referenced against other similar studies. However, the magnitude of economic indicators and differences could be subject to a higher degree of data uncertainty.

Bearing in mind these caveats, the main findings from our analysis are as follows.

Economic scale and growth

- In terms of exchange-rate-based GDP, China has overtaken Japan since 2010 as the largest economy in Asia and the second largest economy in the world after the US. On this measure, Asia29 was 28 per cent and 33 per cent larger than the US and EU15 in 2010, respectively (Table 1).

- Based on GDP adjusted for purchasing power parity (PPP), the weight of the world economy is even more tilted toward Asia, with Asia29 being 91 per cent and 105 per cent larger than the US and EU15 in 2010, respectively. China has overtaken Japan as the largest Asian economy since 2001, and its size was 70 per cent relative to that of the US in 2010 (Figure 5). India was a close third in 2010 with its GDP using PPP very nearly catching up with that of Japan (Table 2).

- Over the past two decades, Asia29 grew at 5.3 per cent on average per annum, compared with 2.4 per cent and 1.8 per cent in the US and EU15, respectively. Japan was the slowest growing economy among Asia29 at 0.9 per cent, compared with the fastest growth of 9.9 per cent achieved by China.

- The divergence of growth performance between Asian countries on the one hand and the US and EU15 on the other was even more pronounced if we look at the 2000s alone (Table 3). For the past two decades, China and India have emerged as the driving force propelling Asia forward, accounting for 46 per cent and 15 per cent of regional growth, respectively (Figure 7).

- The global financial crisis slowed Asia29 growth significantly from a recent peak of 8.1 per cent in 2007, to 4.7 per cent in 2008 and further to 3.7 per cent in 2009, before rebounding strongly to 9.8 per cent in 2010. This is in comparison to the deep recession of –2.7 per cent and –4.5 per cent experienced by the US and EU15, respectively, in 2009.

- While correlation of economic growth in China on the one hand and the US and EU 15 on the other has grown weaker in recent years, the correlation of other East Asian countries with the US and EU15 has grown stronger (Figures 8 and 9).

Catching up in per capita GDP

- Our results show the outcome of the dramatic development effort of the four Asian Tigers.[3] Singapore and Hong Kong have managed to close a per capita GDP gap with the US of around 65 per cent in just under four decades. Singapore has even surpassed the US since 2004, and in 2010 its per capita GDP was 23 per cent higher. In contrast, veteran Japan has fallen behind and its gap with the US has widened to around 30 per cent. In 2010, the ROC's and Korea's per capita GDP was 76 per cent and 64 per cent of the US level, respectively (Figure 14).

- Despite their rapid growth, per capita GDP of China and India was 16 per cent and 7 per cent that of the US in 2010, respectively, due to their population size. Even so, it represents a sevenfold increase in China's relative per capita GDP over the last four decades (Table 15). The level achieved by Asia29 was 16 per cent that of the US, indicating that there is ample room for catch-up.

- Asia's huge per capita GDP gap with the US is predominantly explained by its labor productivity gap. With the exception of the four Asian Tigers, Japan, and Iran, all Asian countries have a labor productivity gap of 50 per cent or higher (Figure 18). However, the change in employment rates also played a significant role in some countries (Figure 19).

- Asia's employment rates relative to the US are generally high, with the leading countries being 10–15 percentage points above that of the US. However, the prevalent surge seen in recent years is also due to weakness in US employment (Figure 21).

The demand-side story

- With a few exceptions, household consumption is the biggest component of final demand. In recent years, Asia29's consumption ratio has dropped below 50 per cent of GDP, largely reflecting the trend in China. This compares with 70.5 per cent in the US, 58.3 per cent in EU15, and 54.5 per cent in Australia (Table 7).

- The share of household consumption in GDP tends to be more volatile and falling in countries that are undergoing rapid development. As countries get richer, the household consumption share tends to rise. At the other end of the spectrum, countries with low income and a high dependency ratio also sustain a high consumption ratio to GDP (Figures 24 and 25).

- China faces huge imbalances in its economy with the investment share of GDP (at 47.8 per cent) as the biggest component in final demand and the household consumption share plummeting to 34.9 per cent in 2010. In contrast, the weight of net exports has been rising in the past decade. Despite softening in recent years due to weak foreign demand, it still accounts for 3.9 per cent of final demand in 2010.

- Overall, Asia invests more than the US/EU15 as a share of its GDP. Lately this wedge has been widening. Historically, Australia's investment share has been sandwiched between that of Asia and the

3: Refers to Hong Kong, the Republic of Korea, Singapore, and the Republic of China.

US/EU15. In 2010, Asia29 invested 35.1 per cent of its GDP, compared with 15.8 per cent for the US, 18.6 per cent for EU15, and 25.9 per cent for Australia (Table 7 and Figure 30).

- If history is any guide, an investment share of 40 per cent or above is unsustainable in the long term. This implies that the investment share of 47.8 per cent in China is expected to fall eventually (Figure 30).

- GCC economies are unusually skewed toward net exports because of their oil. Net exports accounted for 18.2 per cent of final demand in 2010, compared with Asia29's 2.7 per cent and China's 3.9 per cent. Given that its share was as high as one-third in 1970, this represents a reduced dependence on net exports in GCC countries over time.

- Only the US and South Asia run trade deficits of a more persistent nature, which accounted for −3.6 per cent and −4.0 per cent of final demand, respectively, in 2010.

- Basic necessities account for a high proportion of household consumption in lower-income countries – the cross-country version of Angel's Law (Figure 29). Korea and Indonesia spent over 7.5 per cent of their household consumption on education, while the US spent almost one-fifth on health, unmatched in other countries.

- During the Asian financial crisis, when investment took a battering in many countries, household consumption was the main driver of growth. However, in some countries, such as Hong Kong and Malaysia, net exports accounted for most of the economic growth (Figure 33).

- In the 2000s, investment recovered in the Asian economies and drove growth. For Singapore, Hong Kong, and the ROC, however, the strength of net exports was still the dominant force behind their economic growth. In the 2000s, growth slowed in the US and EU15, and the contributions of government consumption to growth nearly tripled as contributions from investment took a plunge (Figure 33).

- Most Asian countries were adversely impacted by the global financial crisis in 2008 and 2009. While Japan's recession was particularly deep (contracting by 5.6 per cent in 2009), other Asian countries experienced a slowdown in growth or mild recession. Even so, relative to their customary rapid growth in recent years, the magnitude of the impact was still substantial (Figure 37).

- Asian countries experienced a sharp fall in investment or net exports, or both. In contrast, the US and EU15 suffered from sizable contraction in investment and household consumption, which pulled down growth (Figure 37).

- Japan was the only Asian country where the global financial storm of 2007–2008 caused a deeper retrenchment in the economy than the Asian financial crisis of 1997–1998. The latter marked an exceptional time for many Asian economies, causing investment to nose-dive in 1998 and consumption to fall, albeit to a lesser extent. Net export growth, on the other hand, was exceptionally strong in some of these countries (Figure 37).

Economy-wide productivity – The supply-side story

GDP per worker

- For most Asian countries, their per capita GDP gap with the US is largely explained by their labor productivity shortfalls of 80 per cent or more against the US level. Only Singapore and Hong Kong

have effectively closed that gap. The relative labor productivity of Asia23 was 15 per cent that of the US in 2010 (Figure 38 and Table 8).

- Growth of per-worker GDP in Asia has outstripped that in the US, allowing catch-up. In particular, the low-income countries appeared to experience a labor productivity growth spurt in the 2000s. China achieved the fastest labor productivity growth of 10.2 per cent on average per year in 2005–2010, followed by India's of 7.3 per cent. This compares with that of the US of 1.3 per cent. Singapore's 0.4 per cent growth over the same period was the weakest performance among the Asian Tigers and Japan (Table 9).

- Countries that are catching up fast with the US in per capita GDP are also fast catching up in labor productivity. Similarly, countries with deteriorating relative per capita GDP are found to also be deteriorating or changing little compared to the US in labor productivity (Figure 40).

GDP per hour

- The productivity gap based on GDP per hour is generally wider between Asian countries and the US. While the adjustments are negligible for most Asian countries, the productivity gap significantly widened by 15–25 percentage points for the Asian Tigers, suggesting that people work much longer hours than in the US (Figure 41).

- Most Asian countries experience faster growth in GDP per hour than the US. Among them, China's performance is the most outstanding, with average annual productivity growth doubling from 4.3 per cent to 9.1 per cent between 1970–1990 and 1990–2010, compared to that of the US at 1.5 per cent and 1.9 per cent over the same periods (Figure 43).

- Mapped onto Japan's historical trajectory of GDP per hour, most Asian countries cluster around the level that Japan achieved in the 1950s and 1960s, with the Asian Tigers being the clear front-runners away from the pack. This indicates that most Asian countries are still half a century away in catching up with Japan (Figure 45).

Total factor productivity

- Half of the Asian countries compared experienced faster TFP growth than the US over the period 1970–2010, with China being a league of its own. Its TFP growth was at 3.2 per cent on average a year, compared with that of Thailand at 1.8 per cent in second place and that of the US at 0.9 per cent. With TFP growing at 0.5 per cent on average per year, Singapore's productivity performance has been weak relative to its economic counterparts (Figure 47).

- Over the past four decades, economic growth in Asia has been predominantly explained by the contribution of capital input, but the role of TFP growth should not be underestimated. Its contribution accounted for over 20 per cent of economic growth in half of the Asian countries compared, with it being most prominent in China (37 per cent), Thailand (31 per cent), and Hong Kong (29 per cent) (Figure 49).

- The composition of economic growth is shifting over time. In the past two decades, we observe that the contribution of capital input is getting progressively smaller in Asia, falling to a share of below 50 per cent on average, while the contribution of TFP is getting progressively more significant, rising to a share of above 40 per cent on average in the 2000s (Figure 51).

- The evident rise in the contribution of IT capital is noteworthy. By the 2000s, it had risen to above 5 per cent in most Asian countries compared while accounting for over one-third of economic

growth in Japan. This compares with 30 per cent in the US (Figure 51). The allocation shift toward IT capital started two decades earlier in the US than in any Asian country (Figure 54).

- Widening our perspective to include other OECD countries shows that Asia's vibrant economic growth and TFP performance in the 2000s was unmatched by any other country, except Ireland (Figure 52).

- Over the past decades, we observe that economic growth has decelerated in the early starters (i.e., Japan and the Asian Tigers). Their experience lends support to the likelihood of an eventual slowdown in China; the question is more likely to be when than if. TFP growth slowed from its former peaks achieved in the late 1970s or early 1980s until recent years when countries experienced TFP resurgence (Figure 53).

Enhancement of labor productivity growth

- Although capital deepening is the prime cause of labor productivity growth, TFP growth can make a significant difference in determining a country's relative labor productivity performance (Figures 60 and 61).

- Capital deepening appears to be an accompanying process of rapid economic development. The early starters (i.e., Japan and the Asian Tigers) underwent more rapid capital deepening in the initial period whereas the reverse is true for the currently emerging Asian economies. For example, the rise in capital–labor ratio decelerated from 10.4 per cent on average a year to 7.4 per cent in Korea between 1970–1990 and 1990–2010, whereas it doubled in China from 5.2 per cent to 10.4 per cent (Figure 56).

- Capital deepening tends to go hand in hand with deterioration in capital productivity. China's performance is particularly impressive as its acceleration in capital deepening in the past two decades did not compromise its capital productivity as much as the early starters in the early period (Figure 57).

- China achieved the fastest labor productivity of 6.7 per cent on average a year in the period 1970–2010, while it was only third in its pace of capital deepening. This was because its productivity performance was bolstered by the fastest TFP growth of 3.2 per cent achieved over the same period (Figures 60 and 61). The roles of TFP growth and IT capital deepening have also been expanding over the years in other countries (Figures 62 and 63).

- Over a long period stretching four decades, we can discern a downward trend in labor productivity growth among the early starters, but a step up in China and India. Singapore's productivity performance, albeit robust compared with other mature economies like the US, has been very modest against its Asian counterparts (Figure 64).

Industry perspective

Industry structure

- Evidence supports the view that a country's industry structure transforms with its economic development. There is a broad negative correlation between the share of agriculture in total GDP and per capita GDP. Finance, real estate, and business activities increase in weight as countries move up income levels, whereas mining is the sector that defines the oil-exporting countries (Figure 65).

- Manufacturing is a significant sector, accounting for over 20 per cent of total value added in most Asian economies. It is particularly prominent in China, Thailand, Korea, Malaysia, and the ROC.

Asian manufacturing is dominated by machinery and equipment in the richer Asian economies while their poorer counterparts concentrate on light manufacturing such as textiles and the food industry (Figure 66).

- While Asian countries are diversifying away from agriculture, the sector still dominates employment, accounting for 41 per cent of total employment in 2009 for Asia29, down from 62 per cent in 1980. Its share in total value added rose from 6 per cent to 10 per cent over the same period, implying more labor efficiency (Figure 67). However, it is still the only sector that consistently has a disproportionately higher employment share than justified by its value-added share. Shifting out of agriculture into more efficient sectors will boost economy-wide productivity (Figure 71).

Industry origins of economic growth

- Our results support the observation that China and India have taken different development paths, with the former relying more on the traditional growth engine of manufacturing and the latter on services.

- In the past two-and-a-half decades China has been undergoing a slight transition, with its growth shifting from being manufacturing-driven to more services-driven. In the period 2000–2009, the contributions to economic growth by manufacturing and services were 35 per cent and 45 per cent, respectively, compared with 47 per cent and 30 per cent in the first half of the 1990s (Figure 72).

- In contrast, growth in India has always been more driven by services, the contribution of which rose from 51 per cent in the late 1980s to 64 per cent in the 2000s, while manufacturing usually contributes one-fifth or less (Figure 72).

- A total of 28 per cent of Asia29's regional growth originated from the expansion of manufacturing in the 2000s, two-thirds of which was accounted for by China. In other words, China's manufacturing alone contributed 18 per cent to regional growth (Figure 81).

Industry origins of labor productivity growth

- Our results show that services are no longer a drag on a country's productivity performance, but are as capable as manufacturing in generating labor productivity growth.

- In the 2000s, transport, storage, and communications achieved the fastest labor productivity growth in Asia23 (at 4.7 per cent on average a year), followed by agriculture (4.1 per cent), utilities (3.3 per cent), and manufacturing (3.1 per cent) (Table 16).

- While the importance of manufacturing as a contributor to overall labor productivity growth has never waned in some countries (Korea, the ROC, China, and Thailand), services were contributing at least one-third or more in most Asian countries compared with the 2000s. Manufacturing has never been a major contributor in India in its recent development process, or in Hong Kong and Sri Lanka in the 2000s (Figures 84 and 87).

Real income and terms of trade

- Real GDP could systematically underestimate (overestimate) growth in real income when terms of trade improve (deteriorate). Positive net primary income from abroad also bolsters a country's real income.

- It is generally observed that the trading gain effect is more significant in the short term than in the long term. Our findings confirm this observation, with the exceptions being for some oil-exporting countries such as Kuwait and Brunei, where trading gain has always been positive and significant (Table 17).

- Net primary income from abroad tends to oscillate within a tight range of ±1.5 per cent of GDP for more mature and large economies, and within a wider range of ±10 per cent for small and less well-off economies. However, Japan and the Philippines have been breaking through their respective margins of fluctuations in recent years with net primary income from abroad reaching 3.3 per cent in 2008 and 33.3 per cent in 2010, respectively. Singapore's historical margin fluctuates within a large range when compared with other rich economies, from +1.9 per cent in 1997 to −7.1 per cent in 2004 (Figure 90).

- Our results show that for most countries studied, the difference between growth of real GDP and real income (reflecting the combined effect of trading gain and net primary income from abroad) was within the margin of ±20 per cent over the long period 1970–2010; Kuwait and Brunei appear to be the outliers (Figure 91).

- Our results also reflect Australia's recent fortune found in trading gain as the prices of their commodity exports rise and their import prices fall in the past decade or so (Table 17 and Figure 96).

- The five countries that have been enjoying a trading gain over 1.0 per cent per annum are all oil-exporting countries. Among them, only Iran managed to achieve a positive growth in labor productivity. In contrast, export-oriented, high productivity Asian countries have been facing a deteriorating trading gain position as a price for their own success (Figure 97).

Asia is a diverse regional economy within which countries have embarked on their own journeys of economic development at different times and different paces. As shown by our analysis, nearly all countries are making concerted efforts to move away from agriculture and accumulate capital in order to improve their growth potential and catch up with the West. Their efforts are yielding results beyond just impressive growth rates. Our evidence confirms that countries' capital accumulation is accompanied by strong productivity improvements. Through the statistics and data presented in this report, we manage to catch a glimpse of the current unparalleled economic dynamics inherent in the region. China, in particular, has been rising in world economic rankings, having overtaken Germany as the largest exporter in 2009 and Japan as the second-largest economy in 2010. Growth in India has also received a sudden spur in recent years. As the rich economies are heavily laden with debt (to the point of crisis in some) and associated difficulties, this may well prove to be an opportunity for the region to consolidate its development achievements further.

3 Production-Side GDP

In the past two decades, a wedge in growth performance between Asia and the West has opened. With the exception of the years adversely affected by the Asian financial crisis (i.e., 1997–1999), Asia29 has been growing faster than the US and EU15 by more than 3 and 4 percentage points on average a year, respectively (Figure 1). Furthermore, this wedge has been widening in recent years; at the height of the global financial storm (i.e., 2009), the growth differentials were 7.2 and 8.1 percentage points against the US and EU15, respectively. The subsequent rebound in 2010 was also a lot stronger in Asia than in the West. It is therefore no surprise that the center of gravity in the global economy is gradually shifting toward Asia. In 2010, the Asian economy contributed two-fifths of world output (36 per cent for Asia29), compared with the US and EU27, each accounting for a one-fifth share (Figure 2). The IMF (2011) projects that the Asian share in world output will continue to rise, reaching 45 per cent (42 per cent for Asia29) by 2016. In contrast, the US and EU27 will shrink by a similar extent to around 18 per cent (15 per cent for EU15).

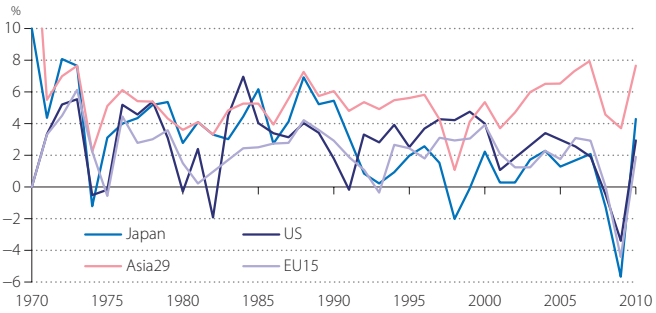

Figure 1 GDP Growth of Asia, the EU, Japan, and the US, 1970–2010
——Annual growth rate of GDP at constant market prices

Sources: Official national accounts in each country, including author adjustments.

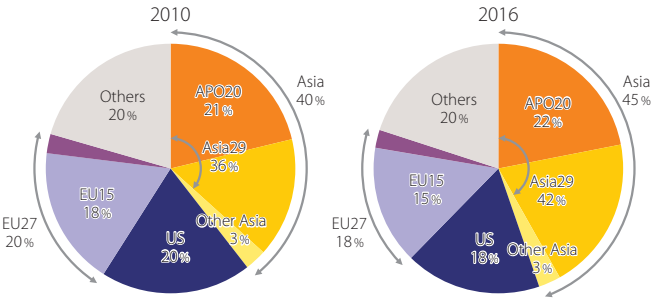

Figure 2 Share of Asia in World GDP in 2010 and Projection for 2016
——Share of GDP using constant PPPs

Source: IMF, World Economic Outlook Database, September 2011.

As the advanced economies have been much weakened following the recent financial crisis, the fortune of the world economy is increasingly tied with that of Asia. To better understand the dynamics of the long-term economic growth within the region, the remainder of the chapter looks into the details of countries' diverse development efforts and achievements since the 1970s, through cross-country level comparisons of GDP and other related performance indicators.[4] Underlying international level comparisons are harmonized GDP data of individual countries[5] and a set of conversion

4: The database used in the *Databook* series includes author adjustments made to harmonize GDP coverage better across countries. When compared with last year's edition, GDP reported in this edition includes the final consumption of FISIM (financial intermediation services indirectly measured), and thus GDP is larger by 0.5–2.0 per cent than that in last year's edition. Although this edition mainly follows the 1993 SNA, the current decision to exclude investment of valuables and to include software investment and final consumption of FISIM is detailed in Appendix A.1. The *Databook 2012* reflects some large revisions published by national statistical offices in 2011 and in the first quarter of 2012. More specifically, at the end of 2011, Thailand officially switched to the 1993 SNA, and its national accounts compatible with the 1993 framework became available for the first time. To construct the long time-series data in this report, back data based on the 1968 SNA have been adjusted to be consistent with the new series. (For example, government consumption in the new series includes consumption of fixed capital (CFC) owned by the government since 1990. We estimate government capital stock and its CFC for the period 1970–1989 and adjust the past estimates of government consumption and GDP accordingly.) There are also some revisions to the data, largely results of national accounts revisions including backward amendment and/or benchmark revisions.

5: Appendix A.1 discusses the extent to which countries' GDP data are comparable.

rates between the individual national currencies and a common currency unit (customarily the US dollar). The choices for conversion rates are exchange rates and purchasing power parities (PPP). (For their strengths and weaknesses, see Appendix 1.)

3.1 Economic Scale and Growth

Table 1 provides snapshot-level comparisons of Asian countries, based on GDP at current market prices using exchange rates,[6] for the six separate years of 1970, 1990, 2000, and 2008–2010. By this

Table 1 Cross-Country Comparison of GDP Using Exchange Rates, 1970, 1990, 2000, and 2008–2010
——GDP at current market prices, using annual average exchange rate

1970		(%)	1990		(%)	2000		(%)	2008		(%)	2009		(%)	2010		(%)
Japan	209	100.0	Japan	3,103	100.0	Japan	4,741	100.0	Japan	4,859	100.0	Japan	5,047	100.0	China	5,926	100.0
China	92	43.9	China	390	12.6	China	1,198	25.3	China	4,519	93.0	China	4,990	98.9	Japan	5,501	92.8
India	63	30.4	India	332	10.7	Korea	533	11.3	India	1,269	26.1	India	1,333	26.4	India	1,692	28.6
Pakistan	12	5.8	Korea	270	8.7	India	479	10.1	Korea	931	19.2	Korea	834	16.5	Korea	1,015	17.1
Iran	11	5.1	ROC	165	5.3	ROC	326	6.9	Indonesia	518	10.7	Indonesia	547	10.8	Indonesia	717	12.1
Indonesia	10	4.8	Indonesia	127	4.1	Saudi Arabia	190	4.0	Saudi Arabia	480	9.9	Iran	400	7.9	Iran	467	7.9
Bangladesh	10	4.7	Saudi Arabia	118	3.8	Hong Kong	169	3.6	ROC	400	8.2	Saudi Arabia	380	7.5	Saudi Arabia	455	7.7
Korea	9	4.3	Iran	94	3.0	Indonesia	168	3.5	Iran	387	8.0	ROC	378	7.5	ROC	430	7.3
Philippines	7	3.5	Thailand	88	2.8	Thailand	126	2.7	UAE	321	6.6	Thailand	279	5.5	Thailand	341	5.8
Thailand	7	3.5	Hong Kong	77	2.5	Iran	110	2.3	Thailand	290	6.0	UAE	276	5.5	UAE	304	5.1
ROC	6	2.8	UAE	51	1.6	UAE	105	2.2	Malaysia	223	4.6	Hong Kong	209	4.1	Malaysia	238	4.0
Saudi Arabia	5	2.6	Philippines	49	1.6	Singapore	94	2.0	Hong Kong	215	4.4	Malaysia	193	3.8	Singapore	227	3.8
Malaysia	4	1.9	Pakistan	48	1.5	Malaysia	94	2.0	Singapore	190	3.9	Singapore	186	3.7	Hong Kong	224	3.8
Hong Kong	4	1.8	Malaysia	46	1.5	Philippines	81	1.7	Philippines	174	3.6	Philippines	168	3.3	Philippines	199	3.4
Kuwait	3	1.4	Singapore	39	1.3	Pakistan	72	1.5	Kuwait	150	3.1	Pakistan	158	3.1	Pakistan	176	3.0
Myanmar	3	1.3	Bangladesh	29	0.9	Bangladesh	46	1.0	Pakistan	148	3.0	Kuwait	108	2.1	Qatar	129	2.2
Sri Lanka	3	1.2	Kuwait	19	0.6	Kuwait	38	0.8	Qatar	117	2.4	Qatar	99	2.0	Kuwait	127	2.1
Singapore	2	0.9	Oman	12	0.4	Vietnam	31	0.7	Vietnam	92	1.9	Vietnam	98	1.9	Vietnam	105	1.8
Vietnam	1	0.6	Sri Lanka	8	0.3	Oman	20	0.4	Bangladesh	80	1.6	Bangladesh	90	1.8	Bangladesh	100	1.7
UAE	1	0.5	Qatar	7	0.2	Qatar	18	0.4	Oman	61	1.3	Oman	49	1.0	Oman	60	1.0
Nepal	1	0.5	Vietnam	7	0.2	Sri Lanka	17	0.4	Sri Lanka	41	0.8	Sri Lanka	42	0.8	Sri Lanka	50	0.8
Cambodia	1	0.4	Myanmar	5	0.2	Bahrain	8	0.2	Bahrain	23	0.5	Bahrain	20	0.4	Myanmar	23	0.4
Qatar	1	0.3	Bahrain	4	0.1	Myanmar	7	0.2	Myanmar	18	0.4	Myanmar	20	0.4	Bahrain	23	0.4
Bahrain	0	0.2	Nepal	4	0.1	Nepal	6	0.1	Brunei	14	0.3	Nepal	15	0.3	Nepal	19	0.3
Oman	0	0.1	Brunei	3	0.1	Brunei	6	0.1	Nepal	14	0.3	Brunei	11	0.2	Brunei	14	0.2
Fiji	0	0.1	Cambodia	2	0.1	Cambodia	4	0.1	Cambodia	10	0.2	Cambodia	11	0.2	Cambodia	11	0.2
Brunei	0	0.1	Fiji	1	0.0	Fiji	2	0.0	Mongolia	6	0.1	Lao PDR	6	0.1	Lao PDR	7	0.1
Mongolia	0	0.1	Mongolia	1	0.0	Lao PDR	2	0.0	Lao PDR	5	0.1	Mongolia	5	0.1	Mongolia	6	0.1
			Lao PDR	1	0.0	Mongolia	1	0.0	Fiji	4	0.1	Fiji	3	0.1	Fiji	3	0.1
(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)		
APO20	360	172.4	APO20	4,493	144.8	APO20	7,102	149.8	APO20	9,857	202.9	APO20	9,999	198.1	APO20	11,530	194.6
Asia23	454	217.6	Asia23	4,891	157.6	Asia23	8,314	175.4	Asia23	14,409	296.5	Asia23	15,021	297.6	Asia23	17,493	295.2
Asia29	464	222.7	Asia29	5,103	164.5	Asia29	8,693	183.4	Asia29	15,562	320.2	Asia29	15,954	316.1	Asia29	18,590	313.7
East Asia	319	152.8	East Asia	4,006	129.1	East Asia	6,969	147.0	East Asia	10,931	225.0	East Asia	11,462	227.1	East Asia	13,102	221.1
South Asia	89	42.7	South Asia	422	13.6	South Asia	620	13.1	South Asia	1,552	31.9	South Asia	1,638	32.5	South Asia	2,037	34.4
ASEAN	35	16.9	ASEAN	367	11.8	ASEAN	613	12.9	ASEAN	1,535	31.6	ASEAN	1,518	30.1	ASEAN	1,883	31.8
GCC	11	5.1	GCC	211	6.8	GCC	380	8.0	GCC	1,152	23.7	GCC	933	18.5	GCC	1,098	18.5
(reference)			(reference)			(reference)			(reference)			(reference)			(reference)		
US	1,038	497.9	US	5,801	186.9	US	9,952	209.9	US	14,292	294.1	US	13,939	276.2	US	14,527	245.1
EU15	1,197	573.8	EU15	6,179	199.1	EU15	9,544	201.3	EU15	13,999	288.1	EU15	13,639	270.3	EU15	13,942	235.3
						EU27	10,584	223.3	EU27	15,968	328.6	EU27	15,604	309.2	EU27	15,934	268.9
Australia	45	21.6	Australia	323	10.4	Australia	407	8.6	Australia	1,039	21.4	Australia	998	19.8	Australia	1,271	21.4

Unit: Billions of US dollars.
Sources: Official national accounts in each country, including author adjustments.
Note: See Appendix A.1 for the adjustments made to harmonize GDP coverage across countries.

measure, Japan had been the largest economy in Asia until 2010 when China finally overtook Japan's position to become the second-largest economy in the world after the US. Japan clearly surged ahead strongly between the 1970 and 1990 comparisons, dwarfing the relative size of all other Asian economies and reducing the US lead from five times to less than two times its economy. The turn of Japan's fortune came in 1990, when the country's bubble years of the late 1980s ended and its descent began. Thereafter, stagnation in Japan combined with vibrant growth in developing Asia has resulted in the rapid erosion of Japan's prominence in the regional economy. On this measure, Asia29 was 28 per cent and 33 per cent larger than the US and EU15 in 2010, respectively.

Comparisons based on exchange rates could appear arbitrary, as movements in exchange rates can be volatile, subject to short-term, at times substantial, fluctuations of speculative capital flows and government intervention. Furthermore, comparisons based on exchange rates typically underestimate the size of a developing economy and in turn the perceived welfare of its residents. The rankings of scale of economy change dramatically when international price differences are properly accounted for. This is because exchange rates embody the trade sector bias (i.e., more influence by the prices of traded than non-traded goods and services) and thus do not necessarily succeed in correcting the price differentials among countries. As developing economies tend to have relatively lower wages and in turn lower prices for non-traded goods and services, a unit of local currency has greater purchasing power in the local economy than reflected in its exchange rate.

Figure 3 shows the extent to which the exchange rates have failed to reflect countries' price differentials properly relative to the US. With the exception of Japan and Australia, exchange rates systematically under-represent the relative purchasing power for all the countries covered in this report. The underestimation is substantial for some, ranging from 15 per cent for Fiji to 76 per cent for Myanmar. Thus, the exchange-rate-based GDP considerably underestimates the economic scales in real terms for those countries. By taking into account the international price differentials, purchasing power parity (PPP) rectifies the trade sector bias, and in turn the relative size of economies can be more adequately measured.[7]

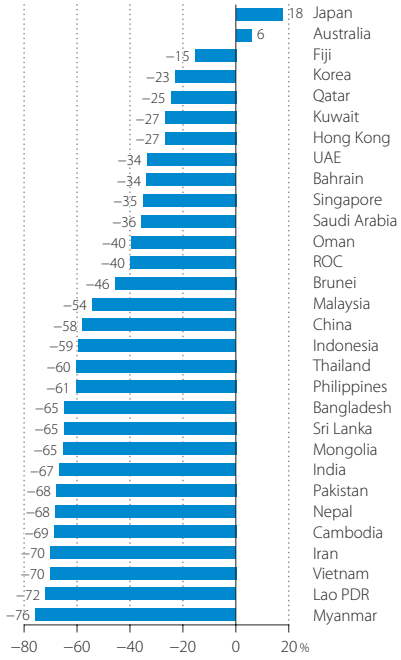

Figure 3 Relative Prices of GDP, 2005
——Ratio of PPP to exchange rate (reference country=US)

Sources: AMA rates by UNSD and PPP by World Bank.

6: The exchange rates used in this *Databook* are the adjusted rates, which are called the AMA (Analysis of Main Aggregate) rates in the UN Statistics Division's National Accounts Main Aggregate Database. The AMA rates coincide with the IMF rates (which are mostly the annual average of market or official exchange rates) except for some periods in countries with official fixed exchange rates and high inflation, when there could be a serious disparity between real GDP growth and growth converted to US dollars based on IMF rates. In such cases, the AMA adjusts the IMF-based rates by multiplying the growth rate of the GDP deflator relative to that of the US.

7: It is therefore important to note that any international GDP comparisons are sensitive not only to revisions in national accounts but also to revisions in multilateral PPPs. Results presented in this edition are based on the PPP estimates of the 2005 International Comparisons Program benchmarking round.

Table 2 repeats the same snapshot-level comparisons of Asian countries as in Table 1 but based on GDP at constant market prices using constant PPPs for Asian countries. By correcting for international price differentials, Asia29 has been expanding rapidly, and was 91 per cent, instead of 28 per cent, larger than the US economy in 2010, having overtaken it in 1988 (Figure 4). East Asia (China, the ROC, Hong Kong, Japan, Korea, and Mongolia) caught up with the US in 2008 from a low base of 42 per cent in 1970. In contrast, EU15 has been experiencing a relative decline in economic size, from 116 per cent of the US economy in 1970 to a low of 93 per cent in 2010. Based on GDP using constant PPPs, therefore, the weight of the world economy is even more tilted toward Asia than portrayed by GDP using exchange rates. This reflects the fact that nearly all Asian countries increase in relative size after international price differentials have been properly accounted for. The relative size of China's economy in

Table 2 Cross-Country Comparison of GDP Using PPP, 1970, 1990, 2000, and 2008–2010
——GDP at constant market prices, using 2005 PPPs, reference year 2010

1970		(%)	1990		(%)	2000		(%)	2008		(%)	2009		(%)	2010		(%)
Japan	1,501	100.0	Japan	3,644	100.0	Japan	4,076	100.0	China	8,398	100.0	China	9,171	100.0	China	10,125	100.0
India	502	33.4	China	1,387	38.1	China	3,738	91.7	Japan	4,449	53.0	Japan	4,203	45.8	Japan	4,389	43.3
China	312	20.8	India	1,159	31.8	India	1,972	48.4	India	3,470	41.3	India	3,757	41.0	India	4,064	40.1
Iran	215	14.3	Korea	519	14.2	Korea	977	24.0	Korea	1,377	16.4	Korea	1,381	15.1	Korea	1,468	14.5
Saudi Arabia	140	9.3	Indonesia	415	11.4	Indonesia	631	15.5	Indonesia	945	11.2	Indonesia	988	10.8	Indonesia	1,048	10.4
Indonesia	100	6.7	Iran	388	10.6	Iran	573	14.1	Iran	941	11.2	Iran	982	10.7	Iran	1,047	10.3
Korea	87	5.8	Saudi Arabia	347	9.5	ROC	565	13.9	ROC	758	9.0	ROC	745	8.1	ROC	824	8.1
Philippines	83	5.5	ROC	308	8.5	Saudi Arabia	455	11.2	Saudi Arabia	603	7.2	Saudi Arabia	603	6.6	Thailand	632	6.2
Kuwait	81	5.4	Thailand	260	7.1	Thailand	405	9.9	Thailand	594	7.1	Thailand	588	6.4	Saudi Arabia	628	6.2
Pakistan	70	4.6	Pakistan	203	5.6	Pakistan	299	7.3	Pakistan	438	5.2	Pakistan	453	4.9	Pakistan	471	4.6
Thailand	64	4.3	Philippines	173	4.8	Malaysia	266	6.5	Malaysia	396	4.7	Malaysia	389	4.2	Malaysia	417	4.1
ROC	58	3.9	Hong Kong	150	4.1	UAE	235	5.8	UAE	360	4.3	UAE	356	3.9	Philippines	368	3.6
Bangladesh	57	3.8	UAE	143	3.9	Philippines	231	5.7	Philippines	338	4.0	Philippines	342	3.7	UAE	361	3.6
Malaysia	34	2.3	Malaysia	134	3.7	Hong Kong	220	5.4	Hong Kong	314	3.7	Hong Kong	306	3.3	Hong Kong	327	3.2
HongKong	33	2.2	Bangladesh	88	2.4	Singapore	170	4.2	Singapore	259	3.1	Vietnam	263	2.9	Singapore	294	2.9
Vietnam	30	2.0	Singapore	85	2.3	Bangladesh	140	3.4	Vietnam	249	3.0	Singapore	256	2.8	Vietnam	281	2.8
Singapore	17	1.1	Vietnam	67	1.8	Vietnam	139	3.4	Bangladesh	221	2.6	Bangladesh	233	2.5	Bangladesh	247	2.4
Sri Lanka	15	1.0	Kuwait	50	1.4	Kuwait	87	2.1	Kuwait	141	1.7	Kuwait	133	1.4	Qatar	156	1.5
Qatar	12	0.8	Sri Lanka	38	1.0	Sri Lanka	64	1.6	Qatar	116	1.4	Qatar	130	1.4	Kuwait	135	1.3
Myanmar	9	0.6	Oman	32	0.9	Oman	49	1.2	Sri Lanka	95	1.1	Sri Lanka	98	1.1	Sri Lanka	106	1.0
UAE	7	0.5	Qatar	23	0.6	Qatar	44	1.1	Myanmar	77	0.9	Myanmar	85	0.9	Myanmar	93	0.9
Brunei	7	0.5	Nepal	17	0.5	Myanmar	30	0.7	Oman	73	0.9	Oman	76	0.8	Oman	80	0.8
Oman	5	0.3	Myanmar	15	0.4	Nepal	28	0.7	Nepal	37	0.4	Nepal	39	0.4	Nepal	40	0.4
Bahrain	4	0.3	Brunei	13	0.4	Bahrain	17	0.4	Cambodia	29	0.4	Bahrain	30	0.3	Cambodia	31	0.3
Mongolia	2	0.1	Bahrain	11	0.3	Brunei	17	0.4	Bahrain	29	0.3	Cambodia	29	0.3	Bahrain	31	0.3
Fiji	1	0.1	Cambodia	7	0.2	Cambodia	14	0.4	Brunei	19	0.2	Brunei	19	0.2	Brunei	19	0.2
			Mongolia	5	0.1	Lao PDR	8	0.2	Lao PDR	14	0.2	Lao PDR	15	0.2	Lao PDR	16	0.2
			Lao PDR	4	0.1	Mongolia	6	0.1	Mongolia	11	0.1	Mongolia	10	0.1	Mongolia	11	0.1
			Fiji	3	0.1	Fiji	4	0.1	Fiji	4	0.0	Fiji	4	0.0	Fiji	4	0.0
(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)		
APO20	2,870	191.2	APO20	7,668	210.4	APO20	10,788	264.7	APO20	14,938	177.9	APO20	15,081	164.4	APO20	16,086	158.9
Asia23	3,198	213.0	Asia23	9,083	249.3	Asia23	14,573	357.5	Asia23	23,432	279.0	Asia23	24,355	265.6	Asia23	26,324	260.0
Asia29	3,447	229.6	Asia29	9,688	265.9	Asia29	15,461	379.3	Asia29	24,755	294.8	Asia29	25,683	280.0	Asia29	27,715	273.7
East Asia	1,994	132.8	East Asia	6,014	165.0	East Asia	9,582	235.1	East Asia	15,307	182.3	East Asia	15,816	172.5	East Asia	17,145	169.3
South Asia	644	42.9	South Asia	1,504	41.3	South Asia	2,503	61.4	South Asia	4,260	50.7	South Asia	4,581	49.9	South Asia	4,928	48.7
ASEAN	344	22.9	ASEAN	1,174	32.2	ASEAN	1,911	46.9	ASEAN	2,920	34.8	ASEAN	2,973	32.4	ASEAN	3,200	31.6
GCC	249	16.6	GCC	605	16.6	GCC	888	21.8	GCC	1,323	15.7	GCC	1,328	14.5	GCC	1,391	13.7
(reference)			(reference)			(reference)			(reference)			(reference)			(reference)		
US	4,735	315.4	US	8,909	244.5	US	12,449	305.4	US	14,608	173.9	US	14,099	153.7	US	14,526	143.5
EU15	5,487	365.5	EU15	9,531	261.6	EU15	11,956	293.3	EU15	13,871	165.2	EU15	13,267	144.7	EU15	13,531	133.6
						EU27	13,413	329.1	EU27	15,717	187.1	EU27	15,042	164.0	EU27	15,324	151.4
Australia	260	17.3	Australia	469	12.9	Australia	666	16.3	Australia	859	10.2	Australia	880	9.6	Australia	897	8.9

Unit: Billions of US dollars (as of 2010).
Sources: Official national accounts in each country, including author adjustments.
Note: See Appendix A.1 for the adjustments made to harmonize GDP coverage across countries.

2010 more than doubled to 231 per cent that of Japan, compared with 108 per cent when exchange rates are used in Table 1. Similarly, its size increased from 41 per cent to 70 per cent relative to the US economy in 2010. On this measure, China has overtaken Japan since 2002 to become the leading economy in Asia (Figure 5). This represents remarkable growth, considering that the Chinese economy was only 21 per cent that of Japan and 62 per cent that of India in 1970. India has also nearly caught up with Japan, with its relative size having increased from 33 per cent in 1970 to 93 per cent in 2010. If India and Japan were to grow at the same pace as they have been on average during 2000–2010, (i.e., at 7.2 per cent and 0.7 per cent a year, respectively), India is projected to overtake Japan and become the second-largest economy in Asia and the third-largest economy in the world by 2013. Assuming that China and the US also grow at the same pace as they have been during the same period, the total GDP of the three largest Asian countries alone will be about 50 per cent larger than the US economy.

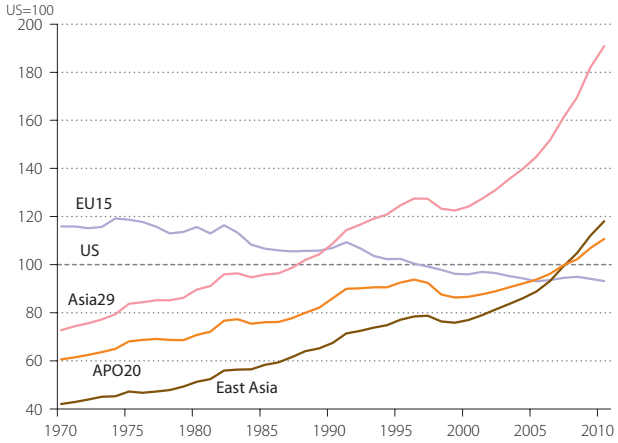

Figure 4 Regional GDP of Asia and EU Relative to the US, 1970–2010
——Indices of GDP at constant market prices, using 2005 PPPs

Sources: Official national accounts in each country, including author adjustments.

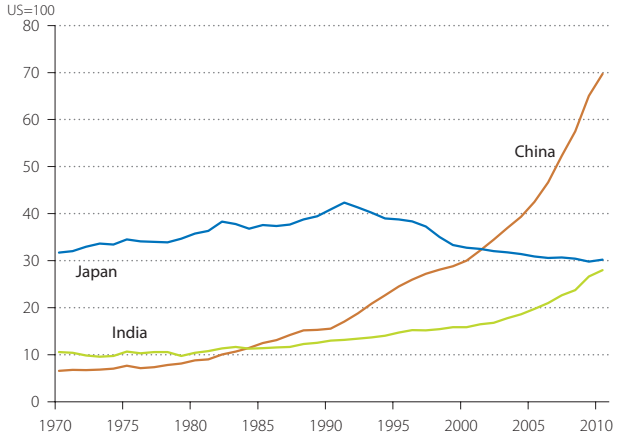

Figure 5 GDP of China, India, and Japan, 1970–2010
——Indices of GDP at constant market prices, using 2005 PPPs

Sources: Official national accounts in each country, including author adjustments.

Figure 6 shows the rapid expansion of the relative size of the South Asia economy (consisting of Bangladesh, India, Nepal, Pakistan, and Sri Lanka), 83 per cent of which was accounted for by India in 2010. The catch-up effort of ASEAN[8] has also been vigorous, but the setback caused by the Asian financial crisis of 1997–1998 is clearly visible. This partly explains why the ASEAN economy has fallen behind the regional economy of South Asia. In contrast, the progress of GCC[9] countries sagged for

8: ASEAN (Association of Southeast Asian Nations) consists of Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

9: GCC (Gulf Cooperation Council) consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). These GCC countries display economic characteristics very different from those of other Asian economies due to their preponderant reliance on the oil and energy sector. Together, these countries account for about 45 per cent of the world's proven oil reserves and 25 per cent of crude oil exports, and possess at least 17 per cent of the proven global natural gas reserves.

Box 1 Compilation of National Accounts in Asian Countries

Understanding data comparability is essential for the construction of an international database, and it requires significant effort and expert knowledge. Between May and August 2010, metadata surveys on the national accounts and other statistical data required for international comparisons of productivity were conducted among the APO member economies. The aim of these surveys was to gather the metadata of the input data series required to populate the APO Productivity Database.

Broadly speaking, cross-country data inconsistency can arise from variations in one or more of the three aspects of a statistic: definitions, coverage, and methodology. The international definitions and guidelines work to standardize countries' measurement efforts, but country data can deviate from the international best practice and vary in terms of omissions and coverage achieved. Last but not least, countries can also vary in their estimation methodology and assumptions, which may account for part of the differences we observe in the data and interfere with comparisons of countries' underlying economic performance.

Most of the economic performance indicators in this report are GDP-related. The surveys therefore put a lot of emphasis on discerning countries' GDP compilation practices. For GDP, we take the System of National Accounts 1993 (1993 SNA) as the standard, and note how countries' practices deviate from it. Since there are differences between the 1993 SNA and its predecessor (1968 SNA) in some concepts and coverage, it is important to know in which year in the data series definitions and classification started to switch over, so as to identify breaks in the time series. Figure B1 presents the current situation in compilations and data availability of the backward estimates based on the 1968 and 1993 SNAs and the future plan for introducing

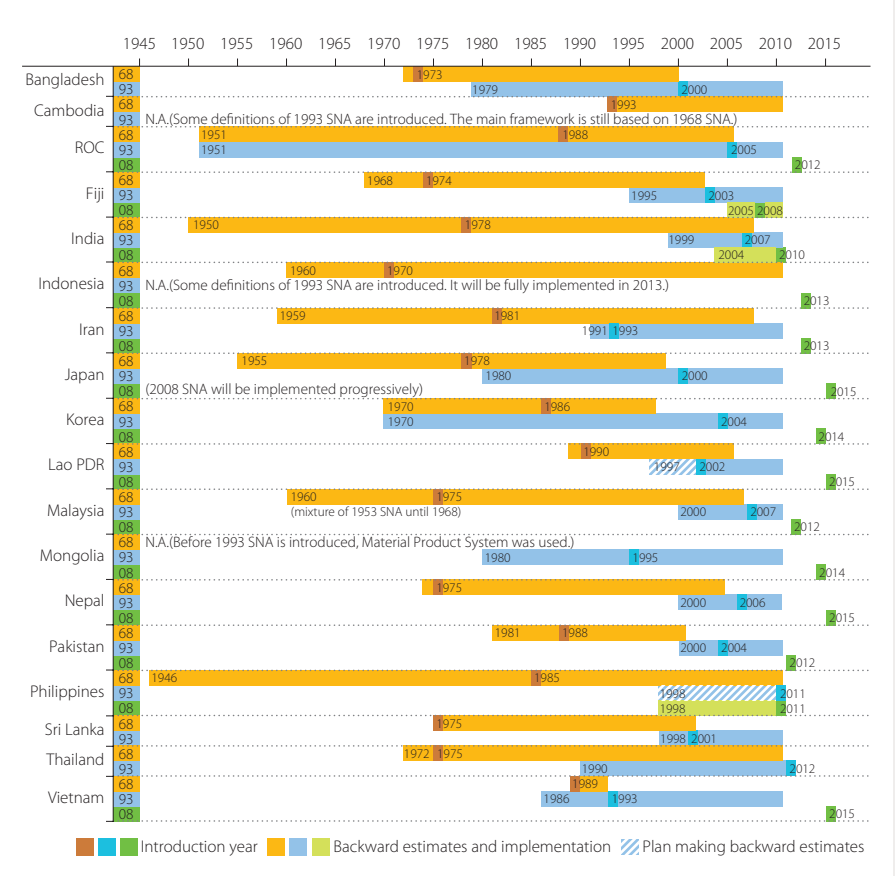

Figure B1 Implementation of the 1968 and 1993 SNA and Plan for the 2008 SNA

Source: APO Metadata Survey 2011.

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the 2008 SNA. For example, Japan started to publish national accounts based on the 1993 SNA in 2000 (backward estimates based on the 1993 SNA are available from 1980 at present) and will introduce the 2008 SNA progressively and switch to it in 2015–2016.

As Figure B1 suggests, countries differ in their year of introduction, the extent of implementation, and backward estimates available. According to our survey response, most APO countries are currently 1993 SNA compliant (partly or fully), although for some countries the switchover was only a recent affair; and for Indonesia and Thailand, the 1993 SNA is planned to be fully introduced in the near future. The starting year of the official 1993 SNA-compliant time series therefore varies a great deal across countries, reflecting the differences in the availability of backward estimates. Countries may have adopted the 1993 SNA as the framework for their national accounts, but the extent of compliance in terms of coverage may still vary. Our survey findings highlight two areas that require alignments to improve comparability: the treatment of FISIM (financial intermediation services indirectly measured) and the capitalization of software.

FISIM is an indirect measure of the value of financial intermediation services provided, but for which financial institutions do not charge explicitly (United Nations, 1993: para. 6.124). It represents a significant part of the income of the finance sector. The 1993 SNA recommends that FISIM should be allocated to users (to individual industries and final demands). This is in contrast to the 1968 SNA, where the imputed banking services were allocated exclusively to the business sector. The common practice was to create a notional industry that buys the entire service as an intermediate expense and generates an equivalent negative value added. As such, the imputed banking services have no impact on GDP. Therefore, the 1993 SNA recommendation, if fully implemented, will impact on industry GDP and the overall GDP for the total economy (by the part of FISIM allocated to final demands). Among the 20 APO member economies, 12 countries have incorporated FISIM in their official national accounts. Due to the lack of information to adjust the data properly, our current decision is to harmonize the data by excluding FISIM from GDP for all countries in the APO Productivity Database.

The 1993 SNA also recommends the capitalization of intangible assets, which changes not only the size of GDP but also the size of capital input. One intangible asset is computer software, which includes pre-packaged software, custom software, and own-account software. Among the APO member economies, only nine have capitalized all three types of software. Another three countries exclude own-account software in their capitalization, in one country only pre-packaged software is capitalized, and in one country only custom software is capitalized. For the APO Productivity Database, tentative adjustments have been made to harmonize data to include all software. See Appendix A.1 for details of the adjustments.

over two decades; only in the past five years has it picked up slightly and brought the relative size of the country group back to its previous peak of the early 1980s.[10]

Countries' relative performance is also reshuffled when economic growth is used as the yardstick. Table 3 presents cross-country comparisons of real GDP growth in Asia, covering the 1990s and 2000s.[11] The rankings vary from period to period and are no longer dominated by the economic giants. In fact, small developing Asian countries, like Qatar, Cambodia, Vietnam, and Mongolia, are equally capable of striking up exuberant growth. In contrast,

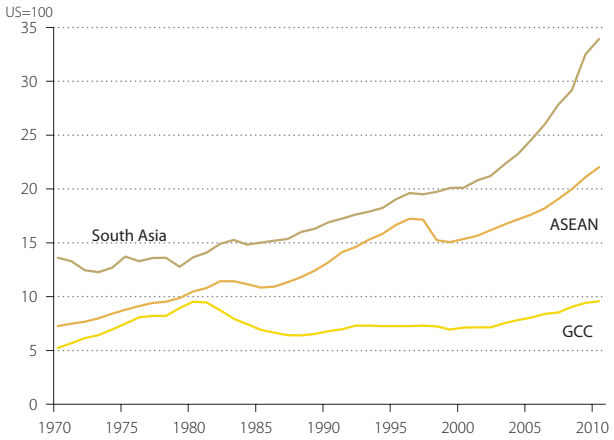

Figure 6 Regional GDP of South Asia, ASEAN, and GCC, 1970–2010

——Indices of GDP at constant market prices, using 2005 PPPs

Sources: Official national accounts in each country, including author adjustments.

Table 3 GDP Growth, 1990–1995, 1995–2000, 2000–2005, and 2005–2010

—— Average annual growth rate of GDP at constant market prices

1990–1995		1995–2000		2000–2005		2005–2010		1990–2010		2000–2010	
China	11.6	Qatar	10.6	Myanmar	12.1	Qatar	17.1	China	9.9	Qatar	12.6
Kuwait	9.2	China	8.3	China	9.3	Myanmar	10.7	Qatar	9.5	Myanmar	11.4
Malaysia	9.1	Myanmar	8.0	Cambodia	9.0	China	10.6	Myanmar	9.1	China	10.0
Singapore	8.2	Cambodia	7.0	Qatar	8.1	Lao PDR	7.9	Cambodia	7.3	Cambodia	7.8
Thailand	8.2	Vietnam	6.7	Vietnam	7.2	India	7.7	Vietnam	7.2	India	7.2
Vietnam	7.9	UAE	6.3	Kuwait	7.2	Vietnam	6.8	Lao PDR	6.6	Vietnam	7.0
Korea	7.6	Lao PDR	5.9	Iran	6.8	Oman	6.7	India	6.3	Lao PDR	7.0
Indonesia	7.6	India	5.7	India	6.8	Cambodia	6.5	Singapore	6.2	Mongolia	6.3
ROC	7.0	Singapore	5.6	Mongolia	6.3	Mongolia	6.3	Malaysia	5.7	Iran	6.0
Cambodia	6.6	ROC	5.1	Lao PDR	6.1	Singapore	6.3	Bahrain	5.4	Bahrain	5.8
Lao PDR	6.2	Bangladesh	5.1	Bahrain	6.1	Sri Lanka	6.2	Korea	5.2	Bangladesh	5.7
Oman	5.7	Korea	5.1	UAE	5.4	Bangladesh	6.0	Bangladesh	5.2	Singapore	5.5
Myanmar	5.7	Sri Lanka	4.9	Thailand	5.3	Bahrain	5.6	Sri Lanka	5.1	Sri Lanka	5.1
Bahrain	5.5	Nepal	4.8	Bangladesh	5.3	Indonesia	5.5	Kuwait	5.0	Indonesia	5.1
Sri Lanka	5.3	Malaysia	4.7	Pakistan	4.9	Iran	5.2	Iran	5.0	Oman	4.9
Hong Kong	5.1	Bahrain	4.4	Singapore	4.7	Philippines	4.8	ROC	4.9	Philippines	4.7
India	5.0	Iran	4.1	Malaysia	4.6	Malaysia	4.4	Oman	4.7	Pakistan	4.5
Nepal	4.9	Mongolia	3.6	Indonesia	4.6	Nepal	4.3	Indonesia	4.6	Malaysia	4.5
Pakistan	4.6	Philippines	3.5	Philippines	4.5	Pakistan	4.2	UAE	4.6	Thailand	4.4
Bangladesh	4.3	Pakistan	3.2	Korea	4.4	ROC	4.0	Thailand	4.4	Kuwait	4.4
Iran	3.7	Oman	3.2	Hong Kong	4.1	Hong Kong	3.9	Nepal	4.3	UAE	4.3
UAE	3.6	Hong Kong	2.6	Sri Lanka	4.0	Korea	3.7	Pakistan	4.2	Korea	4.1
Brunei	3.1	Saudi Arabia	2.6	Saudi Arabia	3.8	Thailand	3.6	Hong Kong	3.9	Hong Kong	4.0
Saudi Arabia	2.8	Kuwait	2.1	ROC	3.5	UAE	3.2	Philippines	3.8	ROC	3.8
Fiji	2.7	Fiji	2.0	Nepal	3.1	Saudi Arabia	2.7	Mongolia	3.6	Nepal	3.7
Qatar	2.3	Brunei	1.4	Oman	3.1	Kuwait	1.6	Saudi Arabia	3.0	Saudi Arabia	3.2
Philippines	2.2	Japan	0.8	Brunei	2.1	Brunei	0.7	Brunei	1.8	Brunei	1.4
Japan	1.4	Indonesia	0.8	Fiji	2.0	Japan	0.3	Fiji	1.7	Fiji	1.1
Mongolia	−1.8	Thailand	0.7	Japan	1.2	Fiji	0.1	Japan	0.9	Japan	0.7
(regrouped)		(regrouped)		(regrouped)		(regrouped)		(regrouped)		(regrouped)	
APO20	3.9	APO20	2.9	APO20	3.9	APO20	4.0	APO20	3.7	APO20	4.0
Asia23	5.3	Asia23	4.1	Asia23	5.5	Asia23	6.3	Asia23	5.3	Asia23	5.9
Asia29	5.2	Asia29	4.1	Asia29	5.4	Asia29	6.2	Asia29	5.3	Asia29	5.8
East Asia	5.1	East Asia	4.2	East Asia	5.2	East Asia	6.4	East Asia	5.2	East Asia	5.8
South Asia	4.9	South Asia	5.3	South Asia	6.4	South Asia	7.2	South Asia	5.9	South Asia	6.8
ASEAN	7.2	ASEAN	2.6	ASEAN	5.1	ASEAN	5.2	ASEAN	5.0	ASEAN	5.2
GCC	3.8	GCC	3.9	GCC	4.8	GCC	4.2	GCC	4.2	GCC	4.5
(reference)		(reference)		(reference)		(reference)		(reference)		(reference)	
US	2.5	US	4.2	US	2.4	US	0.7	US	2.4	US	1.5
EU15	1.6	EU15	2.9	EU15	1.8	EU15	0.7	EU15	1.8	EU15	1.2
		EU27	2.8	EU27	1.8	EU27	0.9	EU27	1.8	EU27	1.3
Australia	3.2	Australia	3.8	Australia	3.4	Australia	2.6	Australia	3.2	Australia	3.0

Unit: Percentage.
Sources: Official national accounts in each country, including author adjustments.
Note: See Appendix A.1 for the adjustments made to harmonize GDP coverage across countries.

10: In interpreting the results in this report, we must bear in mind that conventional GDP tends to overstate the income of these oil-exporting countries since it does not account for the depletion of natural resource stock, and in turn a large part of their GDP may not be sustainable. Besides, GDP growth can underestimate the growth of real income available to the country brought about by a favorable change in terms of trade, and vice versa. For an oil-exporting country, the growth wedge of the two measures could be significant in the face of volatile oil prices. For example, Saudi Arabia's real GDP growth underestimated its real income growth by 24 per cent between 1970 and 2010 (see Chapter 7).

11: Annual data maximize the use of available information and data, and are normally published two to three years in arrears. For more timely analysis, quarterly economic data are used as they are normally published within a month of the reference period and are subsequently revised as more data become available. That is, there is a trade-off between data timeliness and precision. See Box 4 for more details.

Japan has been consistently struggling at the bottom over the past two decades, with average growth of 0.9 per cent per year, compared with Asia29's 5.3 per cent and the fastest growth of 9.9 per cent achieved by China. During this period, only three Asian countries – Brunei, Fiji, and Japan – grew slower than the US (2.4 per cent), and only Japan grew slower than EU15 (1.8 per cent). The divergence of growth performance between the Asian countries on the one hand and the US and EU15 on the other was even more pronounced if we look at the 2000s alone (i.e., Asia29's 5.8 per cent compared with the US at 1.5 per cent and EU15 at 1.2 per cent). The change of guards in Asia can be clearly seen in Figure 7. While Japan was the story of yesteryears, China and India have emerged as the driving force propelling Asia forward over the past two decades, accounting for 46 per cent and 15 per cent of regional growth, respectively. Although Japan has been the slowest growing economy in Asia, it remained the fourth-largest contributor to regional growth in 1990–2010 due to its size.

Looking at the four sub-periods (in Table 3), growth in the reference countries, namely the US, EU15, and Australia, revived between 1990–1995 and 1995–2000, before it began to deteriorate in the subsequent two periods in the 2000s. Both the US and EU15 went through deep recession in 2009, following the global financial storm. Consequently, for the second half of 2000s, they managed a growth of only 0.7 per cent. In contrast, growth in Asia has gone from strength to strength with a blip in the second half of the 1990s due to the Asian financial crisis. Fastest acceleration has been achieved by South Asia, from an annual average growth rate of 4.9 per cent in 1990–1995 to 7.2 per cent in 2005–2010, compared with 5.1 per cent and 6.4 per cent for East Asia, respectively. In contrast, ASEAN, which was most impacted by the Asian financial crisis among all country groups, has not yet fully recovered its pre-crisis growth vitality with the average growth rate in the second half of the 2000s, being 2 percentage points lower than that achieved in the first half of the 1990s.

Based on Table 3, it is easy to assume that Asia was not even slightly affected by the global financial crisis, as Asia29's growth rate accelerated from 5.4 per cent to 6.3 per cent between 2000–2005 and 2005–2010. But, in fact, Asia29's growth slowed significantly from a recent peak of 7.9 per cent in 2007, to 4.6 per cent in 2008 and further to 3.7 per cent in 2009, before rebounding strongly to 7.6 per cent in 2010, partly reflecting their crisis response in the form of fiscal stimulation. Out of the 29 countries, eight Asian economies experienced negative growth in 2009, with the deepest contraction of 5.7 per cent taking place in Japan. Of the four Asian Tigers, only Korea managed a narrow escape from a recession with 0.3 per cent growth in 2009.

It has been a subject of much debate if the Asian economy has

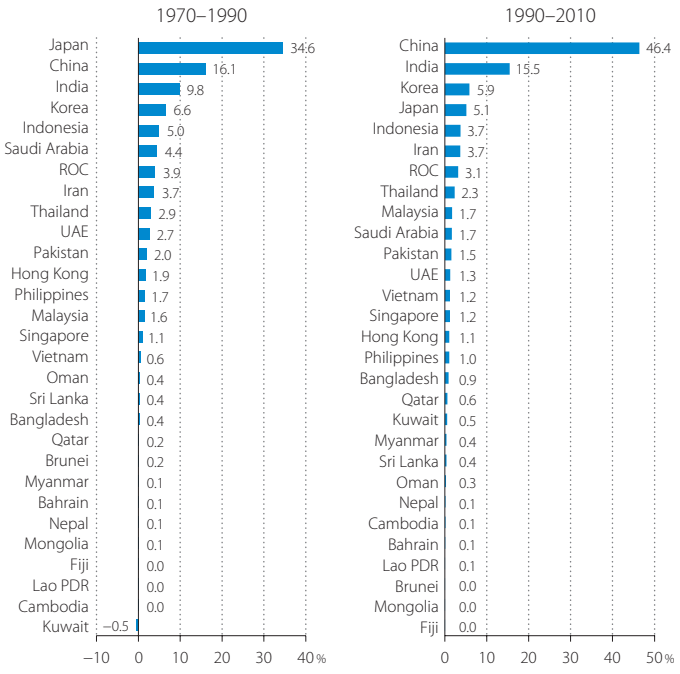

Figure 7 Country Contributions to Regional GDP Growth, 1970–1990 and 1990–2010

——Contribution share to the growth of gross regional products (growth rate of Asia29=100)

Sources: Official national accounts in each country, including author adjustments.

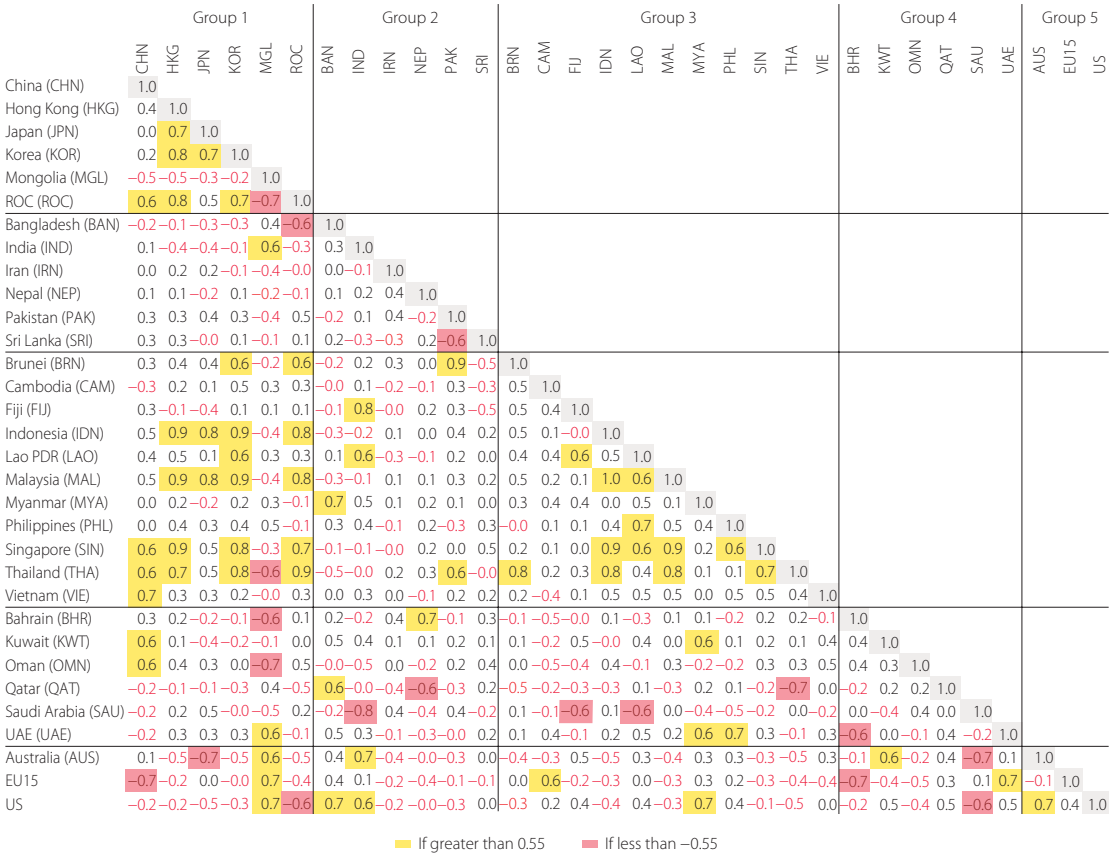

Figure 8 Correlation of GDP Growth in the 1990s
——Correlation of GDP growths at constant prices

Sources: Official national accounts in each country, including author adjustments.

decoupled from the business cycle in the US and EU15. If it has, the world economy will be less volatile. Park and Shin (2009) provide evidence that East Asia has seen a marked increase in intra-regional trade, and, at the same time, diversified its exports markets to other parts of the world, such that its output movement has become more idiosyncratic than before, and in turn, less dependent on that of the US. In particular, the importance of the US market as an outlet of China's final goods exports has weakened recently. In contrast, the impact of Asia's extra-regional integration with the global financial markets on business cycle synchronicity is less clear-cut. While deep financial markets allow more risk diversification and the smoothing out of consumption, closer integration also provides the conduit for financial contagion, and East Asia still suffers from the flight for quality when a crisis strikes. As the impact of the global financial crisis was filtering through, Asia seemed to be immune from the adverse impact initially. However, when the global investors began to retreat from the region and the financial menace began to transmit through the real economy, Asia too started to slow significantly.

Figures 8 and 9 compare the correlation coefficients of growth rates among countries in the 1990s and the 2000s, respectively. Countries are grouped by region. Overall, the correlation coefficients between China and other Asian economies strengthened between the two decades, suggesting that China has become more integrated within the Asian economy. It is interesting to note that the correlation coefficient between China and Japan moved from 0.0 to 0.6, and China's correlation with the US and EU15 is weaker than with other Asian countries. Correlation among the East Asian countries has

	Group 1						Group 2						Group 3												Group 4						Group 5		
	CHN	HKG	JPN	KOR	MGL	ROC	BAN	IND	IRN	NEP	PAK	SRI	BRN	CAM	FIJ	IDN	LAO	MAL	MYA	PHL	SIN	THA	VIE	BHR	KWT	OMN	QAT	SAU	UAE	AUS	EU15	US
China (CHN)	1.0																															
Hong Kong (HKG)	0.6	1.0																														
Japan (JPN)	0.6	0.8	1.0																													
Korea (KOR)	0.4	0.6	0.8	1.0																												
Mongolia (MGL)	0.4	0.8	0.7	0.4	1.0																											
ROC (ROC)	0.8	0.8	0.8	0.7	0.6	1.0																										
Bangladesh (BAN)	0.6	0.6	0.2	–0.1	0.5	0.3	1.0																									
India (IND)	0.6	0.4	0.2	–0.2	0.2	0.3	0.7	1.0																								
Iran (IRN)	–0.1	0.4	0.4	0.5	0.4	0.3	–0.3	–0.0	1.0																							
Nepal (NEP)	0.3	0.1	–0.1	–0.1	0.3	0.3	0.3	0.4	–0.0	1.0																						
Pakistan (PAK)	0.3	0.7	0.4	0.2	0.5	0.5	0.5	0.7	0.5	0.3	1.0																					
Sri Lanka (SRI)	0.7	0.7	0.4	0.2	0.6	0.7	0.6	0.5	–0.0	0.7	0.5	1.0																				
Brunei (BRN)	0.2	0.3	0.6	0.7	0.1	0.4	–0.3	–0.1	0.6	–0.4	0.1	–0.0	1.0																			
Cambodia (CAM)	0.2	0.8	0.7	0.5	0.8	0.4	0.3	0.2	0.7	–0.1	0.6	0.2	0.4	1.0																		
Fiji (FIJ)	–0.3	0.2	0.3	0.4	0.3	0.2	–0.2	–0.5	0.4	–0.3	0.0	–0.2	0.4	0.2	1.0																	
Indonesia (IDN)	0.8	0.6	0.4	0.2	0.6	0.6	0.7	0.5	–0.2	0.6	0.3	0.8	–0.3	0.3	–0.4	1.0																
Lao PDR (LAO)	0.6	0.3	0.0	–0.1	0.3	0.3	0.9	0.6	–0.4	0.4	0.2	0.7	–0.2	–0.1	–0.3	0.7	1.0															
Malaysia (MAL)	0.6	0.9	0.9	0.7	0.9	0.9	0.3	0.2	0.4	0.3	0.5	0.7	0.3	0.6	0.3	0.6	0.2	1.0														
Myanmar (MYA)	–0.1	0.5	0.4	0.2	0.5	0.3	0.0	0.3	0.8	0.0	0.8	0.2	0.4	0.7	0.3	–0.1	–0.3	0.4	1.0													
Philippines (PHL)	0.8	0.9	0.9	0.6	0.8	0.9	0.5	0.4	0.2	0.2	0.5	0.7	0.3	0.6	0.2	0.7	0.3	0.9	0.3	1.0												
Singapore (SIN)	0.8	0.9	0.8	0.6	0.6	1.0	0.5	0.5	0.2	0.3	0.6	0.8	0.3	0.5	0.1	0.7	0.4	0.8	0.3	0.9	1.0											
Thailand (THA)	0.5	0.7	0.9	0.8	0.6	0.8	–0.1	0.1	0.6	0.0	0.4	0.4	0.7	0.6	0.4	0.2	–0.2	0.8	0.5	0.8	0.7	1.0										
Vietnam (VIE)	0.4	0.8	0.7	0.6	0.7	0.6	0.3	0.4	0.8	0.1	0.8	0.4	0.4	0.9	0.1	0.3	0.1	0.7	0.8	0.6	0.6	0.6	1.0									
Bahrain (BHR)	0.3	0.7	0.5	0.3	0.8	0.4	0.4	0.3	0.6	0.4	0.7	0.5	0.1	0.8	–0.1	0.5	0.1	0.7	0.7	0.5	0.4	0.4	0.9	1.0								
Kuwait (KWT)	–0.0	0.5	0.5	0.1	0.6	0.3	–0.0	0.1	0.5	0.1	0.4	0.4	0.4	0.6	0.3	0.1	–0.2	0.6	0.8	0.4	0.3	0.6	0.5	0.7	1.0							
Oman (OMN)	0.1	0.2	0.1	–0.0	0.4	–0.1	0.5	–0.3	–0.3	–0.0	–0.3	0.1	–0.4	0.2	–0.0	0.5	0.4	0.2	–0.4	0.2	–0.0	–0.2	0.1	0.2	–0.1	1.0						
Qatar (QAT)	0.6	0.5	0.2	0.2	0.5	0.4	0.8	0.4	–0.2	0.3	0.3	0.6	–0.1	0.1	0.1	0.6	0.9	0.4	–0.1	0.5	0.6	0.0	0.2	0.1	–0.2	0.4	1.0					
Saudi Arabia (SAU)	0.2	0.6	0.5	–0.1	0.6	0.4	0.3	0.4	0.2	0.2	0.5	0.5	0.0	0.5	0.1	0.4	0.1	0.6	0.6	0.6	0.5	0.5	0.4	0.6	0.9	–0.0	0.0	1.0				
UAE (UAE)	0.0	0.6	0.5	0.2	0.7	0.4	0.3	0.3	0.6	0.1	0.6	0.4	0.4	0.7	0.5	0.1	0.1	0.6	0.8	0.5	0.4	0.5	0.7	0.7	0.8	–0.1	0.3	0.7	1.0			
Australia (AUS)	–0.2	0.1	0.2	0.2	0.1	–0.0	–0.3	0.1	0.8	–0.1	0.3	–0.3	0.6	0.5	0.1	–0.4	–0.4	0.1	0.7	0.0	–0.1	0.4	0.6	0.4	0.3	–0.4	–0.4	0.0	0.4	1.0		
EU15	0.4	0.8	0.9	0.7	0.8	0.6	0.2	0.0	0.7	–0.2	0.4	0.2	0.6	0.9	0.4	0.3	0.0	0.7	0.5	0.7	0.6	0.8	0.9	0.6	0.5	0.3	0.2	0.3	0.6	0.4	1.0	
US	0.4	0.9	0.9	0.7	0.7	0.8	0.1	0.2	0.6	–0.1	0.6	0.4	0.6	0.8	0.4	0.3	–0.1	0.8	0.7	0.8	0.8	0.9	0.8	0.6	0.7	–0.1	0.1	0.6	0.7	0.4	0.9	1.0

If greater than 0.55 If less than –0.55

Figure 9 Correlation of GDP Growth in the 2000s
——Correlation of GDP growths at constant prices

Sources: Official national accounts in each country, including author adjustments.

strengthened over time, and, with the exception of China, so has their correlation with the US and EU15. The correlation among countries in Group 3 and their correlation with the US and EU15, has also grown stronger. Within Group 3, we see that the ties of Vietnam and the Philippines with East Asia have become much closer.

3.2 Catching Up in Per Capita GDP

Performance comparisons based on whole-economy GDP do not take into account the population size and can in turn exaggerate the well-being of countries with large populations. Asia is the world's most populous region. In 2010, it accounted for 61 per cent of the world's population (56 per cent for Asia29), and China and India alone account for more than one-third (Figure 10). Based on per capita GDP, which adjusts for differences in population size (but not income distribution), Asia's rising economic giants

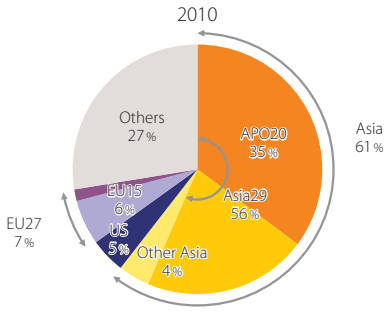

Figure 10 Share of Asian Population in the World in 2010

Source: IMF, World Economic Outlook Database, September 2011.

(i.e., China and India) are still very much less well-off compared with the US standard, whereas the Asian Tigers fare exceptionally well.[12]

Table 4 presents cross-country comparisons of per capita current-price GDP, using exchange rates as the conversion rates. However, given the volatile nature of exchange rates, snapshot comparisons like those presented in Table 4 can appear arbitrary. Rather, long-term trends of nominal per capita GDP provide a better guide of relative movements. Based on this measure, Japan closed up on the US level in the late 1980s and peaked in 1995, reflecting the strong yen (Figure 11). Figure 12 shows comparisons among the four Asian Tigers (Singapore, Hong Kong, the ROC, and Korea). Singapore and Hong

Table 4 Cross-Country Comparisons of Per Capita GDP Using Exchange Rate, 1970, 1990, 2000, and 2008–2010

——GDP at current market prices per person, using annual average exchange rate

1970		(%)	1990		(%)	2000		(%)	2008		(%)	2009		(%)	2010		(%)
Japan	2.01	100.0	Japan	25.10	100.0	Japan	37.35	100.0	Singapore	39.26	100.0	Japan	39.58	100.0	Singapore	44.79	100.0
Hong Kong	0.96	47.9	Hong Kong	13.48	53.7	Hong Kong	25.38	67.9	Japan	38.06	96.9	Singapore	37.22	94.0	Japan	42.95	95.9
Singapore	0.93	46.0	Singapore	12.75	50.8	Singapore	23.41	62.7	Hong Kong	30.86	78.6	Hong Kong	29.88	75.5	Hong Kong	31.72	70.8
Fiji	0.43	21.2	ROC	8.08	32.2	ROC	14.64	39.2	Korea	19.16	48.8	Korea	17.11	43.2	Korea	20.77	46.4
ROC	0.39	19.3	Korea	6.31	25.1	Korea	11.35	30.4	ROC	17.37	44.2	ROC	16.33	41.3	ROC	18.57	41.5
Iran	0.37	18.6	Malaysia	2.57	10.2	Malaysia	4.00	10.7	Malaysia	8.10	20.6	Malaysia	6.93	17.5	Malaysia	8.44	18.8
Malaysia	0.37	18.4	Fiji	1.85	7.4	Fiji	2.11	5.6	Iran	5.35	13.6	Iran	5.45	13.8	Iran	6.29	14.0
Korea	0.28	13.8	Iran	1.71	6.8	Thailand	2.08	5.6	Thailand	4.43	11.3	Thailand	4.24	10.7	Thailand	5.17	11.6
Thailand	0.21	10.6	Thailand	1.62	6.4	Iran	1.71	4.6	Fiji	4.31	11.0	China	3.74	9.4	China	4.42	9.9
Sri Lanka	0.21	10.4	Philippines	0.80	3.2	Philippines	1.06	2.8	China	3.40	8.7	Fiji	3.43	8.7	Fiji	3.77	8.4
Pakistan	0.20	10.0	Indonesia	0.71	2.8	China	0.95	2.5	Indonesia	2.24	5.7	Indonesia	2.33	5.9	Indonesia	3.02	6.7
Philippines	0.20	9.9	Mongolia	0.58	2.3	Sri Lanka	0.89	2.4	Mongolia	2.11	5.4	Sri Lanka	2.07	5.2	Sri Lanka	2.41	5.4
Bangladesh	0.14	7.1	Sri Lanka	0.49	1.9	Indonesia	0.81	2.2	Sri Lanka	2.02	5.1	Philippines	1.83	4.6	Mongolia	2.24	5.0
Cambodia	0.12	5.9	Pakistan	0.43	1.7	Pakistan	0.52	1.4	Philippines	1.93	4.9	Mongolia	1.69	4.3	Philippines	2.13	4.7
India	0.12	5.9	India	0.40	1.6	Mongolia	0.48	1.3	India	1.11	2.8	India	1.15	2.9	India	1.44	3.2
China	0.11	5.5	China	0.34	1.4	India	0.47	1.3	Vietnam	1.08	2.8	Vietnam	1.14	2.9	Vietnam	1.21	2.7
Mongolia	0.11	5.2	Bangladesh	0.27	1.1	Vietnam	0.41	1.1	Lao PDR	0.89	2.3	Pakistan	0.93	2.3	Lao PDR	1.12	2.5
Myanmar	0.10	4.9	Nepal	0.24	1.0	Bangladesh	0.37	1.0	Pakistan	0.89	2.3	Lao PDR	0.93	2.3	Pakistan	1.02	2.3
Nepal	0.09	4.4	Lao PDR	0.21	0.8	Lao PDR	0.32	0.8	Cambodia	0.78	2.0	Cambodia	0.78	2.0	Cambodia	0.83	1.9
Indonesia	0.09	4.2	Cambodia	0.19	0.8	Cambodia	0.31	0.8	Bangladesh	0.58	1.5	Bangladesh	0.64	1.6	Bangladesh	0.70	1.6
Vietnam	0.03	1.4	Myanmar	0.13	0.5	Nepal	0.28	0.7	Nepal	0.53	1.4	Nepal	0.56	1.4	Nepal	0.66	1.5
			Vietnam	0.10	0.4	Myanmar	0.16	0.4	Myanmar	0.36	0.9	Myanmar	0.39	1.0	Myanmar	0.46	1.0
Bahrain	1.82	90.3	Bahrain	9.16	36.5	Bahrain	13.12	35.1	Bahrain	20.94	53.4	Bahrain	17.37	43.9	Bahrain	18.47	41.2
Kuwait	3.95	196.7	Kuwait	8.95	35.7	Kuwait	17.94	48.0	Kuwait	54.37	138.5	Kuwait	37.66	95.2	Kuwait	42.77	95.5
Oman	0.38	19.1	Oman	6.53	26.0	Oman	8.18	21.9	Oman	21.41	54.5	Oman	15.42	39.0	Oman	21.66	48.4
Qatar	5.01	249.4	Qatar	15.73	62.7	Qatar	30.37	81.3	Qatar	83.64	213.1	Qatar	62.12	156.9	Qatar	73.37	163.8
Saudi Arabia	0.93	46.4	Saudi Arabia	7.29	29.0	Saudi Arabia	9.49	25.4	Saudi Arabia	18.35	46.7	Saudi Arabia	14.18	35.8	Saudi Arabia	16.57	37.0
UAE	4.46	221.8	UAE	28.86	115.0	UAE	35.20	94.2	UAE	51.67	131.6	UAE	39.80	100.6	UAE	40.45	90.3
Brunei	1.50	74.4	Brunei	12.70	50.6	Brunei	17.34	46.4	Brunei	36.83	93.8	Brunei	27.86	70.4	Brunei	33.91	75.7
(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)		
APO20	0.32	15.8	APO20	2.59	10.3	APO20	3.46	9.3	APO20	4.28	10.9	APO20	4.28	10.8	APO20	4.88	10.9
Asia23	0.23	11.4	Asia23	1.68	6.7	Asia23	2.47	6.6	Asia23	3.91	10.0	Asia23	4.04	10.2	Asia23	4.66	10.4
Asia29	0.23	11.6	Asia29	1.73	6.9	Asia29	2.56	6.9	Asia29	4.18	10.7	Asia29	4.24	10.7	Asia29	4.89	10.9
East Asia	0.32	16.1	East Asia	2.99	11.9	East Asia	4.73	12.7	East Asia	7.11	18.1	East Asia	7.43	18.8	East Asia	8.45	18.9
South Asia	0.13	6.4	South Asia	0.39	1.5	South Asia	0.47	1.3	South Asia	1.04	2.6	South Asia	1.08	2.7	South Asia	1.32	3.0
ASEAN	0.13	6.3	ASEAN	0.84	3.4	ASEAN	1.20	3.2	ASEAN	2.67	6.8	ASEAN	2.61	6.6	ASEAN	3.20	7.1
GCC	1.36	67.9	GCC	9.28	37.0	GCC	13.19	35.3	GCC	28.45	72.5	GCC	21.92	55.4	GCC	25.12	56.1
(reference)			(reference)			(reference)			(reference)			(reference)			(reference)		
US	5.06	251.9	US	23.24	92.6	US	35.27	94.4	US	46.95	119.6	US	45.40	114.7	US	46.96	104.8
EU15	3.50	174.1	EU15	16.88	67.3	EU15	25.25	67.6	EU15	35.41	90.2	EU15	34.36	86.8	EU15	34.99	78.1
						EU27	21.92	58.7	EU27	32.09	81.7	EU27	31.23	78.9	EU27	31.80	71.0
Australia	3.56	177.1	Australia	18.92	75.4	Australia	21.26	56.9	Australia	48.31	123.1	Australia	45.41	114.7	Australia	56.87	127.0

Unit: Thousands of US dollars.
Sources: Official national accounts in each country, including author adjustments.
Note: See Appendix A.1 for the adjustments made to harmonize GDP coverage across countries.

Kong have been moving closely with one another for three and a half decades until the mid-2000s, when Singapore spurred strongly ahead of Hong Kong. The ROC and Korea move roughly together but at a lower level than Singapore and Hong Kong. In Asia, Japan and Singapore are the two countries that have income levels almost equivalent to those of the US and Australia. However, this view is considerably revised when we focus on production or real income per capita (i.e., using PPPs as the conversion rates) (Table 5).

In terms of per capita GDP at constant prices using PPPs, Japan was the first country in Asia to start catching up with the US (Figure 13). By 1970, its per capita GDP was 63 per cent that of the US, quite a distance ahead of other Asian countries. It had been closing the gap with the US up to 1991 (86 per cent), but the gap widened again when the impact of the long recession of the 1990s started to manifest itself.[13] In recent years, Japan's level has stabilized to around 70 per cent that of the US.

Japan's per capita GDP was the top among Asian countries until it was overtaken by Singapore[14] in 1993. The result highlights the outcome of the dramatic development effort made by the four Asian Tigers, as shown in Figure 14.

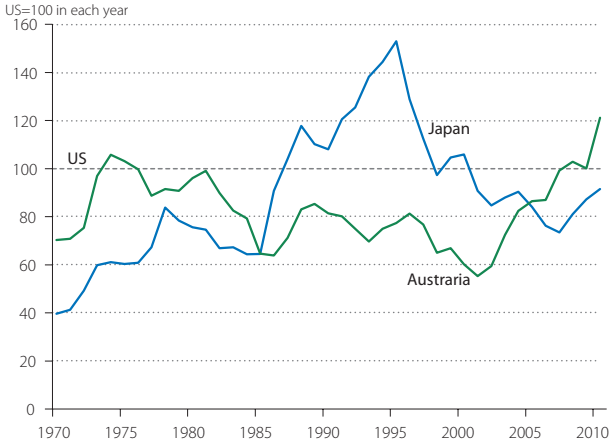

Figure 11 Cross-Country Comparison of Per Capita GDP Using Exchange Rate of Japan and Australia Relative to the US, 1970–2010

——GDP at current market prices per person, using annual average exchange rates, relative to the US

Sources: Official national accounts in each country, including author adjustments.

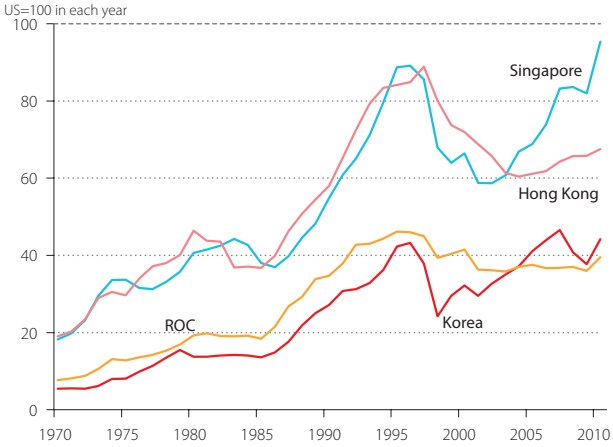

Figure 12 Cross-Country Comparison of Per Capita GDP Using Exchange Rate of Asian Tigers Relative to the US, 1970–2010

——GDP at current market prices per person, using annual average exchange rates, relative to the US

Sources: Official national accounts in each country, including author adjustments.

12: Even so, it is not without its shortcomings as a welfare measure. A rise in the per capita GDP data does not always directly translate into an improvement in the welfare of the people concerned. In fact, as an average measure, per capita GDP can bear little relevance to individuals' personal experience if, for example, the distribution of economic gain is highly skewed or economic advancement has been achieved at high environmental and health costs, which are not accounted for in the statistics. There are a lot more attributes to individuals' welfare than captured in one simple measure called per capita GDP. Supplementary statistics are therefore necessary to build a fuller picture of progress made in individual well-being.

13: Jorgenson and Nomura (2007) indicated that the manufacturing sector was the main contributor to the catching-up process of the Japanese economy in the 1960s, and that the US–Japan TFP gap for the manufacturing sector had almost disappeared by 1990.

Not only were they edging to the top, they were constantly closing the gap with the US. Starting from a level of 36 per cent that of the US in 1970, Singapore surpassed the US in 2004.[15] In 2010, Singapore had a per capita GDP which was 23 per cent above that of the US, and it has been the richest economy in Asia. This represented a remarkable achievement. Hong Kong occupies the second place, with a per capita GDP similar to that of the US. Japan's per capita GDP, at 73 per cent of the US or around 60 per cent of the group leader (Singapore), is similar to that of EU15. The ROC and Korea trail closly at 76 per cent and 64 per cent of the US, respectively.

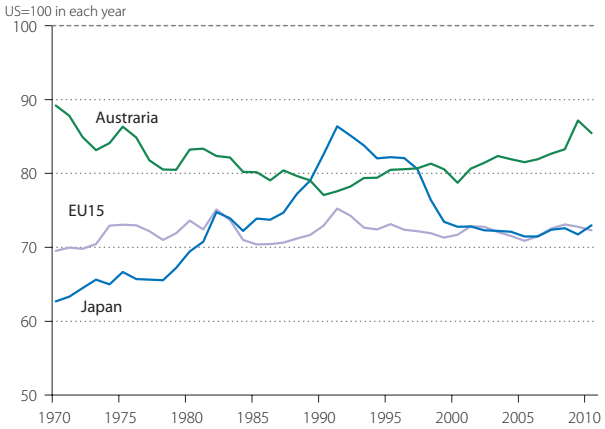

Figure 13 Per Capita GDP of Japan, the EU, and Australia Relative to the US, 1970–2010

——GDP at current market prices per person, using 2005 PPPs, relative to the US

Sources: Official national accounts in each country, including author adjustments.

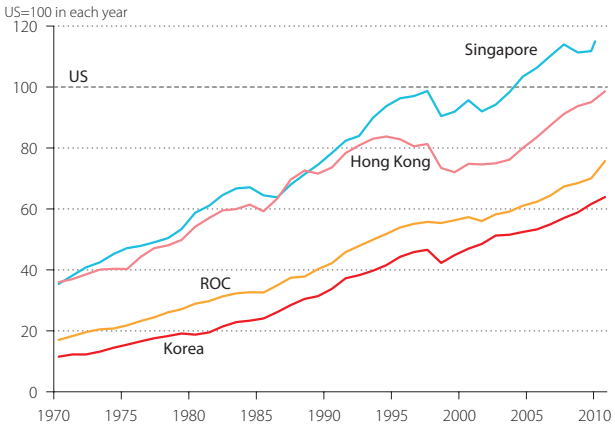

Figure 14 Per Capita GDP of Asian Tigers Relative to the US, 1970–2010

——Ratio of per capita GDP at constant market prices, using 2005 PPPs, relative to the US

Sources: Official national accounts in each country, including author adjustments.

The relative performance of China and India, the two most populous countries in the world, is pulled down on this measure due to their population size, with their per capita GDP at 16.1 per cent and 7.4 per cent that of the US in 2010, respectively (Figure 15). Even so, this should not tarnish their remarkable progress made over the past decades, especially that of China, whose per capita GDP was less than 2 per cent that of the US in 1970; China's relative per capita GDP has increased sevenfold in four decades. The income gap between the US and the majority of Asian countries is still sizable,[16] indicating that there is still a lot of room to catch up.

14: Singapore's population comprises not only Singaporean citizens but also non-citizens who have been granted permanent residence in Singapore as well as non-permanent residents such as employment pass holders, work permit holders, and student pass holders. It is known that many workers and students commute to Singapore from outside the country every day. According to the most recent census, the share of Singaporean citizens with respect to total population was 74 per cent in 2000, the share of permanent residents who are not Singaporean citizens was 7 per cent, and the share of non-permanent residents was 19 per cent.

15: Generally, Singapore's GNI is lower than its GDP, and over the past four decades, the divergence was the largest in 2004 with GNI equivalent to 92.9 per cent of GDP. As the US GNI never goes outside +1.5 per cent of GDP, Singapore would not have overtaken the US in 2004 if GNI was used for comparisons instead of GDP. However, Singapore's lead of 22 per cent over the US in 2010 was large enough that their relative positions would be independent of whether GNI or GDP was used.

Table 5 presents separately the figures for seven oil-rich economies (Brunei and the six GCC countries). At first glance, figures in 1970 and to a lesser extent in 1990 suggest that these economies enjoyed an income many times that of Japan and the US. For example, Kuwait, Qatar, and Brunei had a per capita GDP 7.5 times, 7.4 times, and 3.9 times that of Japan, respectively, in 1970. However, the measurement of GDP as an indicator of income is misleading for these countries, as it erroneously includes proceeds from the liquidation of a natural resource stock as part of the income flow. In other words, GDP overestimates income of the oil-exporting economies, as it does not account for depletion of their natural resource assets. To give a rough indication of the extent of distortion, Figure 16 provides comparisons of per capita GDP excluding production of the mining sector (i.e., crude oil, natural gas, and so on). The non-mining GDP per person in Brunei and GCC economies like Qatar, the UAE, and Kuwait is almost similar to Japan's level, although total GDP per capita is much larger.

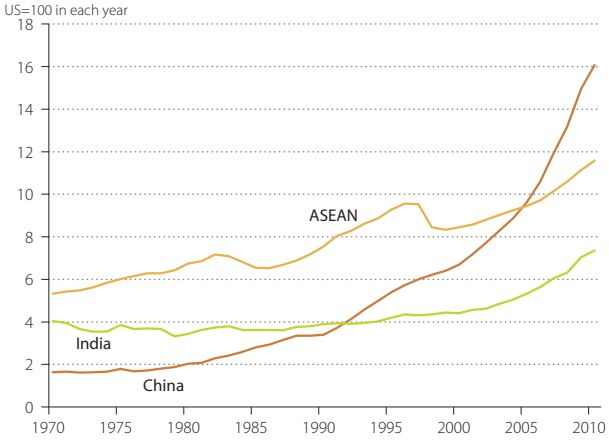

Figure 15 Per Capita GDP of China, India, and ASEAN Relative to the US, 1970–2010
——Ratio of per capita GDP at constant market prices, using 2005 PPPs, relative to the US

Sources: Official national accounts in each country, including author adjustments.

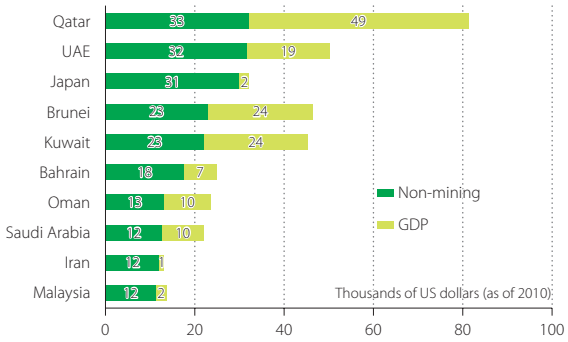

Figure 16 Per Capita Non-Mining GDP in Oil-Rich Countries, 2009
——GDP at constant market prices per person, using 2005 PPPs, reference year 2010

Sources: Official national accounts in each country, including author adjustments.

Catching up to the per capita GDP level of the advanced economies is a long-term process that could take several decades to accomplish. Empirical evidence has suggested that there may be a negative correlation between per capita GDP level and the speed of catching up, although not without exceptions. With the possibility of adopting successful practices and technologies from the more advanced economies, less advanced economies are poised to experience faster growth in per capita GDP, enabling them to catch up in average income level. However, as their income levels come closer to those of the more advanced countries, their economic growth rates are expected to decline over time.[17] (See Box 5 on the middle-income trap.)

16: Per capita GDP may have underestimated the welfare of people in some countries. In the ROC, Hong Kong, and Japan, for example, GNI is consistently higher than GDP although the fluctuations are within +5 per cent. The Philippines is the exception where the divergence between GNI and GDP has been increasing and has become significant for the past two decades, and GNI was higher than GDP by 33.3 per cent in 2010. Fiji had a GNI 10–16 per cent above GDP in the early 2000s, but since then, GNI has converged back to the GDP level.

Table 5 Per Capita GDP, 1970, 1990, 2000, and 2008–2010

——GDP at constant market prices per person, using 2005 PPPs, reference year 2010

1970		(%)	1990		(%)	2000		(%)	2008		(%)	2009		(%)	2010		(%)
Japan	14.5	100.0	Japan	29.5	100.0	Singapore	42.2	100.0	Singapore	53.5	100.0	Singapore	51.4	100.0	Singapore	57.9	100.0
Hong Kong	8.3	57.7	Singapore	28.0	95.0	Hong Kong	33.1	78.3	Hong Kong	45.0	84.3	Hong Kong	43.7	85.1	Hong Kong	46.3	80.0
Singapore	8.2	56.7	Hong Kong	26.3	89.2	Japan	32.1	76.0	Japan	34.8	65.2	Japan	33.0	64.2	ROC	35.6	61.5
Iran	7.6	52.3	ROC	15.1	51.3	ROC	25.3	60.0	ROC	32.9	61.6	ROC	32.2	62.7	Japan	34.3	59.2
ROC	4.0	27.4	Korea	12.1	41.1	Korea	20.8	49.2	Korea	28.3	53.0	Korea	28.3	55.2	Korea	30.0	51.9
Malaysia	3.1	21.5	Malaysia	7.4	25.0	Malaysia	11.3	26.8	Malaysia	14.4	26.9	Malaysia	14.0	27.2	Malaysia	14.8	25.5
Fiji	2.7	18.9	Iran	7.1	23.9	Iran	8.9	21.1	Iran	13.0	24.3	Iran	13.4	26.1	Iran	14.1	24.3
Korea	2.7	18.6	Thailand	4.8	16.2	Thailand	6.7	15.8	Thailand	9.1	17.0	Thailand	8.9	17.4	Thailand	9.6	16.6
Philippines	2.3	15.6	Fiji	3.8	13.1	Fiji	4.5	10.6	China	6.3	11.8	China	6.9	13.4	China	7.6	13.0
Thailand	1.9	12.8	Philippines	2.9	9.7	Sri Lanka	3.3	7.9	Fiji	4.8	9.0	Sri Lanka	4.8	9.3	Sri Lanka	5.1	8.9
Mongolia	1.4	9.8	Mongolia	2.6	8.8	Indonesia	3.1	7.2	Sri Lanka	4.7	8.7	Fiji	4.7	9.2	Fiji	4.7	8.1
Sri Lanka	1.2	8.6	Indonesia	2.3	7.8	Philippines	3.0	7.1	Indonesia	4.1	7.6	Indonesia	4.2	8.2	Indonesia	4.4	7.6
Pakistan	1.1	7.9	Sri Lanka	2.2	7.6	China	2.9	7.0	Mongolia	4.0	7.4	Mongolia	3.8	7.5	Mongolia	4.0	6.9
India	0.9	6.4	Pakistan	1.8	6.1	Mongolia	2.5	5.9	Philippines	3.7	7.0	Philippines	3.7	7.2	Philippines	3.9	6.8
Indonesia	0.9	6.0	India	1.4	4.7	Pakistan	2.2	5.1	India	3.0	5.7	India	3.2	6.3	India	3.5	6.0
Bangladesh	0.8	5.8	China	1.2	4.1	India	1.9	4.6	Vietnam	2.9	5.5	Vietnam	3.1	5.9	Vietnam	3.2	5.6
Vietnam	0.7	4.8	Lao PDR	1.0	3.5	Vietnam	1.8	4.2	Pakistan	2.6	4.9	Pakistan	2.7	5.2	Pakistan	2.7	4.7
China	0.4	2.6	Vietnam	1.0	3.4	Lao PDR	1.5	3.6	Lao PDR	2.3	4.3	Lao PDR	2.4	4.7	Lao PDR	2.6	4.4
Myanmar	0.3	2.3	Nepal	0.9	3.2	Nepal	1.2	2.9	Cambodia	2.2	4.1	Cambodia	2.2	4.2	Cambodia	2.3	3.9
			Bangladesh	0.8	2.7	Cambodia	1.2	2.9	Bangladesh	1.6	3.0	Myanmar	1.7	3.3	Myanmar	1.8	3.2
			Cambodia	0.8	2.7	Bangladesh	1.1	2.7	Myanmar	1.5	2.9	Bangladesh	1.7	3.2	Bangladesh	1.7	3.0
			Myanmar	0.4	1.3	Myanmar	0.6	1.5	Nepal	1.4	2.6	Nepal	1.4	2.8	Nepal	1.4	2.5
Bahrain	20.8	143.5	Bahrain	21.7	73.5	Bahrain	27.5	65.1	Bahrain	26.4	49.4	Bahrain	25.4	49.4	Bahrain	25.3	43.6
Kuwait	108.0	746.3	Kuwait	23.3	79.1	Kuwait	40.8	96.7	Kuwait	50.8	95.1	Kuwait	46.2	89.9	Kuwait	45.5	78.6
Oman	7.3	50.1	Oman	17.7	60.0	Oman	20.5	48.5	Oman	25.6	47.8	Oman	24.0	46.7	Oman	28.9	49.9
Qatar	107.0	739.5	Qatar	49.1	166.4	Qatar	74.9	177.2	Qatar	83.3	155.9	Qatar	81.7	159.0	Qatar	88.5	152.9
Saudi Arabia	24.2	167.2	Saudi Arabia	21.5	73.0	Saudi Arabia	22.7	53.7	Saudi Arabia	23.0	43.1	Saudi Arabia	22.5	43.8	Saudi Arabia	22.9	39.5
UAE	29.9	206.8	UAE	80.7	273.7	UAE	78.3	185.5	UAE	58.1	108.6	UAE	51.2	99.8	UAE	48.0	82.9
Brunei	55.8	385.6	Brunei	52.5	178.0	Brunei	50.6	119.8	Brunei	49.2	92.1	Brunei	47.4	92.4	Brunei	47.8	82.6
(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)		
APO20	2.5	17.6	APO20	4.4	15.0	APO20	5.3	12.4	APO20	6.5	12.1	APO20	6.5	12.6	APO20	6.8	11.8
Asia23	1.6	11.1	Asia23	3.1	10.6	Asia23	4.3	10.2	Asia23	6.4	11.9	Asia23	6.5	12.8	Asia23	7.0	12.1
Asia29	1.7	11.9	Asia29	3.3	11.2	Asia29	4.6	10.8	Asia29	6.7	12.4	Asia29	6.8	13.3	Asia29	7.3	12.6
East Asia	2.0	14.0	East Asia	4.5	15.2	East Asia	6.5	15.4	East Asia	10.0	18.6	East Asia	10.2	20.0	East Asia	11.1	19.1
South Asia	0.9	6.4	South Asia	1.4	4.7	South Asia	1.9	4.5	South Asia	2.8	5.3	South Asia	3.0	5.9	South Asia	3.2	5.5
ASEAN	1.2	8.5	ASEAN	2.7	9.1	ASEAN	3.7	8.8	ASEAN	5.1	9.5	ASEAN	5.1	10.0	ASEAN	5.4	9.4
GCC	32.0	220.9	GCC	26.6	90.1	GCC	30.8	73.0	GCC	32.7	61.1	GCC	31.2	60.7	GCC	31.8	55.0
(reference)			(reference)			(reference)			(reference)			(reference)			(reference)		
US	23.1	159.5	US	35.7	121.1	US	44.1	104.4	US	48.0	89.8	US	45.9	89.4	US	47.0	81.1
EU15	16.1	110.9	EU15	26.0	88.3	EU15	31.6	74.9	EU15	35.1	65.6	EU15	33.4	65.1	EU15	34.0	58.7
						EU27	27.8	65.8	EU27	31.6	59.1	EU27	30.1	58.6	EU27	30.6	52.8
Australia	20.6	142.3	Australia	27.5	93.3	Australia	34.7	82.3	Australia	40.0	74.8	Australia	40.0	78.0	Australia	40.1	69.3

Unit: US dollar (as of 2010).
Sources: Official national accounts in each country, including author adjustments.
Note: See Appendix A.1 for the adjustments made to harmonize GDP coverage across countries.

Figure 17 plots countries' initial per capita GDP levels against their respective average growth rates per year between 1970 (or whichever year data first became available for the country in question) and 2010. The two variables have a correlation coefficient of –0.5 (i.e., a negative relationship of medium strength). In other words, the higher the initial income level, the slower the average growth rate per

17: The OECD (2008) observes that GDP per capita has broadly converged in the OECD (Organisation for Economic Co-operation and Development) countries since the 1970s. However, more advanced economies that started with high income levels in the 1970s have had lower rates of catch-up, or even stagnated or recently diverged *vis-à-vis* the US. Between 1973 and 2006, Ireland and Korea managed the highest rates of catch-up in per capita GDP, with 2.3 per cent and 3.8 per cent per year, respectively.

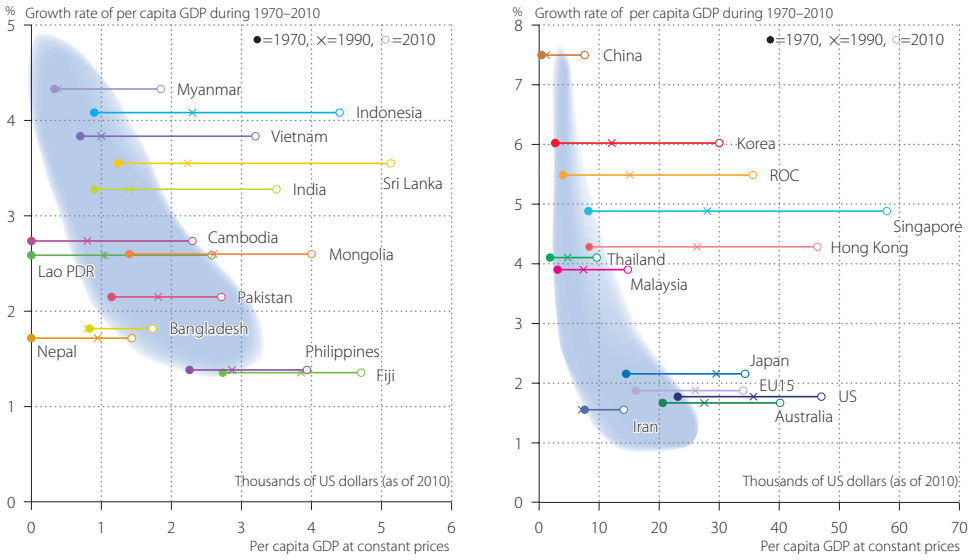

Figure 17 Initial Level and Growth of Per Capita GDP, 1970–2010
——Level and average annual growth rate of GDP at constant market prices, using 2005 PPPs, reference year 2010

Sources: Official national accounts in each country, including author adjustments.

year. However, this is not always true. Low-income countries like Nepal, Bangladesh, the Philippines, and Fiji have failed to catch up, while Thailand and Malaysia could be expected to have grown even faster given their initial income levels. The Asian Tigers have enjoyed robust growth in the past four decades, but Korea and the ROC, with their lower initial per capita GDP, have sustained higher growth rates than Singapore and Hong Kong. Mature economies like the US, EU15, and Japan shared similar growth experiences (i.e., around 2 per cent on average per year, in the past four decades).

Table 6 Country Groups Based on the Initial Economic Level and the Pace of Catch-Up
——Level and average annual growth rate of GDP at constant market prices, using 2005 PPPs

Initial GDP level to the US	Annual rate of catch-up to the US			
	(C1) >3%	(C2) 1%<–<3%	(C3) 0%<–<1%	(C4) <0%
(L1) 60%<			Japan, EU15	Brunei, Bahrain, Kuwait, Qatar, Saudi Arabia, UAE, Australia
(L2) 20%<–<60%	Singapore	Hong Kong, Oman		Iran
(L3) 5%<–<20%	ROC, Korea	Malaysia, Sri Lanka, Thailand	Mongolia	Fiji, Philippines
(L4) <5%	Cambodia, China	India, Indonesia, Lao PDR, Myanmar, Vietnam	Bangladesh, Nepal, Pakistan	

Sources: Official national accounts in each country, including author adjustments.
Note: The annual catch-up rates are based on the difference in the growths of per capita GDP at constant prices between each country and the US during 1970–2010. The starting years for some countries are different due to data availability: Cambodia (1987–), Lao PDR (1984–), and Nepal (1974–).

Table 6 summarizes Figure 17 by country groups. Four levels of per capita income groups are defined: Group-L1, with per capita GDP at or above 60 per cent of the US; Group-L2, from 20 per cent to under 60 per cent; Group-L3, from 5 per cent to under 20 per cent; and Group-L4, below 5 per cent. Likewise, countries are also grouped according to the speed of their catch-up with the US: Group-C1, at 3 per cent per annum or above; Group-C2, from 1 per cent to under 3 per cent; Group-C3, from 0 per cent to under 1 per cent; and Group-C4, under 0 per cent. The speed of catch-up with the US is defined as the difference in the average annual growth rate of per capita real GDP between each country and the US. Table 6 shows that many Asian countries (not belonging

to Group-C4) succeeded in closing the gap in per capita real GDP against the US over the last four decades.

From Table 6 we can see that the initial economic level does not fully explain the catch-up process. Of the Asia29 countries, five achieved very fast catch-up (i.e., over 3 per cent a year on average) between the respective starting years of their data series and 2010. The per capita GDP level varies from Group-L2 (Singapore) to Group-L4 (Cambodia and China). Ten countries in Group-C4 experienced deterioration in their relative income level against the US. Low-income countries like Fiji and the Philippines have failed to take off. The seven high-income countries in Group-C4 are all GCC countries except Australia. However, it is worth noting that GCC countries had an exceptionally high GDP (which is distortionary, as aforementioned) at the beginning of the period. Japan was the only Asian non-oil-exporting country with a high income level in 1970. But, like EU15, Japan has since failed to achieve further catch-up with the US.

3.3 Sources of Per Capita GDP Gap

To understand the diverse performance in the Asian group further, per capita GDP can be broken into two components, namely labor productivity (defined here as real GDP per worker) and the corresponding labor utilization rate (i.e., number of workers to population ratio, or the employment rate in this report).[18] Figure 18 shows the percentage point differences in per capita GDP decomposed into the contributions by the labor productivity gap and the employment rate gap relative to the US in 1995 and 2010.[19] Most of the Asian countries display a huge per capita GDP gap with the US, predominantly explained by their relative labor productivity performance. Except for the four Asian Tigers, Japan, and Iran, all the other Asian countries had labor productivity gaps of more than 50 per cent against the US in 2010. Hong Kong and Singapore had the smallest labor productivity gaps of around 7 per cent against the US. Allowing for a margin of error of ±10 per cent, these gaps are not statistically significant. In contrast, the labor productivity gaps of the other two Asian Tigers are still sizable against the US, at 21 per cent and 39 per cent for the ROC and Korea, respectively.

Figure 19 focuses on explaining a country's per capita GDP growth by its components: namely labor productivity growth and the change in the employment rate for the periods 1995–2000 and 2000–2010, respectively.[20] For most countries in Asia, the majority of per capita GDP growth can be explained by labor productivity, but this should not lead us to underestimate the role played by changes in the employment rate. On average, Asia29's per capita GDP grew by 2.9 per cent a year between 1995 and 2000, and accelerated to 4.7 per cent a year between 2000 and 2010. The earlier period captured the

18: Due to data constraints, labor utilization is measured as the number of workers relative to the population (termed the employment rate in this report), to ensure consistency with the definition of labor productivity (i.e., GDP per worker) that is measured in all APO member economies, although it is frequently defined as hours worked per capita (OECD 2008). In Section 5.2, we provide labor productivity measures based on hours worked for some selected countries. Also, in the computation of TFP in Section 5.3, hours worked data are used.

19: The gap of country x's per capita GDP relative to the US is decomposed into the sum of the gap of labor productivity and employment rate with respect to the US, as in:

$$\underbrace{\ln\left(GDP_x^t / POP_x^{t-1}\right) - \ln\left(GDP_{US}^t / POP_{US}^{t-1}\right)}_{\text{Gap of per capita GDP}} = \underbrace{\ln\left(GDP_x^t / EMP_x^{t-1}\right) - \ln\left(GDP_{US}^t / EMP_{US}^{t-1}\right)}_{\text{Gap of labor productivity}} + \underbrace{\ln\left(EMP_x^t / POP_x^{t-1}\right) - \ln\left(EMP_{US}^t / POP_{US}^{t-1}\right)}_{\text{Gap of employment rate}}$$

where POP_x^t is population of country x in period t and EMP_x^t is the number of employment of country x in period t.

20: Country x's per capita GDP is decomposed into the product of its labor productivity and employment rate, as in:

$$\underbrace{\ln\left(GDP_x^t / POP_x^t\right)}_{\text{Per capita GDP}} = \underbrace{\ln\left(GDP_x^t / EMP_x^t\right)}_{\text{Labor productivity}} + \underbrace{\ln\left(EMP_x^t / POP_x^t\right)}_{\text{Employment rate}}$$

where POP_x^t is population of country x in period t and EMP_x^t is the number of employment of country x in period t.

dampening effect of the Asian financial crisis of the late 1990s. Emerging from the crisis, both labor productivity growth and employment growth strengthened. For most countries, labor productivity explains a larger share of per capita GDP growth than employment, but the employment rate contribution relative to labor productivity was also highly significant in, for example, Pakistan (45 per cent), Cambodia (36 per cent), Thailand and Bangladesh (34 per cent, respectively), and Iran (29 per cent).

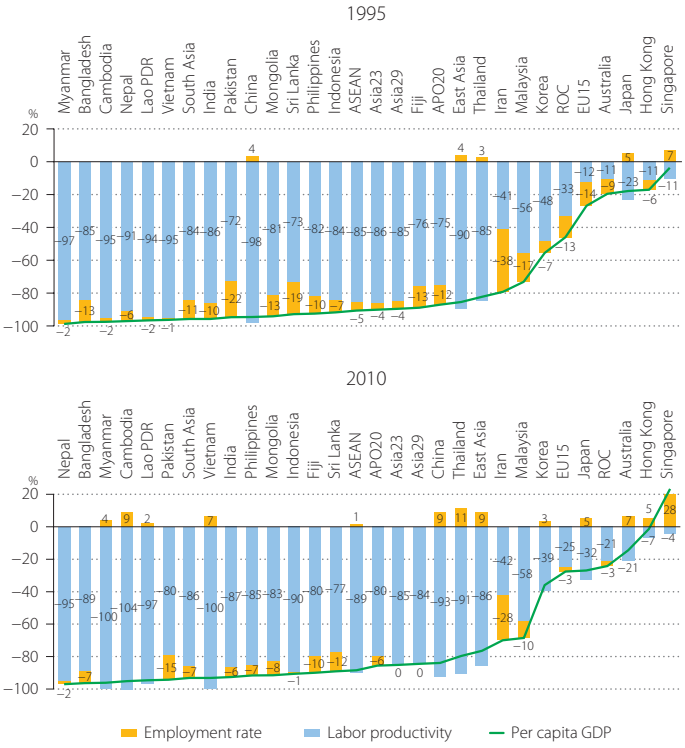

Figure 18 Labor Productivity and Employment Rate Gap Relative to the US, 1995 and 2010
——Decomposition of per capita GDP gap at constant market prices, using 2005 PPPs

Sources: Official national accounts in each country, including author adjustments.

China's improvement was the most impressive, achieving per capita GDP growth of 7.4 per cent and 9.4 per cent a year on average in the two periods, respectively. Over 95 per cent of that growth was consistently explained by improvement in labor productivity. According to official statistics,[21] Myanmar achieved a similar performance to China in growth terms, with per capita GDP growth of 7.3 per cent and 10.6 per cent a year on average in the two periods. However, this growth was from a very low base; even in 2010, Myanmar's per capita GDP was only 24 per cent that of China (see Table 5). Like China, Myanmar's per capita GDP growth was predominantly explained by labor productivity, with its contribution increasing from 76 per cent in the period 1995–2000 to 94 per cent in 2000–2010. Japan had a deteriorating employment rate in both periods. With an aging population (see Box 2), this pattern may well persist. To sustain per capita GDP growth, labor productivity growth will have to accelerate in order to counteract the negative effect of its employment rate.

Most countries also have an employment rate short of the US level, substantially in the case of Iran and Pakistan, further reinforcing their poor productivity performances (Figure 18). It is no coincidence that Iran and Pakistan are among the countries that have the lowest shares of female workers in employment, at 18 per cent and 20 per cent, respectively (Figure 20). In contrast, a handful of countries – most notably Singapore, Cambodia, China, and Thailand – had higher employment rates than the US, counteracting the negative impact of their productivity performances. In particular, the

21: Readers should be cautioned about the reliability and quality of Myanmar's official statistics, which have been questioned. Researchers have suggested that this is not consistent with other variables closely correlated with GDP, such as energy use. Non-official estimates put GDP growth at less than half of the official estimates. See ADB (2009) and Economist Intelligence Unit (2010). Nonetheless, official statistics from Myanmar are presented in this report, as there is no comprehensive and transparent alternative data source.

positive gap in employment rate plays a significant role in nudging Singapore ahead of the US in per capita GDP. More specifically, Singapore's labor productivity was 7 percentage points short of the US level, but its employment rate was 30 percentage points higher, giving an overall per capita GDP 23 per cent higher than the US.

Other things being equal, increasing employment and improving labor productivity could present a policy trade-off in the short term (i.e., they cannot be achieved simultaneously). If the policy target is to increase employment, productivity may suffer in the short term as marginal and less-productive workers are recruited, bringing down the average productivity performance. The huge labor productivity gap between Asia and the US discussed in Chapter 5 should therefore be considered in the context of the generally high employment rate in Asia.

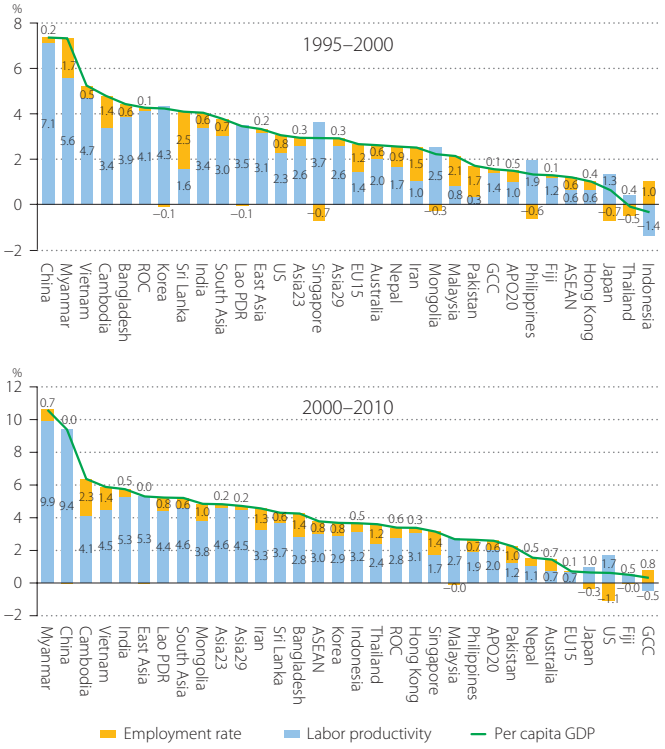

Figure 19 Sources of Per Capita GDP Growth, 1995–2000 and 2000–2010
——Decomposition of average annual growth rate of per capita GDP at constant market prices, using 2005 PPPs

Sources: Official national accounts in each country, including author adjustments.

Figure 21 shows cross-country comparisons of employment rates in 2010, based on the labor statistics of each country. Employment consists of employees, own-account workers, and unpaid family workers. Two countries – Cambodia and Singapore – lead the Asian group with employment rates of 0.62 and 0.60, which were 0.10–0.12 percentage points higher than the US and 0.12–0.14 percentage points higher than EU15, respectively, in 2010. Two other economies also had high employment rates – Thailand (0.58) and Vietnam (0.57).

From Figure 21, it is clear that employment rates have been rising in Asia. Japan is the only exception where the employment rate in 2010 was lower than that in 1970. This reflects, among other things, its aging population. The fastest catch-up countries (i.e., those in Group C1) are also countries with the largest surge in employment rates in the past four decades; they are Singapore, China, Korea, and the ROC. Some of the countries in Group C2 also experienced significant

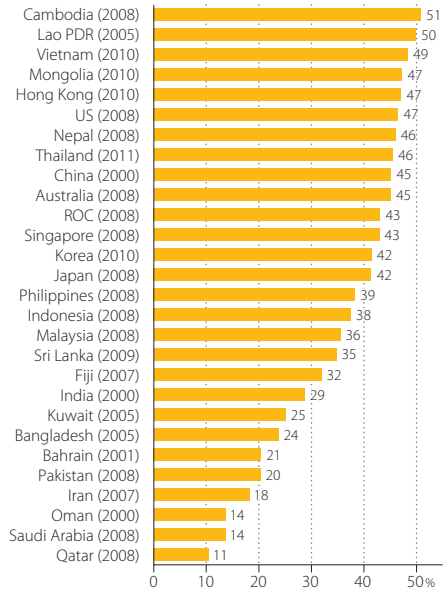

Figure 20 Share of Female Employment
——Ratio of female to total employment

Sources: Population census or labor survey in each country.

improvements in employment rates: for example, Indonesia and Vietnam. Countries that have failed to catch up also tend to make less vigorous improvements over the period, and in turn continue to have lower employment rates. Fiji is the only exception, where the employment rate has improved significantly, but this was from a very low base.

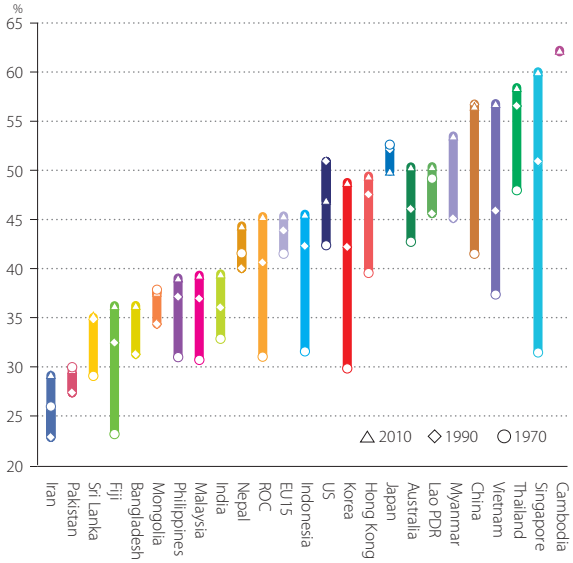

Figure 21 Employment Rates, 1970, 1990, and 2010

——Ratio of employment to total population

Sources: Employment and population data by NSO in each country.

Box 2 Populations of Asian Countries

According to the United Nations (2011), the world's population is estimated to reach 6.9 billion in 2010, of which Asian countries account for 60.4 per cent. The region is by far the most populous in the world. China and India account for 19.5 per cent and 17.8 per cent of the world's population, respectively. It has been observed that falling fertility rates and rising living standards go hand in hand, although the direction of causality is less certain. The evolution of the demographic structure implies dynamics in a society that are not captured by the overall population size or growth. As people's economic behavior, aspirations, and needs vary at different stages of life, changes in a country's age structure can have a significant impact on its economic performance.

The world's fertility rate is converging to the replacement level – the level at which a country's population stabilizes. According to the United Nations, the number of children a woman is expected to have in her reproductive years dropped by more than half, from about 6.0 to 2.5 in the last 60 years, compared to the replacement level of 2.1 children, one of them a girl. There is regional divergence in this trend: in the last 60 years, the total fertility rate dropped from about 6.7 children to 2.6 in Central America, and from about 6 children to 1.6 (i.e., below the replacement level) in East Asia. In comparison, some parts of Africa have only seen a modest drop in total fertility, which today remains at more than 5 children per woman. What is even more staggering is the pace of change. For example, it took Britain over 130 years (1800–1930) to halve its fertility rate, while it took Korea only 20 years to achieve it. This is echoed all around the world. This widespread social revolution is brought on by a complex mix of economic and social development. Economic growth, greater access by women to education, income-earning opportunities, and sexual and reproductive health services are all contributing factors to this trend. Coupled with changes in the mortality rate, this can dramatically change the age profile of a country's population, and with it comes the economic implications.

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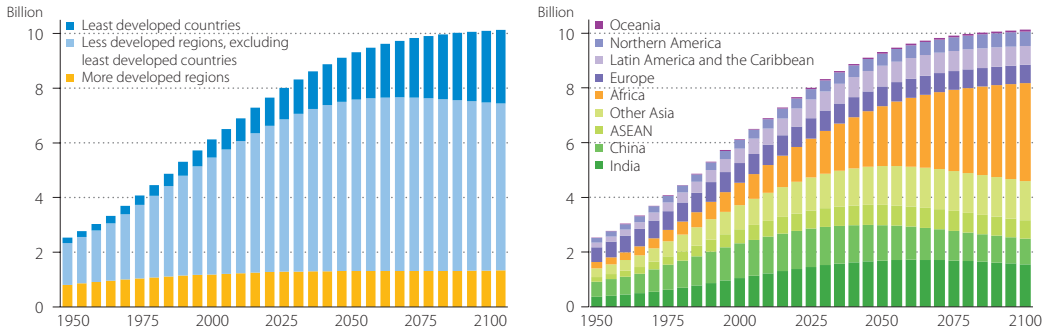

Figure B2.1 Distribution of the World's Population in Different Regions, 1950–2100

Source: United Nations (Department of Economic and Social Affairs), *World Population Prospects: The 2010 Revision* (28 June 2011).

The growth rate of the world's population has slowed from its peak of around 2.0 per cent in the 1970s to today's 1.1 per cent a year. With the falling fertility rate, the UN projects that the world's population growth rate will decelerate to 0.40 per cent a year by 2050 and further to 0.05 per cent by 2100. Even so, the world population will still increase by one-third in the next 40 years, from 6.9 billion to 9.3 billion and a further 8 per cent to 10.1 billion by 2100. These estimates are based on the medium-fertility variant, but with only a small variation in fertility, particularly in the more populous countries, the total could be higher (10.6 billion by 2050 and 15 billion in 2100) or lower (8.1 billion in 2050 and 6.2 billion in 2100).

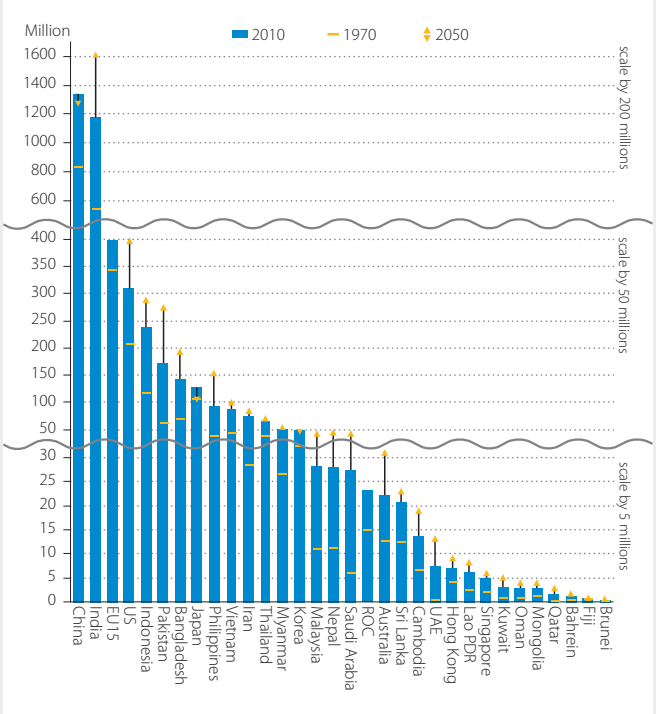

Figure B2.2 Asian Countries' Population Size and Projection, 1970, 2010, and 2050

Source: 1970 and 2010: Population census and official national accounts in each country and World Bank, *World Development Indicators* (28 July 2011).
2050: World Bank, Population Projection tables by country and Group 2011.

Much of this increase is expected to come from the high-fertility countries, which comprise 39 out of the 55 countries in Africa, nine in Asia, six in Oceania, and four in Latin America. In contrast, low-fertility countries include all countries in Europe except Iceland and Ireland, 19 out of the 51 in Asia, 14 out of the 39 in the Americas, two in Africa (Mauritius and Tunisia), and one in Oceania (Australia). Figure B2.1 depicts this shift in the distribution of the world population with the more developed regions' share gradually declining from 17.9 per cent to 14.1 per cent in 2050 and 13.2 per cent in 2100, compared with 32.1 per cent in 1950, whereas the share of the least developed countries rising from today's 12.1 per cent to 18.6 per cent in 2050 and 26.6 per cent in 2100, up from 7.9 per cent in 1950. Turner (2009) highlights the challenge of the continued rapid population growth to economic and social progress in many countries in Africa and the Middle East, and its major and adverse impact on the global environment.

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Asia's share will decline from today's 60.4 per cent to 55.3 per cent in 2050 and 45.4 per cent in 2100, while Africa's share will rise from today's 14.8 per cent to 23.6 per cent and 35.3 per cent, respectively. Figure B2.2 shows the current population size of individual Asian countries compared with the 1970 level and projection in 2050. As can be seen from the chart, China's population is expected to more or less stabilize around the current level. China has socially engineered the change with its one-child policy, which has made its current population 300–400 million lower than it would have been otherwise. In less than a decade, India is projected to overtake China as the most populous country in the world, and China's population will drop to under 1 billion by 2088.

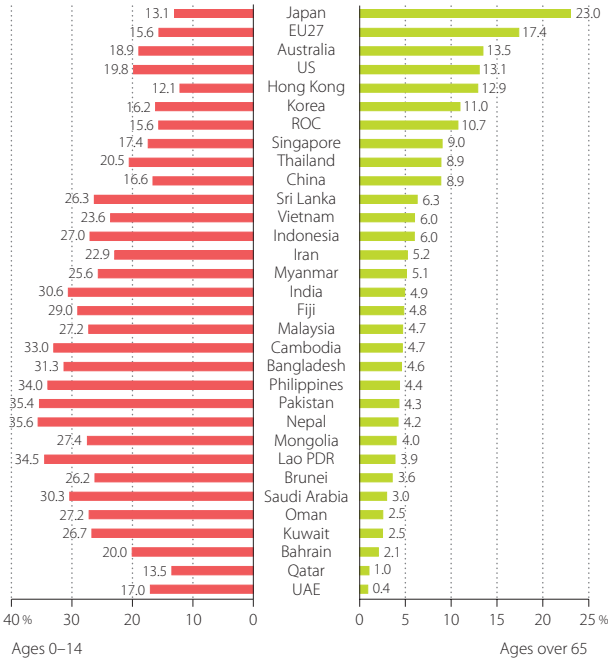

Figure B2.3 Population Proportion of the Dependent Population, 2010

Sources: Population census and official national accounts in each country.

Figure B2.3 shows the demographic make-up of countries in 2010 (i.e., the population proportions of the under-15 and over-65 age groups, which together make up the dependent population). Ranking the countries by the share of old-age population filters the rich economies to the top end; these economies also have a relatively low share of the young age group compared to less developed countries. This suggests that demographic transition tends to go in parallel with economic progress, although the direction of causation is not certain.

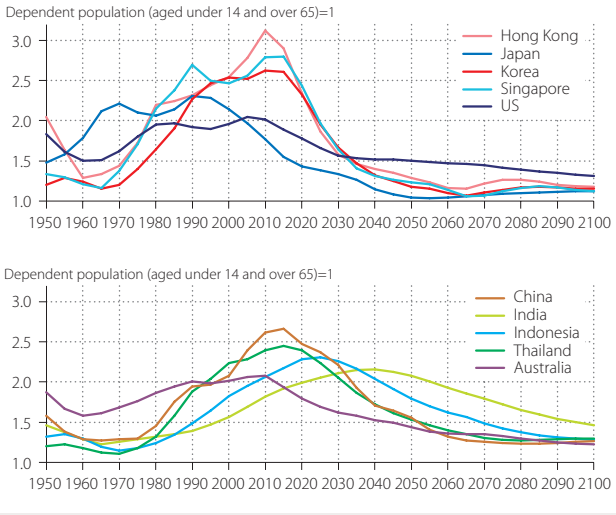

Figure B2.4 Demographic Dividend, 1950–2100

Source: United Nations (Department of Economic and Social Affairs), *World Population Prospects: The 2010 Revision*.

As countries move from high to low mortality and fertility rates, the demographic transition produces a "boom" generation that is larger than those immediately before and after it. As this boom generation gradually works through a nation's age structure, it produces a demographic dividend of economic growth as people reach their prime. The improved ratio of productive workers to child dependents and the increase in available resources for investment open a special window for faster economic growth and human development. It has been suggested that the demographic dividend accounted for a third of East Asian growth in 1965–1990 (Bloom, Canning, and Malaney 2000).

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Although China has a smaller dependent ratio than India, its population is aging rapidly. India, on the other hand, has one of the most favorable demographics in waiting. This demographic dividend can work wonders to produce virtuous cycles of wealth creation if it is combined with appropriate health, labor, financial, human capital, and growth-enhancing economic policies. If India is able to capitalize on this dividend, it may well overtake China in economic growth in the not-so-distant future. However, the experience of East Asia suggests that this dividend is far from being automatic but needs to be earned. This one-off opportunity will pass in a couple of generations, and it will be regrettable if it is missed.

Using past demographic data since 1950 and UN projections up to 2100, we can track the changes in the ratio of working population (aged 15–64) to dependent population (aged under 14 and over 65) over time (Figure B2.4). Where the curve bulks in Figure B2.4, it is when the demography was/will be the most favorable for economic growth. Japan could have received the demographic dividend in the 1960s when its GDP growth was over 10 per cent on average per year for ten years. In the 2000s and 2010s, China, Hong Kong, Korea, Singapore, and Thailand have been in the period in which they can reap the demographic dividend. Based on the projections, Indonesia will have such a privilege in the 2020s and 2030s, and India in the 2040s.

Box 3 The System of National Accounts 2008

In the past two decades, the economic structure in many countries has been changing at an unprecedented rate, owing to the advances in information and communication technology (ICT). The rapid and widespread dissemination of the technology has been enabled by the sharp decline in its prices, and the deep financial markets that can afford funding for innovation to take off. Its penetration of the fabric of society has changed our behavior, revolutionized the way we organize economic activities, extended markets and product ranges, given birth to an array of new industries, and transformed the service industries. Its far-reaching effects on economies have given rise to new analytical and data needs, and have posed numerous new challenges to statisticians who aim to track economic activities and measure economic performance.

To catch up with time, the changes in the 2008 SNA bring the framework of national accounts into line with the latest economic landscape, advances in methodological research, and needs of users. It introduces treatments for new aspects of economies that have come into prominence, elaborates on aspects that have increasingly become the focus of analytical attention, and clarifies guidance on a wide range of issues (*SNA 2008*, Annex 3). In the interest of a smooth transition from implementation of the earlier versions of the SNA, fundamental and comprehensive changes have been ruled out. Highlighted below are some key revisions to the 1993 SNA that strengthen its relevance for the 21st century by improving its coverage and adequately taking into account quality changes.

Improved measurement of the service sector

1. The 2008 SNA adopts the International Standard of Industrial Classification of all Economic Activities Revision 4 (ISIC Rev. 4), which is a hierarchical, four-level structure of mutually exclusive categories to facilitate data collection, presentation, and analysis of economic activities in an internationally comparable, standardized way. In the revision effort, continuity was carefully balanced with the need for relevance of ISIC and its comparability with other existing industry classifications. The relative emphasis that the previous ISIC put on manufacturing at the expense of detail on services was becoming increasingly misaligned with the growing weight of services in most economies of the world and the growing attention on the ICT sector. In response, the detail of the classification in ISIC Rev. 4 has been substantially increased. For service-producing activities, this increase is visible at all levels, including the top level, while for other activities, such as agriculture, the increase in detail has affected mostly the lower levels of the classification. For example, there is a new industry section for Information and Communication (Section J) and Business Activities has been separated from Real Estates, and classified into

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Professional, Scientific and Technical Activities (Section M) and, Administrative and Support Service Activities (Section N). Furthermore, the details of manufacturing have been expanded and the information economy can now be more readily identified for analytical purposes.

2. The 2008 SNA recommends that a producer unit undertaking ancillary activities be recognized as a separate establishment if it is statistically observable (i.e., with separate accounts for production or in a different geographical location from the establishments). This contrasts its treatment in the 1993 SNA whereby it is always regarded as an integral part of the establishments it served. This change mainly affects large establishments that engage in a large diversity of production, and will give rise to more homogeneous institutional units. As the SNA defines industries in terms of establishments, this amendment will lead to a clearer demarcation of industries, and in turn facilitate analyses of production.

3. The 2008 SNA provides a comprehensive overview of financial services to reflect developments in one of the fastest-changing segments of many economies. The definition of financial services has been enlarged beyond the financial intermediation to capture financial risk management and liquidity transformation, by expanding the financial asset boundary and introducing some new functional classifications. Further, the method for calculating financial intermediation services indirectly measured (FISIM) has been refined and the option *not* to allocate FISIM among different users has been removed. Output of the central bank is classified into three broad groups: financial intermediation, monetary policy services, and supervisory services overseeing financial corporations. Output is further distinguished between market and non-market services, with their different measurements.

Capitalizing the knowledge economy

4. The 2008 SNA renames the asset type previously called "intangible produced assets" as "intellectual property products" to reflect that many of these assets are associated with the establishment of property rights over knowledge in one form or another. For the first time, its asset boundary is extended to include research and development (R&D), which was treated as intermediate consumption in the 1993 SNA. With the inclusion of R&D in the asset boundary, patented entities no longer appear separately but are subsumed into R&D assets. The 2008 SNA recommends that all databases with a useful life of more than one year should be included in the modified asset category of "computer software and databases".

5. The fixed asset boundary has also been expanded to include, under the heading of weapons systems, all military expenditure that meets the same criteria as for other fixed assets, regardless of the nature of the expenditure or the purpose intended for it. Under machinery and equipment, a new category called ICT equipment has been introduced to facilitate analysis of the information economy.

Globalization

6. The 2008 SNA makes the application of the principle of change in ownership of goods universal, affecting the recording of goods sent for processing, both abroad and within the domestic economy, and then returned to the owner. This is to recognize that a lot of physical movements of goods do not incur actual transactions, and in turn their corresponding financial flows, as there is no change in ownership. In these situations, only processing services will be recorded.

7. The 2008 SNA recommends the same principle to be applied to merchanting, which concerns activities as global manufacturing, global wholesaling, and retailing and commodity dealing (i.e., part of the production process in an increasingly globalized and inter-connected world). The case is the reverse one to that of goods for processing: there is a change of ownership, and consequences for financial flows, without the goods entering the merchant's economy. The 2008 SNA recommends that goods so acquired should be recorded as negative exports on acquisition and positive exports on disposal.

For productivity analysis

8. The 2008 SNA recommends that estimates of capital services be compiled in a supplementary table, which will greatly facilitate, among other things, productivity analysis.

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9. The 2008 SNA recommends chain-linking for volume and price indices to minimize substitution bias. Further, the chapter concerning prices and volumes has been significantly updated to reflect the latest methodological developments in the area, including the measurement of changes in quality over time. As quality change is an increasing feature of product markets, appropriate quality adjustment procedures have become all the more important in accurately measuring volume changes. For compiling volume indices of non-market services, prices of which are not available, the 2008 SNA recommends the direct "output volume method," where possible, based on quantity indicators, adequately quality-adjusted, and weighted together using average cost weights.

10. Employee stock options have become a common tool used by companies to motivate their employees. Addressing its omission from national accounts, the 2008 SNA recommends that transactions in employee stock options be recorded in the financial account as the counterpart to the element of compensation of employees represented by the value of the stock option. Ideally, the value of the option should be spread over the period between the grant date and vesting date; if this is not possible, they may be recorded at the vesting date. This will help correct the potential downward bias to the contribution of labor to output growth in growth accounting, whereby the labor share of total income is used as weight.

Recording pension entitlements

11. The 2008 SNA recommends changes in recording pension entitlements in case of a defined benefit plan, for which the treatment in the 1993 SNA proved to be unsatisfactory. As many countries are facing aging populations, it is increasingly important to have a measurement that accurately reflects pension liabilities. Previously, the actual social contributions by employer and employee in a period were the amount actually paid into a pension fund. While this is correct and complete for a defined contribution scheme, there is no guarantee that the amounts set aside will exactly match the liability of the employer to the employee for a defined benefit plan. For the latter, therefore, it is recommended that the level of the employer's contribution be recorded as the increase in the net present value of the pension entitlement (determined actuarially) the employee has earned in the period in question, adding any cost charged by the pension fund for operating the scheme and deducting the amount of any contribution the employee makes.

12. For pensions provided by the government via social security, however, countries have some flexibility to deviate from this procedure in the set of standard tables, because of the vast diversity of funding arrangements across countries. However, the 2008 SNA recommends that the full range of information required for a comprehensive analysis of pensions be provided in a supplementary table that shows the liabilities and associated flows of all private and government pension schemes, whether funded or unfunded and including social security.

4 Expenditure-Side GDP

In national accounts, GDP is measured by three approaches: production (i.e., by industry or products), expenditure on final demand, and income to factor inputs. In theory, these three approaches are accounting identities, but in reality, they differ by statistical discrepancies.[22] Decompositions of GDP are valuable in understanding the structure, and in turn the behavior, of an economy. In this chapter, we look at countries' economic composition from the expenditure side. We investigate the decomposition of output growth into input growth and total factor productivity growth (the supply side) in Chapter 5, while countries' industry structure is presented and analyzed in Chapter 6.

4.1 Composition of Final Demand

From Table 7, we can see that country groups display distinctive features in their final demand composition, reflecting their development stage and economic makeup. With the differences in emphasis and vulnerabilities, their behavior and reaction to economic shocks can be expected to be quite diverse. Table 7 presents comparisons of final demand shares of nominal GDP, covering: (1) household consumption (including consumption of non-profit institutions serving households: NPISHs), (2) government consumption, (3) investment (or, in national accounts terminology, gross fixed capital formation (GFCF) plus changes in inventories), and (4) net exports (i.e., exports minus imports).

For most countries, household consumption is by far the biggest component of GDP.[23] The GCC countries, Brunei, and China are the exceptions. Over the past four decades, the share of household consumption for mature economies tends to be rather stable and trending upward in recent years, while it is more volatile and largely trending downward in economies undergoing rapid transformation, such as the Asian Tigers in the 1970s and 1980s, and India and China currently.

Table 7 Final Demand Shares in GDP, 1970, 1980, 1990, 2000, and 2010
——Share of final demands with respect to GDP at current market prices

	Household consumption					Government consumption					Investment					Net exports				
	1970	1980	1990	2000	2010	1970	1980	1990	2000	2010	1970	1980	1990	2000	2010	1970	1980	1990	2000	2010
APO20	51.9	56.2	54.9	58.5	58.2	10.8	13.7	12.8	13.9	13.0	36.5	31.6	31.8	25.2	28.2	0.9	−1.4	0.6	2.4	0.6
Asia23	52.2	55.8	54.1	55.6	49.3	10.8	13.7	13.0	14.4	13.1	36.2	31.8	32.2	27.6	35.7	0.8	−1.4	0.8	2.4	1.9
Asia29	51.8	52.5	53.8	55.0	48.9	10.9	13.7	13.6	14.6	13.2	35.8	30.6	31.3	27.2	35.1	1.5	3.2	1.3	3.2	2.7
East Asia	50.3	54.5	52.3	53.1	42.9	10.9	14.1	13.4	15.6	14.7	37.8	32.5	32.9	29.2	39.1	1.1	−1.1	1.4	2.0	3.4
South Asia	76.3	76.0	67.9	66.2	62.2	8.6	9.2	11.2	11.9	11.0	15.4	19.2	23.4	23.3	30.8	−0.3	−4.4	−2.5	−1.5	−4.0
ASEAN	65.3	58.4	56.1	56.7	57.1	13.3	12.4	10.5	10.0	10.2	26.3	31.7	34.8	24.1	28.2	−4.9	−2.5	−1.4	9.2	4.5
GCC	36.1	29.8	49.9	42.9	40.1	13.9	13.4	24.6	19.7	16.4	19.5	22.4	16.0	18.2	25.3	30.5	34.5	9.5	19.1	18.2
China	55.6	50.2	47.0	46.7	34.9	11.2	14.9	14.1	15.8	13.4	33.1	35.2	36.1	35.1	47.8	0.1	−0.3	2.7	2.4	3.9
India	75.0	74.2	64.8	63.8	58.0	9.4	10.1	12.0	12.9	11.7	15.7	18.7	24.6	24.2	33.6	−0.1	−3.0	−1.4	−0.9	−3.3
Japan	49.3	54.6	53.0	56.4	59.1	10.7	14.1	13.3	16.9	19.7	38.8	32.3	32.8	25.3	20.0	1.2	−0.9	0.9	1.4	1.2
Australia	54.7	55.9	58.4	59.5	54.5	13.9	17.7	18.1	17.7	18.0	31.7	28.3	23.7	22.6	25.9	−0.3	−1.9	−0.2	0.2	1.5
US	62.4	63.0	66.1	68.6	70.5	18.3	16.7	16.7	14.3	17.2	18.9	20.8	18.6	20.9	15.8	0.4	−0.5	−1.3	−3.8	−3.6
EU15	58.1	58.3	58.2	58.8	58.3	16.3	20.1	20.0	19.7	22.3	26.0	24.0	22.6	21.2	18.6	−0.5	−2.4	−0.8	0.3	0.8

Unit: Percentage.
Sources: Official national accounts in each country, including author adjustments.
Note: Final demand shares in country groups are computed by using the PPPs for GDP. Household consumption includes consumption of NPISHs. Investment includes gross fixed capital formation plus changes in inventories.

22: Countries follow an international framework, called the System of National Accounts (SNA), in compiling their national accounts. As economies keep evolving, the SNA is revised periodically so it does not lose its relevance to economic realities and compromise on the accuracy of GDP measurement. The latest international effort resulted in the 2008 SNA, which improves on the 1993 SNA. For further details, see Box 3.

China's household consumption as a share of GDP has been trending downward. It fell from 55.6 per cent in 1970 to 46.7 per cent in 2000. This compares with the early Communist era, when household consumption was more volatile and at a higher level of over 60 per cent of GDP (Figure 22); China was much less well off then. Figure 22 shows how household consumption share and investment share mirror each other. As the decline in household consumption share accelerated in the 2000s, plummeting to 34.9 per cent in 2010, we see the investment share rising rapidly to 47.8 per cent of GDP. We also observe a rapid rise in exports as a share of GDP since the 1980s when China began to open its economy, from around 5.0 per cent or below in the 1950s and 1960s to its peak of 37.0 per cent in 2006 before softening to 24.0 per cent in 2010.

With a low consumption ratio, coupled with an unsustainable rise in investment and an overdependence on exports, China faces huge internal and external imbalances, which if not addressed could jeopardize its medium-term growth prospects. A low consumption share of GDP is not merely a reflection of consumer behavior or preference, but a manifestation of an array of underlying distortions in the economy. For example, an undervalued currency and a wide range of factor price distortions, which favor the production of tradables over non-tradables, result in an unusually low consumption ratio and encourage a heavy reliance on exports. Lax corporate governance of state-owned enterprises is not conducive to distribution of dividends and in turn works to subsidize investment in effect. The absence of a social safety net and well-developed domestic financial markets provides a strong incentive for precautionary saving on the part of households (Eichengreen, Park, and Shin 2011). This suggests that policy levers are available to the government to rebalance the economy.

In recent years, even labor-abundant China faces a tightened supply of surplus labor on the coasts, which is building an upward pressure on wages. This could be good news for the world, as a higher labor share of GDP will enable higher household consumption that will help the domestic market fulfill its potential. This will make China less dependent on foreign demand on the one hand and generate demand for foreign products on the other. Signs that the Chinese economy may have started moving in the right direction are when the decline in the consumption ratio halted and external imbalance narrowed to less than 2.8 per cent in 2011 – the lowest since 2002.[24] Only time will tell if this is a blip or the start of a more persistent trend that reflects changes in the underlying economy.

India, another fast-emerging economy, has seen its household consumption share declining rapidly in the past four decades, from 75.0 per cent in 1970 to 58.0 per cent in 2010 (Table 7). In contrast, the share of household consumption was relatively stable in the US at around 62–63 per cent for the 1970s and 1980s before edging up to 70.5 per cent of GDP in 2010. From a historical perspective, the current level is below that experienced during the Great Depression in the US when the consumption share was over 75 per cent and even as high as 83 per cent in 1932, and above the all-time low of under 50 per cent in 1944 during World War II (Figure 23).

The share of household consumption in EU15, which is around 58 per cent, has stayed fairly stable over the past four decades. The Asian average has been hovering in the lower 50 per cent range until recently when the gap with EU15 widened, largely reflecting the trend in China (Table 7). Australia's

23: Based on our metadata survey on national accounts in Asian countries, Japan is an exceptional country that estimates GDP from the expenditure side. In other countries, GDP is estimated from the production side (value added in industries), and some countries record statistical discrepancy as the difference in the estimates between production-based GDP and the sum of final expenditures. In this *Databook*, statistical discrepancy is mainly attributed to household consumption when data are recorded. Readers should keep in mind that it can have some impacts on the share of final demand: e.g., it accounts for 2.5 per cent of GDP in 1990 in the Thailand SNA published as of the end of 2011.

24: *The Economist*, 18 February 2012, "The incredible shrinking surplus."

consumption ratio has never exceeded 60 per cent of GDP and has dipped significantly in the past decade to 53.6 per cent, reflecting a pickup in the investment share and the strong positive contribution made by net exports. Within Asia, all regions display a decline in household consumption ratio, except for the GCC countries. South Asia maintains the highest share among all, even with it falling from 76.3 per cent in 1970 to 62.2 per cent in 2010. In contrast, GCC economies are unusually skewed toward net exports because of their oil. However, mirroring the declining contribution of net exports to final demand over time, the consumption ratio of GCC countries has risen from 36.1 per cent in 1970 to 40.1 per cent in 2010.

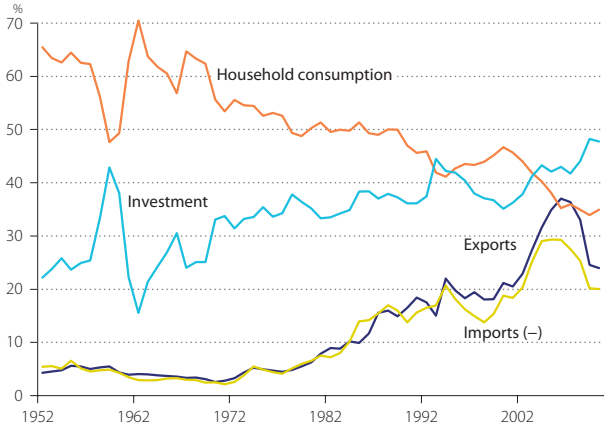

Figure 22 Final Demand Shares in GDP of China, 1952–2010

——Share of final demands with respect to GDP at current market prices

Sources: National accounts by National Bureau Statistics of China, including author interpolation.

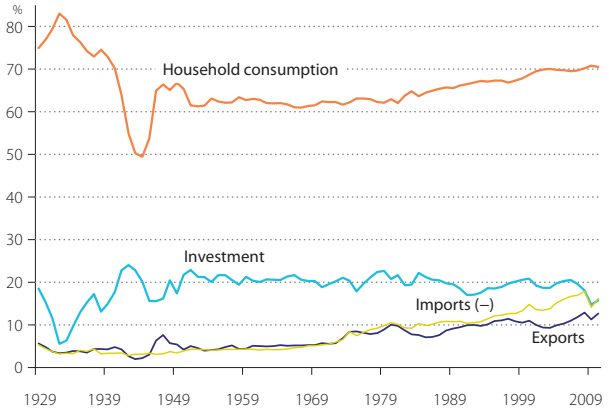

Figure 23 Final Demand Shares in GDP of the US, 1929–2010

——Share of final demands with respect to GDP at current market prices

Sources: National accounts by Bureau of Economic Analysis, US.

Overall, Asian countries invest significantly more than the US and EU15. Historically, the wedge in the investment share of GDP between Asia29 and EU15 never exceeded 10 percentage points, but since 2000, it has started to widen. In 2010, the wedge was over 17 percentage points. In the 1970s, EU15 was investing 5 per cent more of their GDP than the US. Thereafter, the EU15 investment share converged to the US level and they were out of synch with each other temporarily in the late 1980s and early 1990s. For the past five years, a divergence has opened with the US investment share of GDP declining faster than that of EU15 (Figure 30.3). In 2010, investment accounted for 15.8 per cent and 18.6 per cent of final demand in the US and EU15, respectively, compared with 35.7 per cent for Asia23. Recently, Australia's investment level has been closer to the level of APO20 than that of the US/EU15 and in 2010 it accounted for over a quarter of final demand. The share of investment in China is the biggest final demand component of GDP since 2004 and, at 47.8 per cent in 2010, it is probably unsustainable in the long term. East Asia has the highest investment ratio among the Asian regions, but South Asia is catching up fast while the investment intensity has never recovered in ASEAN since the Asian financial crisis of the late 1990s.

Net exports are gaining weight in Asia29, rising from 0.8 per cent of GDP in 1990 to 1.9 per cent in 2010. China explained most of the strengthening between 2000 and 2010, with a net export share of 3.9 per cent in 2010, up from 2.4 per cent in 2000. This compares with the oil-exporting GCC countries' 18.2 per cent in 2010. Including the GCC countries, the contribution of net exports to the GDP of Asia29 was 2.7 per cent in 2010, compared with 1.5 per cent in 1970 when net exports accounted for more than a third of final demand in GCC countries. In contrast, the deficit between exports and imports has considerably expanded in the US, from 0.5 per cent of GDP in 1980 to nearly 4 per cent in the mid-2000s before narrowing to 3.6 per cent in 2010. South Asia is the only Asian region that consistently runs a trade deficit with fluctuating sizes over the years. Lately, it has become quite sizable at 4.0 per cent of GDP in 2010. In EU15, net exports have turned into a positive component in the past two decades, but have shrunk to 0.8 per cent in 2010 from its recent peak.

The regional averages disguise the great variation displayed by individual countries. Figure 24 shows the cross-country comparisons of final demand shares in current-price GDP in 1995 and 2010; countries are arranged in descending order of their household consumption shares. Although most countries fall to the right of the US, there are a handful of Asian countries that have a higher consumption ratios than the US. Bangladesh, Cambodia, Nepal, Pakistan, Myanmar, and the Philippines fell to the left of the US in both years of comparison, and a deficit in net exports tends to be associated with high household consumption. Countries with a low income will struggle to defer consumption. It is no coincidence that Bangladesh, Cambodia, Myanmar, and Nepal[25] have been in the bottom income

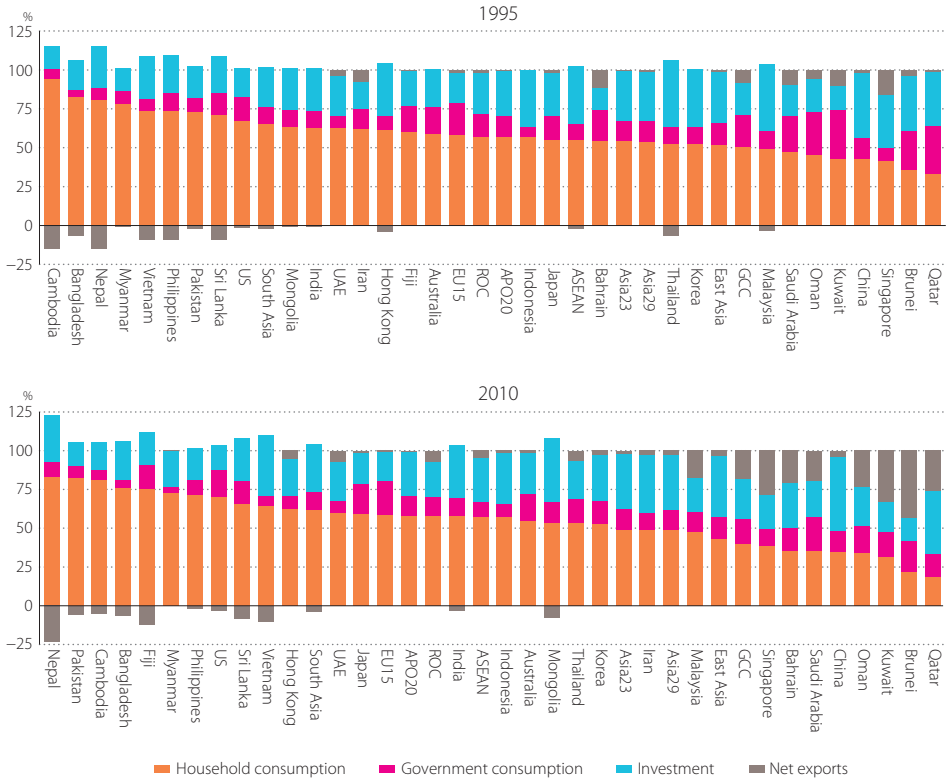

Figure 24 Final Demand Shares in GDP, 1995 and 2010
——Share of final demands with respect to GDP at current market prices

Sources: Official national accounts in each country, including author adjustments.
Note: Household consumption includes consumption of NPISHs. For Myanmar, however, household consumption includes government consumption due to data limitations. Investment includes gross fixed capital formation plus changes in inventories.

group among the countries studied in this report (see Table 14). Besides, countries with a high proportion of dependent population also tend to have a high household consumption share in their GDP (see Figure 25).

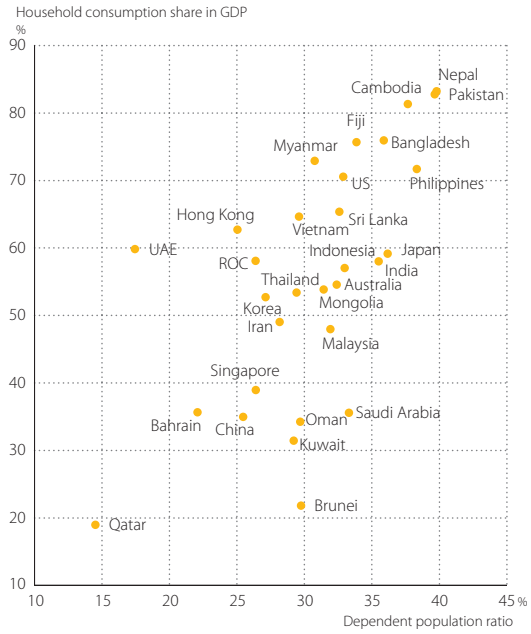

Figure 25 Ratio of Dependent Population and Consumption Share in GDP at Current Prices, 2010

Sources: Population data by NSO in each country; World Bank, *World Development Indicators* (28 July 2011); official national accounts in each country with author estimates.

At the other end, GCC and other oil-exporting countries tend to cluster at the low end of household consumption share of GDP in both years of comparison. The average household consumption share for GCC countries has been squeezed by net exports (which in turn are dominated by erratic oil revenues), from 50.3 per cent in 1995 to 40.1 per cent in 2010.[26] Given that a large part of GCC countries' GDP is not sustainable income, it may be in fact prudent for oil-exporting countries not to overconsume beyond their sustainable level but purposefully invest much to generate a steady income stream for the eventuality of oil depletion, no matter how distant this may now seem. Among the non-oil-exporting Asian countries, Singapore had the smallest household consumption share, but since 2002 China has replaced Singapore in that position, with a share of 34.9 per cent in 2010.

Net exports carry a particularly large weight in a handful of economies: in 2010 it was 28.4 per cent in Singapore, 17.8 per cent in Malaysia, and 5.4 per cent in Hong Kong, reflecting their entrepôt function in Asia. This explains why the total values of exports and imports are exceptionally high relative to the size of GDP in these economies (Figure 26). Once the 2008 SNA is implemented, these values will be adjusted to reflect only a change in the ownership of goods rather than goods moved for processing without incurring actual transactions (see Box 3).

Figure 27 shows the long-term trends of household consumption share of GDP for selected Asian countries. The Asian Tigers have been the high performers, and come at the top for most of the level indicators presented in Chapter 3. As seen in Figure 27.1, Singapore and Korea showed the most rapid relative retrenchment in household consumption as a share of GDP in their initial stage of development. While the downward trend continues in Singapore, it has halted and has been mildly reversed in Korea since the late 1980s. Between 1970 and 2010, the household consumption share of GDP fell from 68.3 per cent of GDP to 38.9 per cent and from 74.1 per cent to 52.7 per cent in Singapore and

25: The Lao PDR is also in the bottom income group; it is, however, omitted from Figure 24 because of a lack of final demand data.

26: It should also be noted that the shares are calculated in current market prices. Revenues from oil exports are notoriously erratic. It is possible that a sudden surge in export revenues relative to imports can squeeze the shares of other components of final demand without real change in the underlying behavior in the economies. For example, Qatar has the smallest share of household consumption, which shrank from 32.9 per cent in 1995 to 18.9 per cent in 2010, while over the same period, net exports swung from 1.0 per cent to 26.1 per cent. Similarly, net exports for GCC countries as a whole swung from 7.8 per cent to 18.2 per cent, squeezing household consumption from 50.3 per cent in 1995 to 40.1 per cent in 2010.

Korea, respectively. In contrast, household consumption as a share of GDP, at 62.7 per cent in 2010, has been rather steady in Hong Kong over the past four decades with no established long-term downward trend. The household consumption share did fall from 64.8 per cent in 1970 to nearly 55 per cent in the late 1980s, but it was subsequently reversed before stabilizing in recent years. Similarly, relative household consumption fell in the ROC, from 56.6 per cent in 1970 to under 50 per cent in the mid-1980s. Since then, it has been on an upward climb until the 2000s when it stabilized at around 60 per cent. It is the only country among the Asian Tigers that has a higher consumption share today than in 1970 (i.e., 58.0 per cent compared with 56.6 per cent).

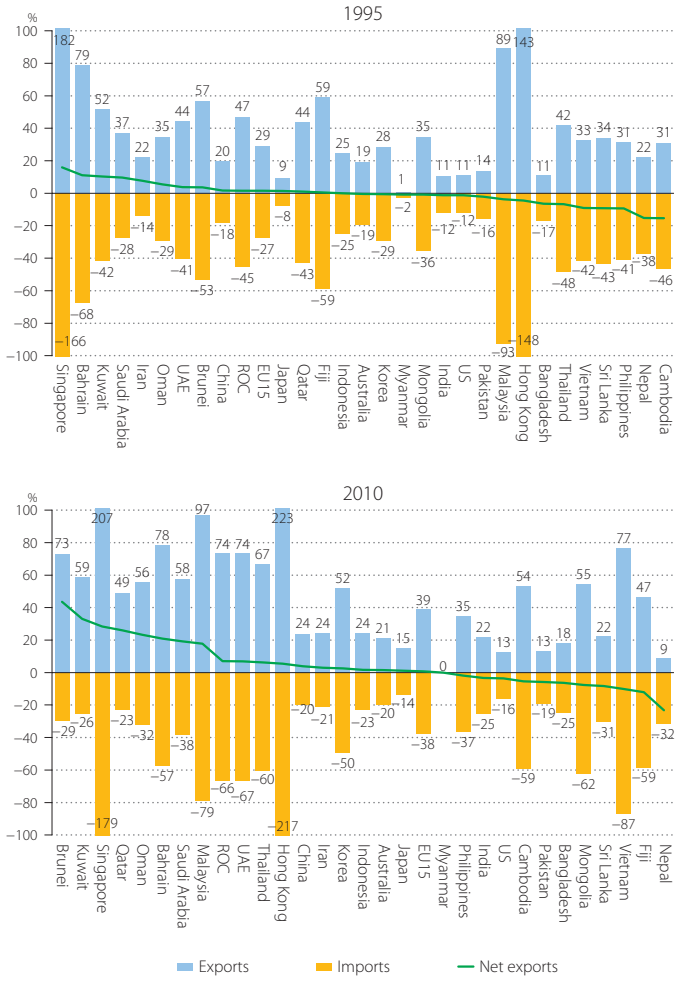

Figure 26 Export and Import Shares in GDP, 1995 and 2010
——Share of exports and imports with respect to GDP at current market prices

Sources: Official national accounts in each country, including author adjustments.

Figure 27.2 plots the trends of household consumption in the three largest Asian economies by size. The downward long-term trend in India and China is unmistakable. When GDP is growing faster than consumption, the share of the latter in GDP will diminish. The falling share of household consumption may partly reflect the falling labor income share of GDP and/or an uneven distribution of economic gain between the rich and the poor in these countries. Furthermore, the fact that China has a dependent population (under-15s and over-65s) of 25.5 per cent, compared with 35.5 per cent in India, may help explain why India has to sustain a much higher share of household consumption than China despite its falling trend over time (Figure 25). In contrast, the household consumption share in Japan has been rising slowly since 1970, from just under 50 per cent in 1970 to almost 60 per cent in 2010. With a rapidly aging population, this rising trend can be expected to continue. Japan's population dependency ratio stood at 36.2 per cent in 2010, nearly 60 per cent of which was accounted for by the over-65 age group (Figure 28). To a lesser extent, all the Asian Tigers, China, Australia, and the US have a high proportion of over-65s relative to other countries.

Figure 27.3 visualizes the observations of Table 7, plotting Asian group averages against those of the reference countries. The US household consumption share has been climbing since the mid-1980s to nearly 70 per cent of GDP in 2010, from a level of around 62 per cent. Today the US level is more than 10 per cent higher than that of EU15 and APO20,[27] which have both been fluctuating tightly between

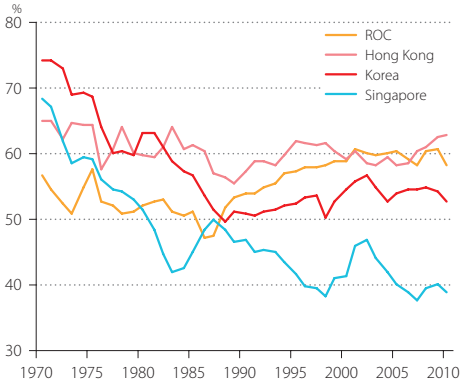

Figure 27.1

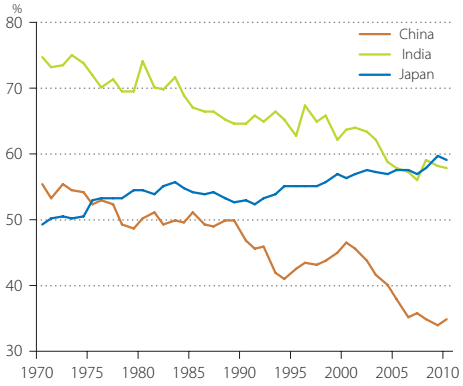

Figure 27.2

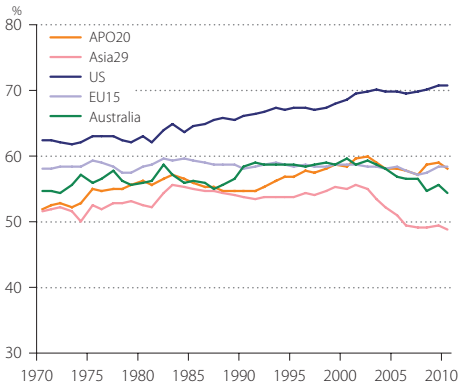

Figure 27.3

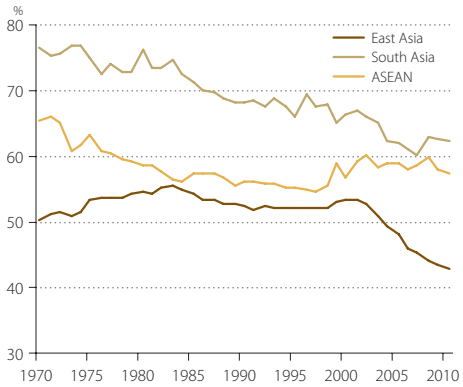

Figure 27.4

Figure 27 Long-Term Trend of Household Consumption Share in GDP, 1970–2010
——Share of household consumption with respect to GDP at current market prices

Sources: Official national accounts in each country, including author adjustments.

57 per cent and 60 per cent since the mid-1990s. In 1970, household consumption accounted for around 50 per cent of GDP in APO countries. It rose to a peak of 57.1 per cent in 1983 before falling back and hovering around 55 per cent. Since the early 1990s, however, it has been trending up toward 60 per cent. The pattern in APO closely follows that of Japan. After the burst of its bubble economy, the investment share of GDP shrank; household consumption and government consumption rose in their shares to sustain final demand (see Figure 24). In contrast, the consumption share for Asia29 declined rapidly from 55.6 per cent to around 50 per cent over the past decade. This largely reflects China's recent household consumption behavior as it gained weight in the regional economy. Australia's level has been fluctuating between that of EU15 and Asia29 in the 1970s and 1980s, and converged to EU15's level in the 1990s, but its trend in the past decade has diverged again and become similar to that of Asia29. The trends of South Asia and East Asia are dominated by those of India and China, respectively (Figure 27.4).

27: It is worth noting that the GDP share of government consumption in EU15 was 9.2 percentage points higher than the average of Asia23 in 2010 (Table 7). In fact, when it comes to welfare measurement, actual individual consumption, as opposed to household consumption, is preferred because the former takes into account expenditures by NPISHs and government expenditures on individual consumption goods and services (such as education and health) in addition to household consumption. (For more details see Box 3.)

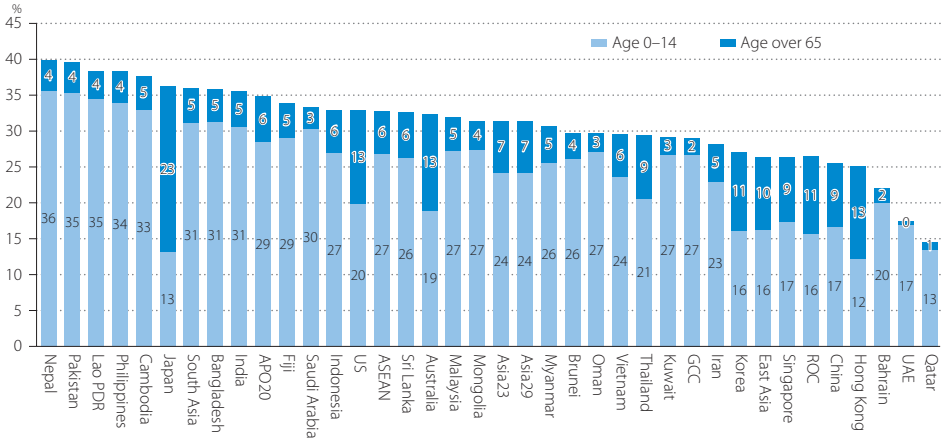

Figure 28 Ratio of Dependent Population, 2010

Sources: Population data by NSO in each country; World Bank, *World Development Indicators* (28 July 2011).

The decomposition of household consumption reveals a huge diversity of consumption patterns among individual countries, reflecting partly their income level and partly the idiosyncratic characteristics of the society under concern. Figure 29 displays strongly the cross-country version of Angel's Law which says that basic necessities will account for a high proportion of household consumption for a lower per capita income group and vice versa. More specifically, countries where food and non-alcoholic beverages account for a large proportion of consumption tend to have low income (i.e., in groups L3 or L4 in Table 14). Among the selected countries, it is staggering to note that in 2009, 57.0 per cent of Fiji's household consumption was spent on food and non-alcoholic beverages at one end, compared with only 6.7 per cent in the US at the other end. This translates into the fact that low-income countries spend 30–50 per cent of their GDP on food and non-alcoholic beverages. Eating out and recreation and culture are things that the least well-off countries cannot afford as much of as in their richer counterparts. Besides food and non-alcoholic beverages, housing/utilities and transport are the other two large spending categories. In the rich economies, these two categories account for bigger shares in household consumption than food and non-alcoholic beverages. Idiosyncratic spending such as education in Korea and Indonesia, accounting for 7.5 per cent of household consumption in both countries, and health in the US, accounting for one-fifth of consumption, are unmatched in other countries.[28]

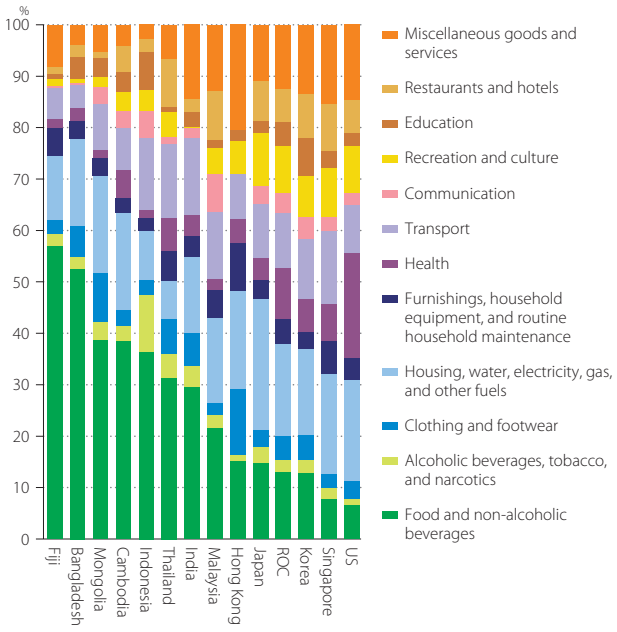

Figure 29 Household Consumption by Purpose, 2009

Sources: Official national accounts in each country.
Note: For data of Hong Kong, transportation includes communication; recreation and culture includes hotels; miscellaneous goods and services includes restaurants.

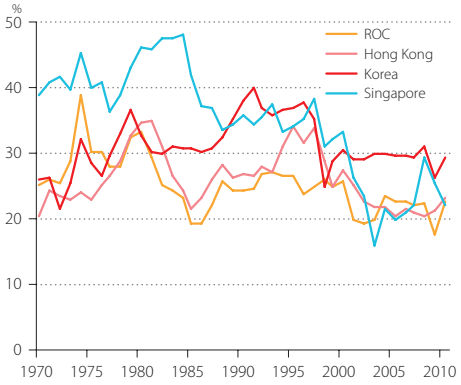

Figure 30.1

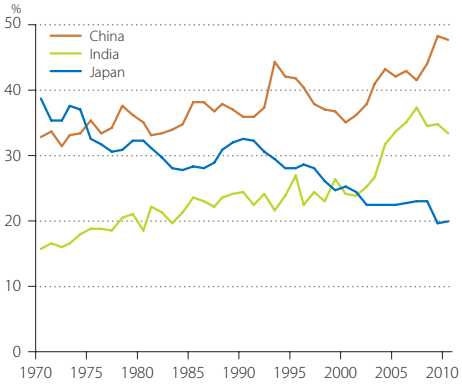

Figure 30.2

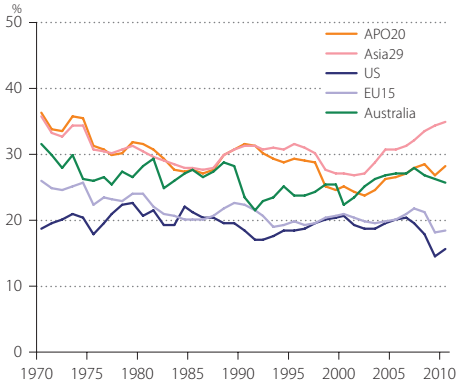

Figure 30.3

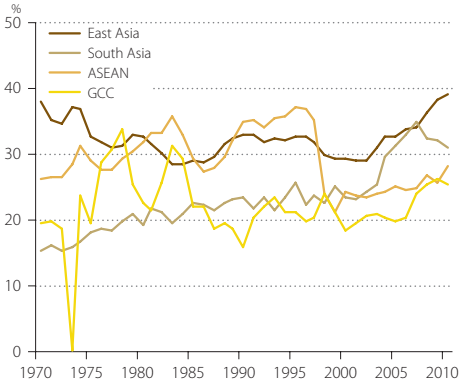

Figure 30.4

Figure 30 Long-Term Trend of Investment Share in GDP, 1970–2010
——Share of investment with respect to GDP at current market prices

Sources: Official national accounts in each country, including author adjustments.

Figure 30 looks at the long-term trend of investment share in GDP across countries. Historically, Australia's investment share of GDP has been sandwiched between Asia's level and that of US/EU15; in recent years, it has been close to APO20's average (Figure 30.3). During the financial crisis, the investment share dropped in the US and EU15, opening wider gaps of 19.3 percentage points and 16.6 percentage points with Asia29, respectively, in 2010. Historically, an investment share in the region of 40 per cent or above is unsustainable in the long run. We see that Japan's investment share of GDP steadily declined over the past decades from 38.8 per cent in 1970 to 20.0 per cent in 2010 (Figure 30.2). In the initial period, Singapore also sustained an investment share of 40 per cent or above. Since the mid-1980s, however, it has been on a downward trend, in spite of its ups and downs. In 2010, the investment ratio was 22.1 per cent. The investment share hit 40 per cent in the ROC and Korea at different times but these were no more than temporary spikes (Figure 30.1). In contrast, the investment share in China and India has been rising. India in particular has been investing very aggressively since

28: If the household consumption pattern correlates with and differs a great deal according to income level, this undermines the concept of a single representative consumption basket that underpins the construction of a consumer price index (CPI) as a measure of the cost of living. When all prices move together, the difference may not be huge. However, if the rise in CPI is driven for example by soaring oil and food prices, then it is going to bear more heavily upon the poor than the rich. GDP, using CPI as a deflator, in turn inherits this shortcoming of the price index as a welfare measure.

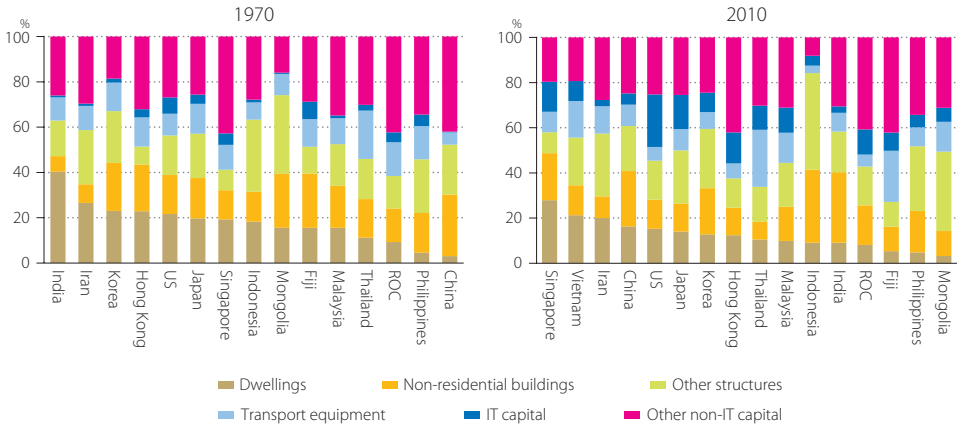

Figure 31 Investment by Type of Asset, 1970 and 2010

Sources: Official national accounts in each country, including author estimates based on input–output tables and commodity flow data.

2000, coming as close as 4.3 percentage points to China's 41.7 per cent share in 2007. Since then, the gap has widened to 14.2 per cent in 2010 (Figure 30.2). If history is any guide, the contribution of investment to final demand in China will drop sooner or later. South Asia and East Asia's investment shares are dominated by the effort in India and China, respectively. ASEAN's investment share used to be around 35 per cent, but it fell sharply to around 25 per cent during the Asian financial crisis in the late 1990s and is slowly edging up, reaching 28.2 per cent in 2010. In the past two and a half decades, the investment share in GCC countries has been fluctuating between 20–25 per cent of GDP (Figure 30.4).

Figure 31 shows the nominal investment share of six types of assets for some selected countries.[29] For most countries, investment is still very much construction-based (i.e., in dwellings, non-residential buildings, and other structures). However, the expansion of IT capital in the past four decades is significant even at the current price comparisons. The real-term comparisons are conducted at the flow and stock levels in Chapter 5.

Figure 32 plots the long-term trend of net export share in GDP from 1970 to 2010. Among the selected countries, India can be identified as prone to running a trade deficit, which deteriorated rapidly from the mid-2000s to 5.3 per cent of GDP in 2009 before narrowing to 3.3 per cent in 2010 (Figure 32.2). In contrast, net exports used to be a huge drag on the Asian Tigers Singapore and Korea in the 1970s, but they rapidly improved their position. In recent years, net exports are making a positive contribution to GDP in all the Asian Tigers. The share of net exports in Singapore is particularly large, at 28.4 per cent in 2010, compared with 2.6 per cent, 7.1 per cent, and 5.4 per cent for Korea, the ROC, and Hong Kong, respectively (Figure 32.1). China is another country that has turned around its net exports position into a significant positive contribution to final demand. The net exports share of GDP peaked at 8.8 per cent in 2007; since then, it has softened to 3.9 per cent in 2010, reflecting weaker foreign demand as a consequence of the global financial crisis (Figure 32.2).

29: The investment data by type of assets includes our own estimates for the countries where data are not available. Although our estimates are constructed based on ten classifications of assets, we have aggregated them to six assets in this table. The IT capital is defined as IT hardware, communications equipment, and computer software.

Box 4 Quarterly Economic Growth

Timely analysis of the current economic situation is beyond the scope of this *Databook*, which presents results based on annual data, and the latest year covered is 2011. In the meantime, if one would like to catch a glimpse, for example, of the strength of recovery after the global financial storm, one has to rely on countries' quarterly national accounts (QNA). Although they are timelier, the QNA are often less precise, and are subject to frequent revisions as more reliable data become available in their normal estimation cycle. With this trade-off between timeliness and data quality in mind, the APO sees the complementary benefits of collating and presenting countries' QNA alongside its database of annual data. As a result, the APO and KEO have developed an Asian Quarterly Growth Map (AQGM) that provides an instinctive understanding of recent economic growth covering Asian countries. Readers can find it at the APO website (www.apo-tokyo.org/AQGM.html).

The AQGM visualizes the seasonally adjusted rates of quarterly economic growth at constant prices. It is worth noting that there are three constant-price measures of quarterly growth. The first is the quarterly output compared with the same quarter in the previous year, which is also called the year-on-year quarterly growth. The second is quarterly output of the previous quarter, or the quarter-on-quarter growth rate. The third is the annualized quarter-on-quarter growth rate, which is also often used in economic analysis of the current economic situation. The first two measures are presented in the AQGM (with year-on-year growth displayed as a default).

The current version includes 20 Asian countries that publish QNA: China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Mongolia, the Philippines, the ROC, Singapore, Sri Lanka, Thailand, Vietnam, Armenia, Cyprus, Georgia, Israel, Jordan, and Turkey. For the purpose of international comparison, the current version includes 50 non-Asian countries, based on data available from OECD.Stat and independent publications by the respective statistical offices in those countries. The AQGM is updated at least once a month, to reflect revisions and cover newly available data. Based on the AQGM, Figure B4.2 presents year-on-year quarterly GDP growth for Asian countries, the US, and EU15 from 2009Q4 to 2011Q4.

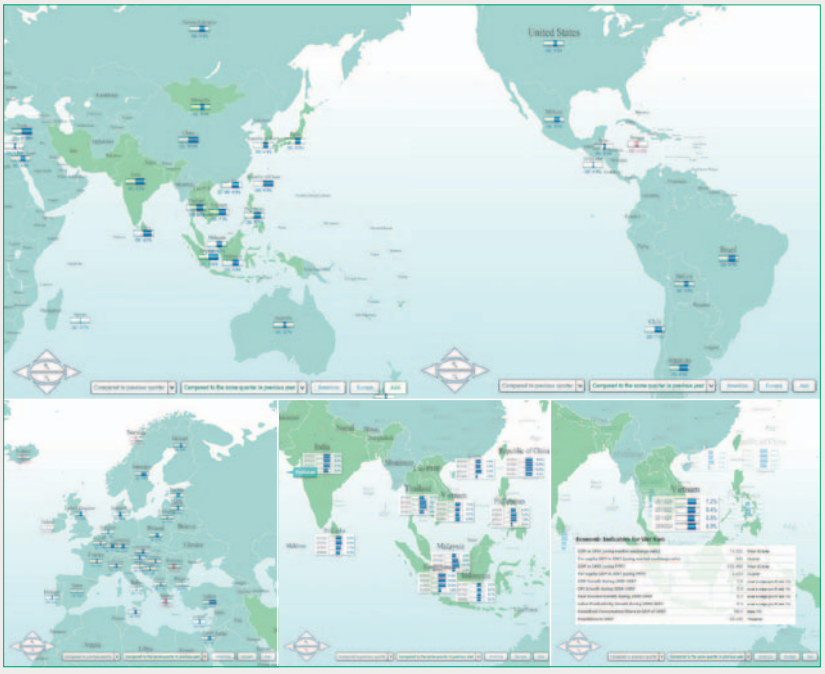

Figure B4.1 Views of Quarterly Economic Growth in Asian Countries by the AQGM

Source: Asian Quarterly Growth Map, January 2012.

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Figure B4.2 Quarterly Economic Growth in Asian Countries, 2009Q4 – 2011Q4

Source: Asian Quarterly Growth Map, January 2012.

Figure 32.3 visualizes the external imbalance of the major economies in the world. Both the US and EU15 faced a trade deficit at the beginning of the period. While EU15 managed to revert and has been in surplus since the early 1990s (within a range of 0–2 per cent of GDP), the US position has significantly deteriorated since the early 1990s, after a tremendous effort in restoring its trade balance in the late 1980s. In 2010, the size of the US trade deficit stood at 3.6 per cent of its GDP, compared to its recent trough of −5.8 per cent of GDP in 2006. Australia has been running a trade deficit for most of the period; only in the past few years has its trade balance been in surplus. In contrast, Asia29's trade has been in surplus continuously and a near mirror image of the US. Asia29's net exports share of GDP was

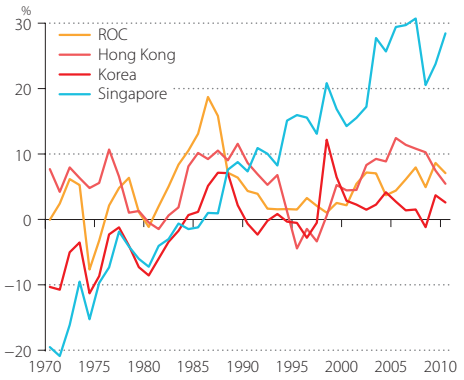

Figure 32.1

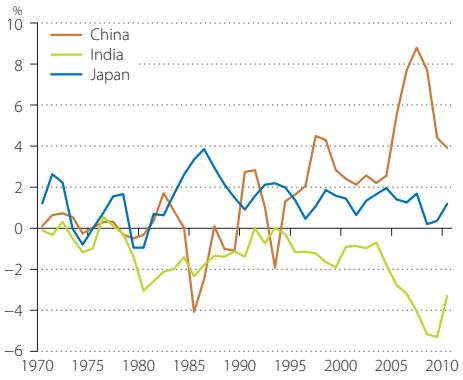

Figure 32.2

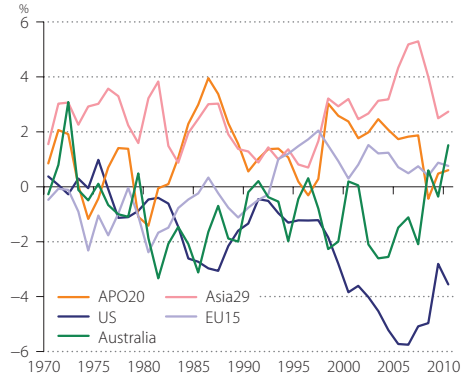

Figure 32.3

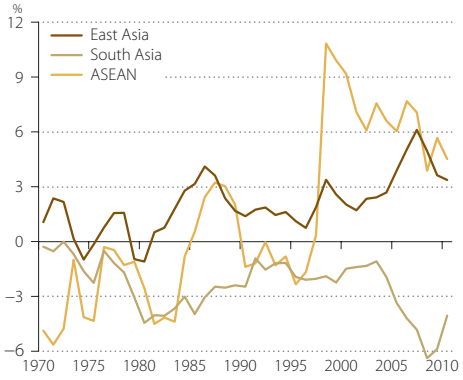

Figure 32.4

Figure 32 Long-Term Trend of Net Export Share in GDP, 1970–2010
——Share of net exports with respect to GDP at current market prices

Sources: Official national accounts in each country, including author adjustments.

2.7 per cent, compared to the recent peak of 5.3 per cent in 2010. Addressing this external imbalance has been highlighted as a necessary step to a healthier and sustained growth in the world economy.

4.2 Demand-Side Growth Decomposition

Figure 33 shows the decomposition of the average annual economic growth by final demand for the periods 1995–2000 and 2000–2010, respectively.[30] Asia29 grew faster in the latter period than the earlier period (at 5.8 per cent on average per annum compared with 4.1 per cent as presented in Table 3). The earlier period was atypical in that it embodied the impact of the Asian financial crisis, and we observe some erratic contributions by the final demand components. On the one hand, investment

30: The Törnqvist quantity index is adopted for calculating the growth of real GDP. Using this index, we can decompose the growth of real GDP into the products of contributions by final demands:
$\underbrace{\ln\left(GDP^{t} / GDP^{t-1}\right)}_{\text{Real GDP growth}} = \underbrace{\sum_i (1/2)\left(s_i^{t} + s_i^{t-1}\right) \ln\left(Q_i^{t} / Q_i^{t-1}\right)}_{\text{Contribution of final demand } i}$ where Q_i^t is quantity of final demand i in period t and s_i^t is expenditure share of final demand i in period t. Thus, the real GDP growth may diverge from the official estimates or those presented in Table 3.

shaved 4.8 and 3.4 percentage points off the overall economic growth in Thailand and Indonesia, respectively, canceling out growth in other components of final demand and leaving its GDP at a standstill. On the other hand, some countries received a huge boost in net exports, which contributed, for example, 6.7 and 4.7 percentage points to economic growth in Qatar and Malaysia, respectively. During this period, for most countries in Asia the engine of growth was household consumption while investment growth was more subdued. Qatar experienced the fastest economic growth among the countries studied, averaging 8.9 per cent per year, three-quarters of which was driven by net exports. Unlike the nature of growth in Qatar, China's growth was more even, with all components making their fair shares of positive contribution. Out of its average annual growth of 7.7 per cent, 40.4 per cent was contributed by household consumption, 17.7 per cent by government consumption, 26.2 per cent by investment, and 15.7 per cent by net exports. This compares with average annual growths of 4.3 per cent in the US and 3.0 per cent in EU15. The contribution from household consumption was 71.2 per cent and 59.5 per cent in the US and EU15, respectively, whereas investment growth accounted for 37.6 per cent and 32.0 per cent of overall growth in the US and EU15, respectively.

On the back of the Asian financial crisis, investment growth surged strongly: its impact on real GDP growth became more significant in Asia in the 2000s, especially in fast-growing economies. For example, investment contributed 6.1 percentage points in China, 3.0 percentage points in Myanmar, 3.4 percentage points in India, and 3.9 percentage points in Vietnam. The role played by investment in China has strengthened, with its contribution to economic growth doubling between 1995–2000 and 2000–2010 from 26.2 per cent to 56.4 per cent, whereas the contribution of net exports dwindled from 15.7 per cent to 3.9 per cent. However, for Singapore and the ROC, the strength of net exports was the economic story, accounting for 60.8 per cent and 66.2 per cent of their economic growth on average per year between 2000 and 2010, respectively (Figure 34). The reverse was true in India, where net exports swung from making a positive contribution of 2.7 per cent in the earlier period to being a drag on economic growth with a negative contribution of –6.3 per cent in the period 2000–2010. In some of these economies, the

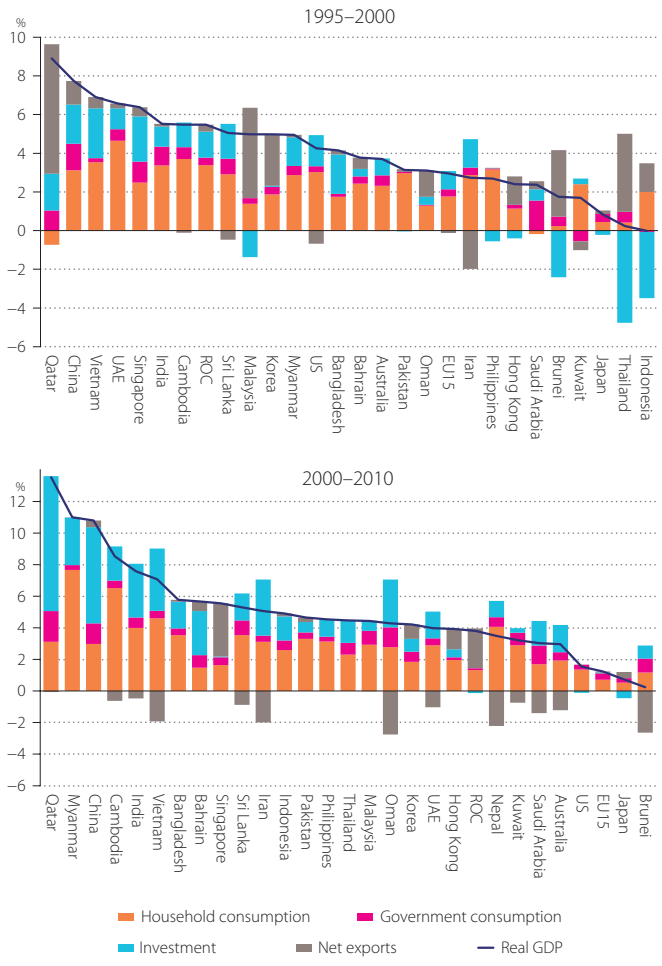

Figure 33 Final Demand Contributions to Economic Growth, 1995–2000 and 2000–2010

——Decomposition: Average annual growth rate of GDP at constant market prices

Sources: Official national accounts in each country, including author adjustments.

contribution of household consumption to economic growth was really squeezed: for example, from 40.4 per cent in 1995–2000 to 27.6 per cent in 2000–2010 in China, from 39.0 per cent to 29.6 per cent in Singapore, and from 61.8 per cent to 34.5 per cent in the ROC. Also, in the latter period net exports made negative contributions in countries such as Vietnam, Nepal, Cambodia, India, and most of the oil-exporting countries.

In the 2000s, economic growth slowed in both the US and EU15: from 4.3 per cent on average per year in 1995–2000 to 1.5 per cent in 2000–2010, and from 3.0 per cent to 1.2 per cent, respectively. In terms of contributions, household consumption increased from 71.2 per cent to 87.2 per cent and government spending from 7.2 per cent to 20.0 per cent in the US over the two periods. Investment in the US took a plunge, however, from a contribution of 37.6 per cent to −8.4 per cent over the two periods. Its net exports improved from −16.0 per cent to 1.3 per cent. EU15 had a similar pattern, where the contribution of government spending nearly tripled over the two periods from 12.5 per cent to 32.1 per cent, squeezing out the contribution of investment by nine-tenths, while household consumption remained more or less stable. Its net exports also improved from −4.0 per cent to 6.3 per cent.

Figure 37 shows how the contribution of economic growth by final demand varies across countries and over time for the period 1970–2010. The immediate impact of the global financial crisis of 2007–2008 has come through our data, although its far-reaching ripple effects go beyond 2010. Most countries felt an adverse impact in 2008 and 2009, with the exception of India where growth rebounded strongly in 2009 from a slowdown in the previous year. The impact on the Asian countries varied both in magnitude and in nature. Japan's recession was particularly deep with the economy contracting by 1.1 per cent and 5.6 per cent in 2008 and 2009, respectively, compared with 2.1 per cent growth in 2007, as shown in Figure 35. Besides Japan, other Asian countries either experienced a mild recession or a growth slowdown. Even so, relative to their rapid growth, the magnitude of the impact could still be substantial. For example, growth in Singapore dropped from 11.3 per cent in 2007 to 0.4 per cent and −0.6 per cent in 2008 and 2009, respectively. Similarly, growth in Hong Kong slowed from 6.2 per cent in 2007 to 2.3 per cent 2008 before moving into the negative zone of −2.8 per cent in 2009. The corresponding real GDP growth figures for the ROC were 5.8 per cent in 2007, 0.9 per cent in 2008, and −1.5 per cent in 2009. India's growth slowed from 10.7 per cent in 2007 to 1.5 per cent in 2008 before bouncing back to 9.1 per cent in 2009. In contrast, the slowdown in China was more gradual but lasted longer; from 13.1 per cent in 2007, growth decelerated to 10.5 per cent in both 2008 and 2009, and further to 9.4 per cent in 2010. Most countries experienced a rebound (strong in some cases) in 2010, but it was largely due to some temporary effects, and did not mark the start of a sustained recovery in the major economies.

The channels through which the adverse impact filtered through also varied across countries. Japan's recession in 2009 was largely accounted for by a sharp fall in investment (3.9 percentage points) and, to a lesser extent, a fall in net exports (1.7 percentage

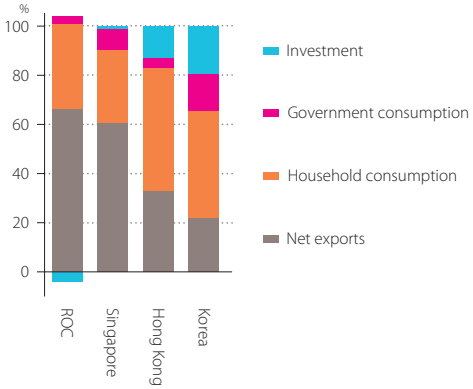

Figure 34 Final Demand Contribution Shares to Economic Growth of the Asian Tigers, 2000–2010

——Shares of final demand contributions to growth rate of GDP at constant market prices

Sources: Official national accounts in each country, including author adjustments.

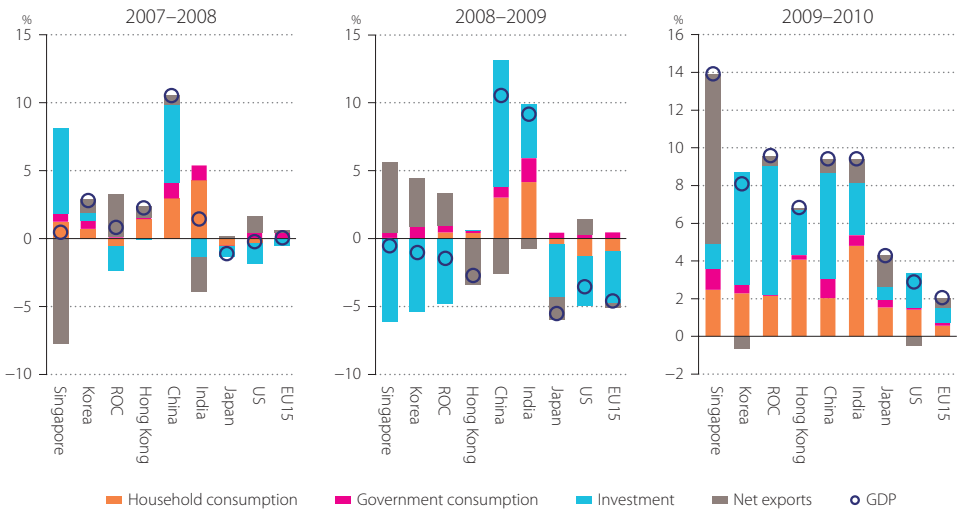

Figure 35 Impacts of Global Financial Crisis and Recoveries, 2007–2010
——Annual growth rates of GDP at constant market prices and contributions of final demands

Sources: Official national accounts in each country, including author adjustments.

points), while the 0.4 per cent growth of government spending canceled out the 0.4 per cent fall in household consumption. Similarly, in the ROC, investment fell by 4.9 per cent in 2009, while the other components of final demand grew albeit more slowly than it had been. In Singapore, net exports and investment accounted for −7.8 percentage points and 6.3 percentage points of the final demand growth, respectively, in 2008. The reverse was true in 2009 with net exports accounting for 5.1 percentage points and investment −6.2 percentage points of final demand growth. In China, net exports were the only component to contract (by 2.6 percentage points) in 2009 while other final demand components expanded handsomely. Hong Kong also took a hard hit in net exports in 2009, falling by 3.4 percentage points, while household consumption slowed considerably over two years. In the US and EU15, the weakness was in investment and household consumption. Consumers were cautious with their spending as households repaired their balance sheets and job prospects became uncertain. Household consumption fell by 1.3 percentage points and 1.0 percentage points in the US and EU15, respectively.

Japan was the only Asian country where the global financial storm of 2007–2008 caused a deeper retrenchment in the economy than the Asian financial crisis of 1997–1998 (Figure 36). The latter marked an exceptional time for many Asian economies. Its impact can clearly be seen in Indonesia, Korea, Malaysia, Singapore, and Thailand, where investment took a nosedive in 1998; consumption also fell, albeit to a lesser extent. In contrast, net export growth was exceptionally strong, and was likely to have benefited from the rapid devaluation of the Asian currencies at the time of the crisis. It appears that some Asian countries, for example, the ROC, Hong Kong, Japan, and Malaysia, also suffered adversely in 2001 following the burst of the dot.com bubble.

Economic restructuring is a gradual process and could take a long time to establish. Some shifting in the relative weight of the key drivers of growth may be emerging in some countries, and is discernible in our data covering almost four decades. For example, in the ROC and Hong Kong, the significant role played by investment in their early development stage has retreated and besides household consumption, net exports have emerged as a relative important driver of economic growth in the 2000s. In contrast, investment has become increasingly prominent in explaining economic growth in China

and India in the past two decades as they undergo rapid development. In Japan, investment has faded as a key driver in economic growth after the bubble years of the late 1980s came to an end. Among the Asian Tigers, Singapore is the most erratic. In the more mature economies like the US and EU15, economic growth is largely driven by household consumption, followed by investment, over the economic cycle, while the contribution from net exports tends to fluctuate. Government consumption has been expanding proportionately more in some countries (such as EU15, Australia, China, and India) than others (Hong Kong, Vietnam, and the ROC in recent years). Growth of government consumption in the US appears to be more cyclical than in other countries.

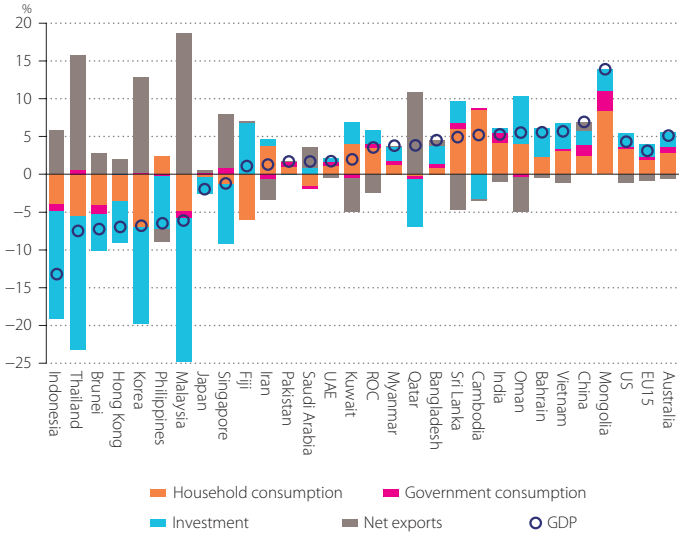

Figure 36 Impacts of Asian Financial Crisis, 1997–1998
——Annual growth rates of GDP at constant market prices and contributions of final demands

Sources: Official national accounts in each country, including author adjustments.

It is difficult to understand the oil-exporting economies fully without analyzing the oil market in parallel. We can clearly observe its volatility from Figure 37, with huge swings from peak to trough particularly in the 1970s. The oil booms of the 1970s brought benefits, but the downturns also hurt. Net exports are still erratic, but overall volatility seems to have reduced in the past two decades. Qatar experienced the fastest GDP growth among the oil-exporting countries in recent years with very strong investment growth, but its economy is still very dependent on oil and gas and related industries, which accounted for 43.9 per cent of its GDP in 2009 (Figure 65), roughly 80 per cent of its export earnings, and 70 per cent of government revenues in the 2000s.[31] In contrast, Bahrain has diversified to be a regional banking and financial center and benefited from the regional boom in recent years. Even so, petroleum production and processing still accounted for less than 30 per cent of its GDP in 2009 (Figure 65), about 60 per cent of export earnings, and 75 per cent of government revenues in the 2000s.[32] The economic fortunes of these countries are therefore tied with the rest of the world via their dependence on the oil and gas industry. For example, demand for oil has been driven by the rapid growth in emerging economies. If, for instance, China's growth slows, the demand for oil will also relent. Their future depends on how well they can diversify away from oil and gas while the stock of natural resources lasts.

31: Data from the series of *Annual Statistical Abstract*, State of Qatar.
32: Data from the Ministry of Finance, Kingdom of Bahrain.


Bahrain
Bangladesh
Brunei
Cambodia
China
ROC
Hong Kong
India
Indonesia
Iran
Japan
Korea
Kuwait
Malaysia
Mongolia
%
1971 1976 1981 1986 1991 1996 2001 2006
Household consumption
Government consumption
Investment
Net exports
Real GDP

Figure 37 Final Demand Decomposition of Real GDP Growth, 1970–2010

Sources: Official national accounts in each country, including author adjustments.
Note: Myanmar's household consumption includes government consumption due to data limitations.

5 Productivity

Productivity performance is crucial to a country's future economic prospects, especially when a lot of countries are facing aging populations. As the factors of inputs (labor and capital devoted to production) cannot increase indefinitely, productivity gains, which enable an economy to produce more for the same amount of inputs, are the only route to sustain economic growth in the long run. It follows that monitoring and improving national productivity capability (the supply side of the economy) are important aspects of public policy in many countries.[33]

Used as a ratio of an output volume measure to an input volume measure, productivity is simple as a notion. When it comes to applying it, however, we quickly realize the complexity in operationalizing this notion to suit different purposes, especially in a world with data limitations. Consequently, we have different measures of productivity for different purposes, and different estimation approaches and definitions subject to the data used. In this report, national accounts are the basis for our productivity estimates, and, in turn, growth accounting with the appropriate choice of index numbers is adopted here as our estimation approach.[34] We present two productivity measures in this chapter, namely labor productivity and total factor productivity (TFP).

Labor productivity can be measured in a number of ways, depending on the definitions of output and labor input measures. The preferred measure is the basic-price GDP per actual hour worked, which adjusts for different work patterns across countries and across time.[35] However, total actual hours worked cannot be constructed for all the countries studied. To include all countries and define the Asian country groups, therefore, the labor productivity measure in terms of GDP per worker is used in Section 5.1. To the extent that workers in high-performing Asian countries tend to work longer hours on average than those in the US, the per worker-based labor productivity gaps probably put the Asian countries in a more favorable light than otherwise. Although being a one-factor or partial-factor productivity measure, interest in labor productivity has never waned due to its simplicity as a concept, its broad availability, and its direct link to per capita GDP performance. In Section 3.2, we see how the per capita GDP gap with the US for most Asian economies is largely explained by their labor productivity shortfalls. The cross-country comparisons of labor productivity performance conducted in Section 5.1 are based on a definition compatible with Section 3.3, namely GDP per worker. In Section 5.2, we shift our focus to our own estimates of the alternative labor productivity measure, namely GDP per hour worked for some selected Asian countries. In Section 5.3, we include capital input as another key factor of production and present the TFP estimates for 15 Asian countries and the US, based on our estimates of capital services.

33: For example, the UK government sets out public service agreements (PSAs) that outline the improvements that are expected by government expenditure. The PSAs are agreed every three years between the main government departments and the Treasury as part of the spending review process. At the top of the 30 targets, PSA1 aims to "raise the productivity of the UK economy." The EU KLEMS project, which was funded by the European Commission and ran from 2003 to 2008, was also a major initiative responding to, among other things, the data demands arising from policy evaluation, especially in the assessment of the goals concerning competitiveness and economic growth potential as established by the Lisbon and Barcelona Summit goals.

34: The growth accounting approach is based on the microeconomic production theory and the nominal accounting balance of input and output of production. The standard model was presented by Solow (1957) and has been developed by researchers such as Zvi Griliches, Dale Jorgenson, Charles Hulten, and Erwin Diewert. See OECD (2001) for a presentation of definitions, theoretical foundations, and a number of practical issues in measuring productivity.

35: GDP is valued at basic prices in this chapter, as opposed to GDP at market prices used in the previous chapters. GDP at basic prices is defined as GDP at market prices minus net indirect taxes on products. Since it reflects prices actually paid and received by the producer, it is more relevant to productivity comparisons. As most Asian countries do not provide the official estimates for GDP at basic prices in their national accounts, they are calculated based on available tax data. See Appendix A.1 for the methods employed for our calculations.

5.1 Per Worker Measure of Labor Productivity

Figure 38 presents the cross-country comparisons of labor productivity levels in 2010, measured as GDP per worker in US dollars.[36] The countries naturally bundle into groups. On this measure, the US is the leading economy. The close frontrunners in Asia are Singapore and Hong Kong. The other two Asian Tigers together with Japan follow at some distance. While Iran is close to the top, it is worth noting that it has the lowest employment rate in Asia (Figure 21). Singapore and Hong Kong achieved a labor productivity level that was within –10 per cent that of the US in 2010. Given data uncertainty, this difference is not deemed statistically significant. The ROC and Japan took the third and fourth places among the Asian group, with productivity levels 20 per cent and 29 per cent below that of the US, respectively. Korea followed, with a gap of 36 per cent. Iran and Malaysia achieved productivity levels that were 48 per cent and 38 per cent of the US level, respectively. Thereafter, among the Asian group was a number of countries with labor productivity levels less than 20 per cent that of the US, pulling down the average performance of the group to 17 per cent for APO20, 16 per cent for Asia29, and 11 per cent for ASEAN. Included in this list tail were China and India, with productivity levels that were 13 per cent and 9 per cent of the US level, respectively.

In the past decade, APO20 as a group achieved little change in its labor productivity relative to that of the US, stagnating at around 16 per cent, while Asia 23's has risen from 11 per cent to 15 per cent (Table 8). Having been the leader in Asia, Japan started to fall behind the Asian Tigers, when Hong Kong and Singapore caught up and overtook it in labor productivity in 1991 and 1992, respectively. In 2000, Hong Kong sustained a productivity gap of 19 per cent with the US, but by 2010 the gap was further narrowed by nearly two-thirds to around 6 per cent. In contrast, the relative productivity level of Singapore against the US has been unchanged in the past decade.

Comparing the new annual data for 2009 and 2010 with 2008 shows that productivity changed little in the three years, stressing the structural nature of productivity performance, which requires medium- to long-term efforts to make statistically significant improvements (Table 8). In the past decade, the top eight countries have maintained their relative positions, although countries have been closing in on the region's leader up to 2010 when Singapore's labor productivity grew faster than the rest. China and India are the two giant and fast-emerging

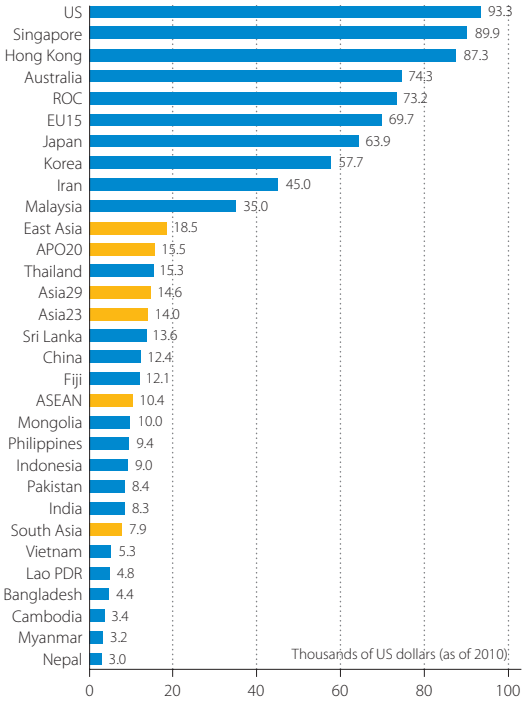

Figure 38 Labor Productivity Level by Per Worker GDP, 2010

——GDP at constant basic prices per worker, using 2005 PPPs, reference year 2010

Source: APO Productivity Database 2012.01.

36: Cross-country level productivity comparisons are notoriously difficult to make and hence subject to a lot of data uncertainty. Estimates should therefore be taken as indicative for broad groupings rather than for precise ranking.

Table 8 Per worker Labor Productivity Levels, 1970, 1990, 2000, and 2008–2010

——GDP at constant basic prices per worker, using the 2005 PPPs, reference year 2010

1970		(%)	1990		(%)	2000		(%)	2008		(%)	2009		(%)	2010		(%)
Iran	27.2	100.0	Japan	52.7	100.0	Singapore	75.6	100.0	Singapore	84.3	100.0	Singapore	82.0	100.0	Singapore	89.9	100.0
Japan	25.6	94.3	Hong Kong	51.5	97.8	Hong Kong	64.0	84.6	Hong Kong	83.2	98.7	Hong Kong	81.9	99.9	Hong Kong	87.3	97.2
Singapore	24.3	89.5	Singapore	51.2	97.2	Japan	58.0	76.7	ROC	67.9	80.5	ROC	67.4	82.3	ROC	73.2	81.4
Hong Kong	19.7	72.4	ROC	34.7	65.8	ROC	55.4	73.2	Japan	63.5	75.4	Japan	60.9	74.3	Japan	63.9	71.2
ROC	11.9	43.8	Iran	28.8	54.6	Korea	42.9	56.7	Korea	54.6	64.8	Korea	55.1	67.2	Korea	57.7	64.2
Fiji	11.0	40.5	Korea	27.1	51.4	Iran	32.5	43.0	Iran	42.8	50.7	Iran	43.5	53.1	Iran	45.0	50.1
Malaysia	9.4	34.7	Malaysia	18.6	35.3	Malaysia	26.7	35.3	Malaysia	34.6	41.0	Malaysia	33.3	40.6	Malaysia	35.0	38.9
Korea	8.9	32.9	Fiji	11.0	21.0	Thailand	12.0	15.9	Thailand	15.0	17.7	Thailand	14.5	17.7	Thailand	15.3	17.0
Philippines	6.8	25.0	Thailand	7.8	14.9	Fiji	11.5	15.2	Fiji	12.5	14.9	Sri Lanka	12.8	15.6	Sri Lanka	13.6	15.2
Sri Lanka	4.0	14.6	Philippines	7.2	13.6	Sri Lanka	9.4	12.4	Sri Lanka	12.3	14.6	Fiji	12.3	15.0	China	12.4	13.8
Mongolia	3.8	14.2	Mongolia	6.4	12.2	Philippines	7.7	10.2	China	10.3	12.3	China	11.3	13.7	Fiji	12.1	13.5
Pakistan	3.6	13.4	Pakistan	6.2	11.7	Pakistan	7.5	9.9	Mongolia	9.4	11.2	Mongolia	9.6	11.8	Mongolia	10.0	11.1
Thailand	3.6	13.3	Sri Lanka	6.0	11.3	Mongolia	6.8	9.0	Philippines	9.1	10.8	Philippines	9.0	10.9	Philippines	9.4	10.4
India	2.6	9.7	Indonesia	5.1	9.7	Indonesia	6.6	8.7	Indonesia	8.6	10.2	Indonesia	8.8	10.7	Indonesia	9.0	10.0
Indonesia	2.5	9.3	India	3.6	6.8	China	4.8	6.4	Pakistan	8.3	9.8	Pakistan	8.3	10.1	Pakistan	8.4	9.4
Nepal	1.5	5.6	Bangladesh	2.4	4.5	India	4.8	6.3	India	7.1	8.5	India	7.7	9.4	India	8.3	9.2
China	0.8	3.1	Nepal	2.2	4.2	Vietnam	3.4	4.5	Vietnam	4.9	5.8	Vietnam	5.1	6.2	Vietnam	5.3	5.9
Vietnam	0.3	1.1	Lao PDR	2.1	4.0	Bangladesh	3.4	4.4	Lao PDR	4.3	5.1	Lao PDR	4.5	5.5	Lao PDR	4.8	5.3
			Vietnam	2.0	3.9	Lao PDR	3.1	4.0	Bangladesh	4.2	4.9	Bangladesh	4.3	5.2	Bangladesh	4.4	5.0
			China	2.0	3.8	Nepal	2.7	3.6	Cambodia	3.3	3.9	Cambodia	3.3	4.1	Cambodia	3.4	3.8
			Myanmar	0.8	1.4	Cambodia	2.3	3.0	Nepal	2.9	3.5	Nepal	3.0	3.6	Myanmar	3.2	3.6
						Myanmar	1.2	1.6	Myanmar	2.7	3.2	Myanmar	3.0	3.6	Nepal	3.0	3.3
Bahrain	12.2	45.1	Bahrain	46.3	87.9	Bahrain	58.8	77.8	Bahrain	50.0	59.3	Bahrain	46.4	56.6	Bahrain	48.7	54.1
Kuwait	320.9	1181.0	Kuwait	50.9	96.7	Kuwait	67.9	89.8	Kuwait	62.6	74.3	Kuwait	58.9	71.9	Kuwait	58.1	64.6
Oman	5.4	19.8	Oman	52.6	99.8	Oman	65.7	86.9	Oman	59.1	70.1	Oman	54.7	66.7	Oman	65.4	72.8
			Qatar	95.7	181.7	Qatar	133.6	176.6	Qatar	127.6	151.4	Qatar	132.4	161.5	Qatar	142.7	158.8
Saudi Arabia	113.0	415.7	Saudi Arabia	62.7	119.0	Saudi Arabia	70.0	92.6	Saudi Arabia	70.0	83.1	Saudi Arabia	68.9	84.1	Saudi Arabia	70.1	78.1
UAE	63.7	234.6	UAE	146.2	277.6	UAE	126.1	166.7	UAE	114.5	135.9	UAE	100.7	122.8	UAE	94.1	104.7
			Brunei	123.5	234.4	Brunei	111.2	147.0	Brunei	98.9	117.3	Brunei	93.9	114.5	Brunei	93.7	104.2
(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)			(regrouped)		
APO20	7.3	26.7	APO20	11.3	21.5	APO20	12.6	16.6	APO20	14.7	17.4	APO20	14.7	17.9	APO20	15.5	17.3
Asia23	4.2	15.3	Asia23	6.6	12.5	Asia23	8.8	11.6	Asia23	12.6	15.0	Asia23	13.0	15.9	Asia23	14.0	15.6
Asia29	4.5	16.4	Asia29	7.0	13.3	Asia29	9.3	12.3	Asia29	13.2	15.7	Asia29	13.6	16.6	Asia29	14.6	16.2
East Asia	4.5	16.5	East Asia	7.6	14.3	East Asia	10.9	14.4	East Asia	16.6	19.7	East Asia	17.1	20.9	East Asia	18.5	20.6
South Asia	3.0	11.0	South Asia	3.7	7.0	South Asia	4.9	6.5	South Asia	6.9	8.2	South Asia	7.4	9.0	South Asia	7.9	8.8
ASEAN	3.5	12.7	ASEAN	7.2	13.7	ASEAN	7.7	10.2	ASEAN	10.0	11.8	ASEAN	10.0	12.1	ASEAN	10.4	11.6
GCC	125.8	462.9	GCC	71.1	135.0	GCC	80.5	106.5	GCC	79.0	93.8	GCC	75.6	92.3	GCC	77.0	85.6
(reference)			(reference)			(reference)			(reference)			(reference)			(reference)		
US	50.8	186.8	US	65.3	123.9	US	78.6	103.9	US	89.5	106.1	US	90.0	109.8	US	93.3	103.9
EU15	36.0	132.5	EU15	55.3	104.9	EU15	65.3	86.3	EU15	69.9	82.9	EU15	68.0	83.0	EU15	69.7	77.6
						EU27	59.2	78.2	EU27	64.5	76.6	EU27	62.9	76.7	EU27	64.4	71.7
Australia	44.7	164.4	Australia	55.4	105.2	Australia	68.8	90.9	Australia	73.6	87.4	Australia	74.8	91.2	Australia	74.3	82.7

Unit: Thousands of US dollars (as of 2010).
Source: APO Productivity Database 2012.01.

economies in Asia. China started off with one-third of India's productivity level in 1970; but four decades later China is showing signs of pulling ahead of India (Figure 39). China's relative performance against the US moved up from 2 per cent in 1970 to 6 per cent in 2000 and 13 per cent in 2010, compared with the corresponding figures of 5 per cent, 6 per cent, and 9 per cent for India.[37]

37: If the comparisons were with the region's leader at different times, India's relative labor productivity has actually fallen, while China has managed to make a substantial leap to close in on the leader, albeit from a very low level.

Box 5 The Middle-Income Trap and Implications for China

Emerging Asia has been catching up with the leading economies at a spectacular pace. In the past two decades, China's real GDP has increased by 630 per cent and India's by 250 per cent, compared with 60 per cent in the US and 40 per cent in EU15. In the historical perspective, the pace of economic catch-up is accelerating. It took 32 years for Britain's economy to double in size between 1830 and 1862, and 17 years for the US to achieve the same and overtake Britain in the 1870s. The economies of China and India doubled within a decade (*The Economist*, "Special Report: The World Economy," 24 September 2011). The recent economic development in the world's two most populous countries has delivered a miraculous rise in living standards, supported global demand when the advanced economies are faltering, and shifted the relative economic balance of different regions with its geopolitical implications. China is already the world's second largest economy in current dollars, and *The Economist* estimates that it may well overtake the US as the world's leading economy within a decade. China will overtake the US in 2015 if it can maintain its pace in the 2000s of catching up to the US, and in 2019 if the relative speed of catching up is halved (Figure B5).

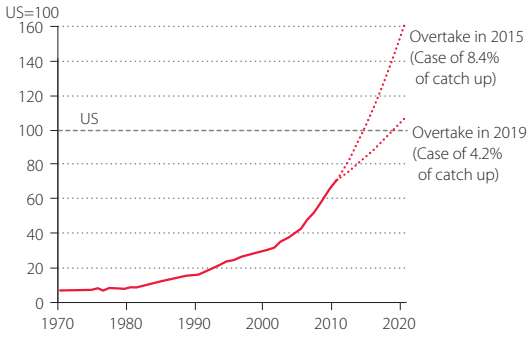

Figure B5 China's GDP Forecast Relative to the US, 2010–2020

Sources: Official national accounts in each country, including author adjustments.

Economic convergence has been achieved before, but it has taken on new significance when it involves China and India because of their sheer size. It is nothing new that with a suitable policy framework put in place, the late-developing countries can grow more rapidly than the leading matured economies by imitating and exploiting proven successes. They can improve their productivity performance by high levels of investment and by shifting underemployed resources from agriculture to high performing export-oriented manufacturing (or IT services in the case of India) that utilizes imported technologies. The question is how long can this breakneck growth last – that is, at what point will this growth engine jam and slow down? It is conceivable that after all the low-hanging fruits have been grabbed, further growth will require more ingenuity, and become more innovation-intensive. To sustain growth, countries must rise up to the challenge. Given its economic weight, the timing and the manner in which the Chinese economy might slow have important implications for the world economy in the medium term.

Eichengreen, Park, and Shin (2011) set out to identify the precursors of growth slowdowns that were associated with economic maturity in fast-growing economies using international data starting in 1957. A significant slowdown is defined as a downshift in the seven-year average growth rate by at least 2 percentage points. Based on countries' experience, 85 per cent of growth slowdowns in fast-growing economies are explained by the slowdown in total factor productivity growth. The probability of this sort of slowdown peaks when per capita GDP reaches USD17,000 in 2005 prices, or 58 per cent of that in the lead country, or when manufacturing accounts for 23 per cent of total employment. Furthermore, higher old age dependency rates, and high and volatile inflation appear to make slowdowns more likely, whereas trade openness has the opposite effect, other things being equal. Interestingly, a low consumption share of GDP also increases the likelihood of slowdown; such a probability is minimized when consumption is around 64 per cent of GDP. Similarly, high investment rates are found to reduce the likelihood of slowdown. More provocatively, the research finds that countries with undervalued real exchange rates face a higher chance of growth slowdowns. It may be that growth reliant on currency undervaluation is vulnerable to external shocks and policy tensions arising from managing the exchange rates. It may also be that undervalued exchange rates distort decisions, building up imbalances and excesses in the export sector. This formula may have worked well in the early catch-up phase to boost growth but it may be less congruous with later-stage development when growth tends to be driven by indigenous innovation, leaving the country increasingly susceptible to slowing down.

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Based on this research, China may hit the middle-income trap in the not-too-distant future. With a per capita GDP of USD7,600 in 2010, China is within reach of the USD17,000 threshold, although it is still some distance away from the relative income threshold of 58 per cent. It may even have hit the manufacturing employment landmark of 23 per cent. On its current course, the odds that China can avoid a growth slowdown are not favorable. Although China's trade openness and high investment rates work to sustain growth, a double-digit growth rate, rising old-age dependency ratio, exceptionally low consumption share of GDP, and undervalued currency together push the probability of China experiencing an imminent slowdown to over 70 per cent.

If China is to avoid the middle-income trap, the obstacles are formidable. Among other things, it needs to rebalance its economy toward consumption and develop its domestic market. This will mean dislocating entire industries, and having a more efficient allocation of workers and capital to encourage promising new ventures and entrepreneurship. This, in turn, requires fundamental structural reforms in the economy and the development of institutional infrastructure to support more sophisticated growth. Given the scale, depth, and breadth of this daunting task, it is far from conclusive that China will successfully complete the transition to upper-middle-income-country status.

The figures for GCC countries and Brunei are uncharacteristically high, especially in 1970, but there are also noticeable variations within the country group. The atypically high figures in the early period reflect the natural resource rents – the value of the resource over and above the cost of extraction – which are erroneously included in these countries' GDP. The extent of exaggeration appears to be proportional to their oil production: Saudi Arabia has the largest proven oil reserves in the world and is the largest world oil exporter; Kuwait has the fourth-largest oil reserves in the world; also, Qatar has become the fourth-largest exporter of liquefied natural gas. In contrast, Bahrain has the smallest oil reserve compared to its peers. Its dependence on oil is therefore considerably lower and it has worked to diversify its economy over the past decade (see Figure 82). The GCC countries have also been experiencing high population growth, especially in the late 1970s and the early 1980s. In the last two decades, this has somewhat stabilized at around 2 per cent a year, except in the UAE and Qatar where the population grew in 2010 at 7.9 per cent and 9.6, respectively per cent over the previous year. The working-age population has been expanding accordingly. Employment is erratic from one year to another, and this will be reflected in the labor productivity figures.

When labor productivity growth is compared, the ranking of countries is reshuffled (Table 9). There appeared a spurt in labor productivity growth in the low-income countries in the 2000s. While they were scattered around the table in the earlier periods, by 2000–2005 the seven countries with the fastest labor productivity growth were all from Group-L4 (as defined in Table 6); and in the latest period 2005–2010, five out of the top seven were from Group-L4 and two from Group-L3. Among them, China has been sustaining rapid productivity growth in the past two decades; its growth accelerated to an average of 10.2

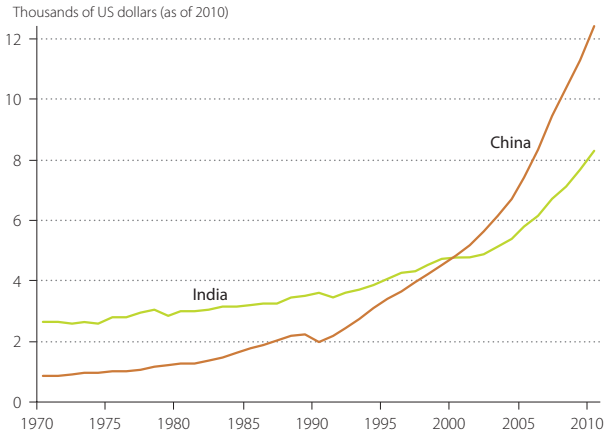

Figure 39 Labor Productivity Trends of China and India, 1970–2010

——GDP at constant basic prices per worker, using 2005 PPPs, reference year 2010

Source: APO Productivity Database 2012.01.

Table 9 Labor Productivity Growth, 1990–1995, 1995–2000, 2000–2005, and 2005–2010
—— Average annual growth rate of GDP at constant basic prices per worker, using 2005 PPPs

1990–1995		1995–2000		2000–2005		2005–2010		1990–2010		2000–2010	
Kuwait	13.1	Oman	11.6	Myanmar	10.6	China	10.2	China	8.8	Myanmar	9.9
China	10.6	China	7.1	China	8.6	Myanmar	9.2	Vietnam	5.0	China	9.4
Thailand	8.2	Qatar	5.7	Vietnam	4.8	India	7.3	ROC	4.7	India	5.5
Sri Lanka	7.5	Myanmar	5.6	India	3.7	Lao PDR	5.2	Korea	4.6	Vietnam	4.5
Indonesia	6.5	Vietnam	4.7	Lao PDR	3.7	Mongolia	5.0	Sri Lanka	4.6	Lao PDR	4.4
Malaysia	6.4	Korea	4.2	Cambodia	3.6	Sri Lanka	4.9	Myanmar	4.5	Cambodia	4.1
Vietnam	5.2	ROC	4.1	Indonesia	3.6	Cambodia	4.6	Thailand	4.3	Mongolia	3.8
ROC	5.2	Bangladesh	3.9	Hong Kong	3.3	Iran	4.3	Singapore	3.9	Sri Lanka	3.7
Korea	5.0	Singapore	3.7	Oman	3.2	Vietnam	4.2	Cambodia	3.7	Iran	3.3
Cambodia	4.3	Lao PDR	3.5	Singapore	3.1	Bangladesh	3.8	Malaysia	3.6	Indonesia	3.2
Singapore	4.1	Cambodia	3.4	Malaysia	3.0	Korea	3.0	Lao PDR	3.6	Hong Kong	3.1
Bahrain	4.1	India	3.4	Thailand	3.0	Hong Kong	3.0	Bangladesh	3.4	Korea	3.0
Hong Kong	3.7	Mongolia	2.5	Korea	2.9	ROC	3.0	Qatar	3.3	Bangladesh	2.8
Lao PDR	3.7	Philippines	1.9	Mongolia	2.7	Philippines	2.7	India	2.9	ROC	2.8
Pakistan	3.5	Nepal	1.7	ROC	2.6	Indonesia	2.7	Kuwait	2.9	Malaysia	2.7
Myanmar	3.3	Sri Lanka	1.6	Sri Lanka	2.5	Malaysia	2.4	Indonesia	2.6	Thailand	2.4
Bangladesh	2.9	Saudi Arabia	1.6	Iran	2.3	Qatar	2.0	Bahrain	2.4	Philippines	1.9
India	2.4	Japan	1.3	Pakistan	2.0	Thailand	1.8	Oman	2.2	Singapore	1.7
Nepal	2.4	Fiji	1.2	Bangladesh	1.8	Nepal	1.6	Hong Kong	2.2	Pakistan	1.2
Iran	1.4	Iran	1.0	Fiji	1.5	Japan	0.6	Nepal	2.0	Nepal	1.1
Qatar	0.9	Malaysia	0.8	Japan	1.3	Pakistan	0.5	Pakistan	1.9	Japan	1.0
Saudi Arabia	0.6	UAE	0.7	Philippines	1.1	Singapore	0.4	Iran	1.2	Qatar	0.7
Japan	0.6	Bahrain	0.6	Nepal	0.6	Saudi Arabia	0.2	Saudi Arabia	1.1	Fiji	0.5
Brunei	−0.2	Hong Kong	0.6	Saudi Arabia	−0.2	Fiji	−0.5	Japan	1.0	Saudi Arabia	0.0
Fiji	−0.4	Thailand	0.4	Qatar	−0.7	Brunei	−2.2	Philippines	0.8	Oman	0.0
Philippines	−0.4	Pakistan	0.3	Kuwait	−0.8	Bahrain	−2.2	Mongolia	0.6	Kuwait	−1.6
Mongolia	−1.3	Indonesia	−1.4	Brunei	−1.2	Kuwait	−2.3	Fiji	0.4	Brunei	−1.7
UAE	−3.7	Brunei	−1.9	Bahrain	−1.6	Oman	−3.3	Brunei	−1.0	Bahrain	−1.9
Oman	−7.1	Kuwait	−7.4	UAE	−1.8	UAE	−4.0	UAE	−1.5	UAE	−2.9
(regrouped)		(regrouped)		(regrouped)		(regrouped)		(regrouped)		(regrouped)	
APO20	1.1	APO20	1.0	APO20	1.4	APO20	2.8	APO20	1.1	APO20	2.1
Asia23	3.1	Asia23	2.6	Asia23	3.8	Asia23	5.5	Asia23	2.9	Asia23	4.6
Asia29	3.1	Asia29	2.6	Asia29	3.7	Asia29	5.3	Asia29	2.8	Asia29	4.5
East Asia	4.1	East Asia	3.2	East Asia	4.6	East Asia	6.1	East Asia	3.6	East Asia	5.3
South Asia	2.6	South Asia	3.0	South Asia	3.3	South Asia	6.3	South Asia	2.8	South Asia	4.8
ASEAN	0.7	ASEAN	0.6	ASEAN	3.2	ASEAN	2.8	ASEAN	0.7	ASEAN	3.0
GCC	0.8	GCC	1.7	GCC	−0.3	GCC	−0.7	GCC	1.2	GCC	−0.5
(reference)		(reference)		(reference)		(reference)		(reference)		(reference)	
US	1.5	US	2.3	US	2.1	US	1.3	US	1.9	US	1.7
EU15	1.9	EU15	1.4	EU15	0.9	EU15	0.4	EU15	1.7	EU15	0.7
		EU27	1.7	EU27	1.2	EU27	0.5	EU27	1.7	EU27	0.9
Australia	2.3	Australia	2.0	Australia	1.3	Australia	0.3	Australia	2.2	Australia	0.8

Unit: Percentage.
Sources: APO Productivity Database 2012.01.

per cent a year in 2005–2010 from 7.1 per cent a year in 1995–2000 and 8.6 per cent a year in 2000–2005. This compares with India's at 7.3 per cent, 3.4 per cent, and 3.7 per cent over the same periods. Labor productivity growth in the Asian Tigers was steady, ranging from 2.6 per cent to 3.3 per cent on average a year in 2000–2005. This performance was sustained in 2005–2010, except in Singapore. While Singapore's average annual productivity growth slowed significantly to 0.4 per cent, the others enjoyed growth of about 3.0 per cent in 2005–2010. Although no match with the fast-emerging Asian economies, this was a robust performance compared with 1.7 per cent in the US and 0.4 per cent in EU15. Japan's labor productivity growth behaved closer to that in other mature economies. Having managed to grow at 1.3 per cent on average a year for a decade in 1995–2005, labor productivity growth in Japan has slowed to 0.6 per cent per year on average since 2005. The 2000s were an era

when labor productivity deteriorated in GCC countries. The decline accelerated from –0.3 per cent to –0.7 per cent between the two halves of the 2000s.

As a group, Asia23 achieved the highest labor productivity growth in recent years, reaching 5.5 per cent on average a year in 2005–2010, up from 3.8 per cent in 2000–2005. Within Asia, labor productivity growth has been accelerating in both South Asia and East Asia, to 6.3 per cent and 6.1 per cent in 2005–2010, respectively. South Asia displayed a newfound vigor in recent years, considering that labor productivity growth had been faster in East Asia previously. In contrast, average annual productivity growth in the US slowed rapidly to 1.3 per cent between 2005 and 2010, after a decade of over 2 per cent growth a year. Average annual labor productivity growth in EU15 has been weakening as well, slowing in every successive period from 1.9 per cent in the first half of the 1990s to 0.4 per cent in the most recent period 2005–2010.

Figure 40 shows labor productivity levels relative to the US (= 100) for Asian countries. The same grouping as in Section 3.2, based on the speed of catch-up with the US in per capita GDP, is used here. Broadly speaking, countries that are catching up fast with the US in per capita GDP (Group-C1) are also fast catching up in labor productivity (Figure 40.1). Similarly, countries with deteriorating relative per

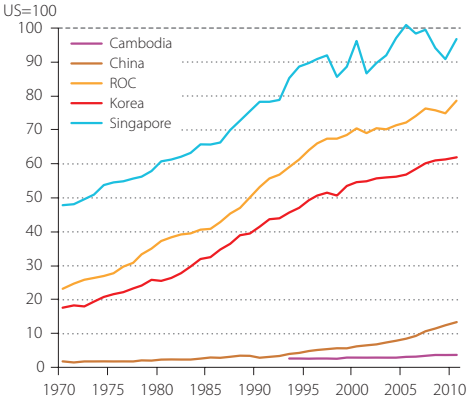

Figure 40.1: Group-C1 Countries

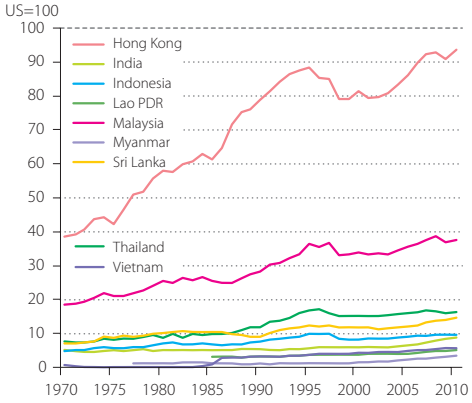

Figure 40.2: Group-C2 Countries

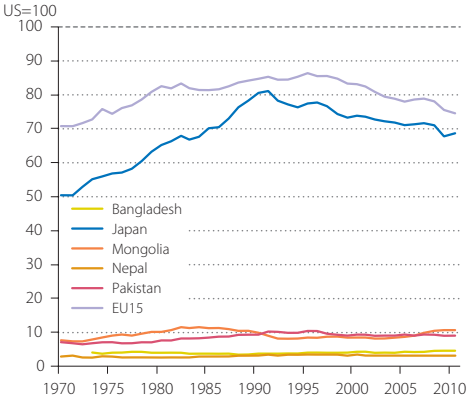

Figure 40.3: Group-C3 Countries

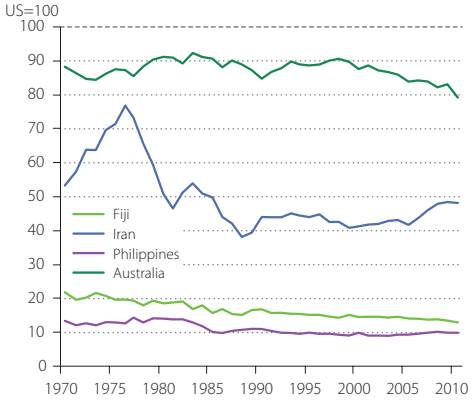

Figure 40.4: Group-C4 Countries

Figure 40 Labor Productivity Level Relative to the US, 1970–2010
—Indices of GDP at constant basic prices per worker, using 2005 PPPs

Source: APO Productivity Database 2012.01.

capita GDP (Group-C4) are found also to be deteriorating or of little change against the US in labor productivity (Figure 40.4).

Among the countries that are catching up with the US in per capita GDP (i.e., Group-C1 and Group-C2), the Asian Tigers have made a tremendous effort in improving their relative labor productivity over the past four decades. Singapore and Hong Kong have closed the gap from 50–60 per cent in 1970 to within 10 per cent in 2010 (Figure 40.1 and Figure 40.2). Similarly, the ROC and Korea have reduced a gap of around 80 per cent initially to 20 per cent and 40 per cent by 2010, respectively (Figure 40.1). Malaysia has been making steady progress, raising its relative productivity level from 19 per cent that of the US in 1970 to 37 per cent in 2010 (Figure 40.2). The rest of the countries in these two groups all had an initial relative labor productivity level of below 10 per cent, but have shown signs of a strong and promising start in their catch-up process in the past decade. Among these countries, the impact of the Asian financial crisis of 1997–1998 in temporarily stalling the progress of Thailand and Indonesia can be clearly seen, but they have slowly recovered the lost ground.

Countries that have managed little catch-up with the US (Group-C3) or have a declining per capita GDP against the US (Group-C4) are also those with rather stagnant or deteriorating relative labor productivity. Japan is the only high-income Asian country in this group, while the rest (except Iran) are all low-income countries with per capita GDP less than 20 per cent that of the US. Japan showed strong catch-up in the earlier period, with relative labor productivity peaking at 81 per cent that of the US in 1991, and since then the gap has widened again to over 30 per cent in 2010. Similarly EU15, a reference economy with high income, has seen its productivity gap double against the US since 1995, from 13 per cent to 25 per cent in 2010, whereas the low-income countries have managed little catch-up (Figure 40.3) or had a declining relative productivity level (Figure 40.4). Iran (a Group-L2 country) experienced a drastic decline in its relative labor productivity from its former peak of 77 per cent in 1976 to 38 per cent in 1988, before reviving to 48 per cent in 2010.

5.2 Per Hour Measure of Labor Productivity

The per worker-based labor productivity gaps presented in Section 5.1 are most likely conservative estimates, since workers in high-performing Asian countries tend to work longer hours than those in the US on average. To adjust for this discrepancy, total hours worked are constructed in our database for 15 Asian countries and the US, although the quality of the estimates may vary considerably across countries.[38] Figure 41 shows how the productivity gap against the US in 2010 varies depending on which measure of labor productivity is used.[39] The productivity gap with the US widens for all Asian countries when the differences in working hours are taken into account. However, for ten of these countries, the adjustments are within 2–5 percentage points, and hence are not deemed as statistically significant. In contrast, the choice of labor productivity measure makes a significant difference for the previously high-performing countries in their relative performance. On a per hour GDP basis, the labor productivity gap against the US widens by 15–25 percentage points for the four Asian Tigers (Korea, the ROC, Singapore, and Hong Kong), suggesting that workers there work much longer hours

38: Cross-country comparisons of hours worked are notoriously difficult, not least because harmonized data are rarely readily available. In the countries studied, three published their total hours worked as part of their official statistics, but not for the whole period studied in this report, and they may be constructed based on different methodologies. Some countries only publish estimates for average weekly hours worked, which need estimates of number of weeks worked to derive the total average hours worked per worker. Others may have only estimates of benchmark hours worked available, which are then extrapolated to form a series. Consequently, growth of employment and growth of total hours worked become identical, as in the case of China and Thailand. In reading the results, it is therefore important to bear in mind the data limitations. See Box 6 for an explanation of the estimation procedure of total hours worked.

39: The labor productivity gap for country *x* is country *x*'s labor productivity divided by the US's labor productivity in Figure 41.

Box 6 Measuring Hours Worked

Hours worked are defined in this *Databook* as the economy-wide hours worked by employees and the self-employed. Japanese and US national accounts publish estimates of the annual hours worked per employee. For both countries, the economy-wide hours worked were estimated in this *Databook* by simply assuming that annual per worker hours worked are the same for employees and the self-employed.

Other Asian countries do not publish hours worked in their national accounts. For Korea, the *Report on Monthly Labor Survey* shows monthly hours worked per employee. The economy-wide annual hours worked in Korea are calculated from average monthly hours worked per worker and the number of workers. Monthly hours worked per worker are assumed to be the same for employees and the self-employed.

For other countries, economy-wide annual hours worked are calculated from average weekly hours worked and the number of workers. It is necessary to know the number of weeks worked per annum in order to calculate annual hours worked from weekly hours worked. Benchmark average annual hours worked from Crafts (1999) and Maddison (1995) are used for our calculation. We utilize Craft's estimates only for Hong Kong and Singapore, which are not covered in Maddison (1995).

In simple terms, the procedure of constructing economy-wide annual hours worked consists of three steps for all countries other than Japan, Korea, and the US. First, we obtain average weekly hours worked and the number of workers from official statistics, such as a labor force survey. Second, from annual hours worked per worker in benchmark years available in Maddison (1995) and Crafts (1999), we obtain the number of weeks worked in benchmark years. Third, numbers of weeks worked are interpolated over non-benchmark years under the assumption of a constant growth rate. Multiplying the average hours worked by the number of workers gives economy-wide average weekly hours worked. Multiplying economy-wide average weekly hours worked by the number of weeks worked gives economy-wide annual hours worked.

Figure B6 presents a cross-country comparison of average annual hours worked per worker for 2000–2010, relative to the level of the US. It indicates that workers in Asian countries tend to work much longer hours than those in the US and Europe. In many countries in our sample, the difference in annual hours worked per person relative to the US is more than 30 per cent of the US level. Prolonged working hours are observed in Asian countries regardless of their stage of development, spanning low-income countries such as Bangladesh and Cambodia to high-income countries such as the ROC and Singapore. Exceptions are Japan and Vietnam. Workers in both countries are likely to work much shorter hours than those in other Asian countries. However, compared with the US and EU15, hours worked by workers in Japan and Vietnam are still about 10 per cent longer.

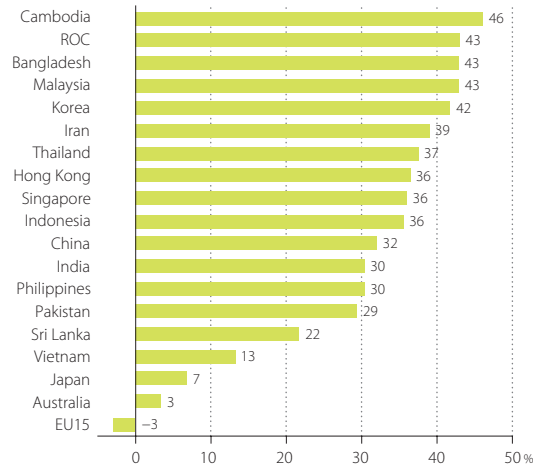

Figure B6 Average Annual Hours Worked Per Worker Relative to the US, 2000–2010

Sources: Official national accounts and labor force survey in each country, including author adjustments.

than their US counterparts. Europeans generally work fewer hours. This is reflected in that comparisons on hourly labor productivity shows EU15 in a more favorable light against the US, albeit only marginally.

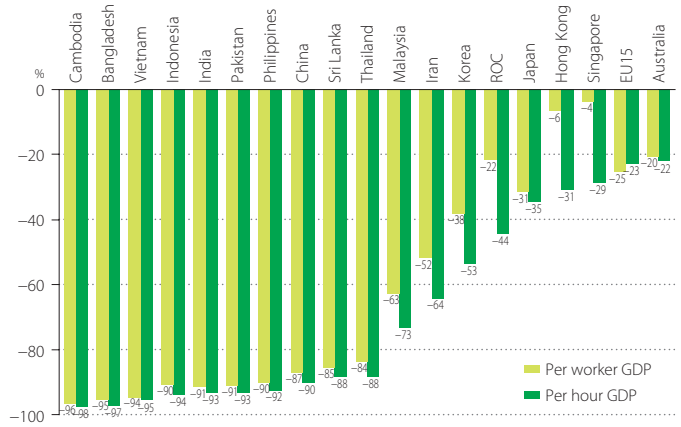

Figure 41 Labor Productivity Gap by Per Worker and Per Hour GDP Relative to the US, 2010

——GDP at constant basic prices per worker and hour, using 2005 PPPs

Source: APO Productivity Database 2012.01.

Based on GDP at constant basic prices per hour worked, US labor productivity has been able to sustain a big lead over even the Asian high performers (Table 10). In 1970, the US productivity level was nearly 2.5 times that of the Asian leader, Japan. This gap was reduced to around 50 per cent in 1990. Since 1990, Japan's pace in closing the gap has slowed. By 2010, a sizable gap of 35 per cent still remained. The gap between the US and the Asian leader of the past decade (i.e., Singapore) has been persistent at around 30 per cent. This is in contrast with the picture painted by the per worker productivity measure, based on which the Asian leaders (Singapore and Hong Kong) have almost closed the gap with the US (Figure 40).[40] EU15's lead over the Asian leader was around 20 per cent in 2000, but rapidly eroded to around 10 per cent by 2010.

The levels of labor productivity for the top five countries, Japan and the four Asian Tigers, maintained their relative positions for almost four decades. The progress of labor productivity in these countries during 1970–2010 is shown in Figure 42. Within four decades, GDP per hour has roughly tripled for the top three economies, namely Japan, Singapore, and Hong Kong, and the gap among them has literally disappeared. They are ahead of the ROC and Korea by 20 per cent and 40 per cent, respectively, in 2010, despite their effort in catching up with Japan by 2.0 per cent and 2.4 per cent a year on average, respectively, over the past four decades. If they could keep up this effort at the same pace, it would take the ROC 8 years and Korea 14 years finally to catch up with Japan.

Over the past four decades, hourly labor productivity growth ranged from 0.8 per cent (the Philippines) to 6.7 per cent (China) on average per year, compared with that of the US at 1.7 per cent and Australia at 1.6 per cent (Figure 43). Among the 16 Asian countries compared, only Bangladesh, Iran, and the Philippines grew slower than the two reference economies. Between the two sub-periods (i.e., 1970–1990 and 1990–2010), we observe a deceleration in the hourly productivity growth for 9 out of 16 Asian countries: for example, 2.4 percentage points and 2.1 percentage points were shaved off productivity growth in the earlier period in Hong Kong and Japan, respectively.

40: Note that the differentials in the labor quality per hour worked among countries have not been accounted for in this comparison: labor productivity will tend to be overestimated if labor quality has been rising, and vice versa. Jorgenson and Nomura (2007) provide a comprehensive picture of bilateral productivity comparisons between the US and Japan, based on detailed estimates for 164 commodities, 33 assets (including land and inventories), and 1,596 labor categories. Even when the differences in quality of labor have been adjusted for, they find that the US–Japan labor productivity gap was still sizable, at 34.3 per cent for 2004. They also point out that the gap in the "level" of TFP has been the major source of the labor productivity gap since the mid-1990s; lower TFP explains 57.0 per cent of the labor productivity gap in 2004, while non-IT-capital deepening (defined by capital input per unit of labor input) accounts for 37.3 per cent. In the next section, we analyze the gap in labor productivity "growth" among countries, without the level comparisons of capital deepening and TFP due to lack of data.

Table 10 Per Hour Labor Productivity Levels, 1970, 1990, 2000, and 2008–2010
——GDP at constant basic prices per hour, using 2005 PPPs, reference year 2010

1970		(%)	1990		(%)	2000		(%)	2008		(%)	2009		(%)	2010		(%)
Japan	12.1	100.0	Japan	26.1	100.0	Singapore	33.2	100.0	Singapore	38.1	100.0	Singapore	37.7	100.0	Singapore	40.2	100.0
Iran	11.8	97.6	Singapore	22.9	87.7	Japan	31.9	96.0	Hong Kong	37.2	97.6	Hong Kong	36.6	97.2	Hong Kong	39.1	97.2
Singapore	11.0	90.9	Hong Kong	22.0	84.4	Hong Kong	28.0	84.3	Japan	35.9	94.0	Japan	35.6	94.4	Japan	36.9	91.8
Hong Kong	7.6	63.0	ROC	13.8	53.0	ROC	22.6	67.9	ROC	29.1	76.2	ROC	29.2	77.4	ROC	31.5	78.3
ROC	4.6	38.0	Iran	12.5	47.9	Korea	17.1	51.4	Korea	24.3	63.8	Korea	24.7	65.5	Korea	26.3	65.5
Malaysia	3.9	32.6	Korea	10.5	40.4	Iran	14.1	42.5	Iran	17.8	46.8	Iran	18.6	49.4	Iran	20.3	50.4
Korea	3.3	26.9	Malaysia	7.8	29.9	Malaysia	11.2	33.7	Malaysia	14.7	38.7	Malaysia	14.1	37.5	Malaysia	15.0	37.3
Philippines	3.1	25.7	Thailand	3.6	13.7	Thailand	5.3	15.9	Thailand	6.5	17.2	Sri Lanka	6.4	17.1	Thailand	6.7	16.6
Pakistan	1.7	13.9	Philippines	3.2	12.2	Sri Lanka	4.9	14.7	Sri Lanka	6.1	16.1	Thailand	6.4	16.9	Sri Lanka	6.7	16.5
Sri Lanka	1.7	13.6	Pakistan	2.8	10.9	Philippines	3.5	10.6	China	4.7	12.3	China	5.1	13.6	China	5.6	14.0
Thailand	1.6	13.6	Sri Lanka	2.8	10.7	Pakistan	3.4	10.3	Philippines	4.2	11.0	Philippines	4.1	10.9	Philippines	4.3	10.7
India	1.2	9.9	Indonesia	2.3	8.9	Indonesia	3.0	9.1	Pakistan	3.9	10.2	Pakistan	3.9	10.4	Pakistan	3.9	9.8
Indonesia	1.2	9.5	India	1.6	6.2	China	2.2	6.6	Indonesia	3.8	10.0	India	3.6	9.4	India	3.8	9.6
China	0.4	3.2	Vietnam	1.2	4.5	India	2.2	6.6	India	3.3	8.6	Indonesia	3.5	9.3	Indonesia	3.6	9.0
			Bangladesh	1.1	4.3	Vietnam	1.7	5.2	Vietnam	2.5	6.6	Vietnam	2.5	6.8	Vietnam	2.8	6.9
			China	0.9	3.5	Bangladesh	1.6	4.7	Bangladesh	1.6	4.3	Bangladesh	1.7	4.5	Bangladesh	1.8	4.4
						Cambodia	0.9	2.8	Cambodia	1.3	3.5	Cambodia	1.3	3.6	Cambodia	1.4	3.4
(reference)			(reference)			(reference)			(reference)			(reference)			(reference)		
US	28.5	235.7	US	38.6	147.8	US	46.5	139.9	US	53.8	141.2	US	54.8	145.5	US	56.4	140.2
						EU15	39.6	119.2	EU15	43.4	113.9	EU15	42.9	113.7	EU15	43.7	108.6
			Australia	31.1	119.3	Australia	38.9	117.0	Australia	42.9	112.6	Australia	44.4	117.9	Australia	44.1	109.6

Unit: US dollar (as of 2010).
Sources: APO Productivity Database 2012.01.

Six countries managed to accelerate their productivity improvement after 1990. Among these, China's performance is the most outstanding, with productivity growth more than doubling from 4.3 per cent to 9.1 per cent between the two sub-periods. Productivity also improved in the US and Australia, with growth accelerating from 1.5 per cent to 1.9 per cent, and from 1.0 per cent to 1.7 per cent between the two periods, respectively.

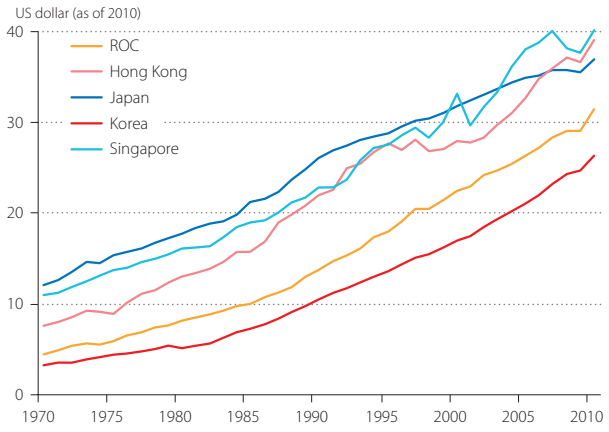

Figure 42 Labor Productivity Trends in Japan and the Four Asian Tigers, 1970–2010
——GDP at constant basic prices per hour, using 2005 PPPs, reference year 2010

Source: APO Productivity Database 2012.01.

The deceleration of productivity growth in most countries between the two sub-periods reflected weaknesses in output growth. Figure 44 shows that all countries except Vietnam experienced a slowdown in hours-worked growth between the sub-periods, which should have worked to boost labor productivity growth, other things being equal.[41] This implies

41: By definition, positive labor productivity growth occurs when output grows faster than labor input. Figures 43 and 44 therefore tend to have an inverse relationship, namely that the higher the labor input growth, the lower the labor productivity growth, other things being equal.

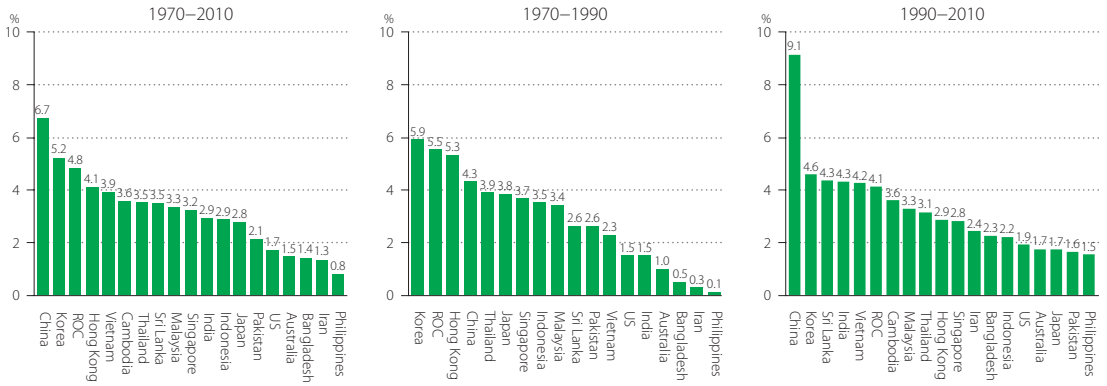

Figure 43 Labor Productivity Growth, 1970–2010, 1970–1990, and 1990–2010
——Average annual growth rate of GDP at constant basic prices per hour

Source: APO Productivity Database 2012.01.

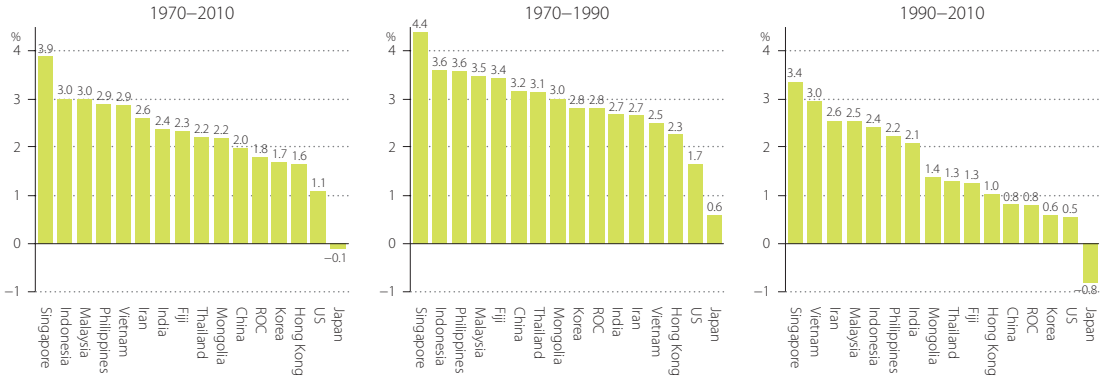

Figure 44 Labor Input Growth, 1970–2010, 1970–1990, and 1990–2010
——Average annual growth rate of total hours worked

Source: APO Productivity Database 2012.01.

that output growth was decelerating more than labor input in percentage points for labor productivity growth to slow. In China, output growth was reinforced by the slower pace of labor input growth to result in an extraordinary surge in labor productivity growth. Labor input growth slowed to 0.8 per cent a year on average in the latter period, from 3.2 per cent in the previous period. Japan was the only economy to experience an actual fall in labor input in the period 1990–2010. This had worked to compensate for the sluggish output growth during that period, and to sustain a positive labor productivity growth of 1.7 per cent a year on average.

Table 11 looks more closely at the latter sub-period and provides the growth rates of per hour-based labor productivity since 1990. The growth patterns of individual countries generally follow closely their counterparts in per worker productivity growth as presented in Table 9, but the two measures diverge, in some countries largely, and are not consistent throughout all the periods compared. For example, per hour productivity growth had been higher in Japan than per worker productivity growth, suggesting that growth in hours worked had been less strong (or falling faster) than the number of workers. This contrast was particularly stark in the first half of the 1990s, when Japan's hourly productivity growth was 2.0 per cent compared with 1.0 per cent in per worker productivity growth.

Table 11 Labor Productivity Growth, 1990–1995, 1995–2000, 2000–2005, and 2005–2010
—— Average annual growth rate of GDP at constant basic prices per hour, using 2005 PPPs

1990–1995		1995–2000		2000–2005		2005–2010		1990–2010		2000–2010	
China	10.6	China	7.1	China	8.6	China	10.2	China	8.8	China	9.4
Sri Lanka	9.0	ROC	4.5	Vietnam	6.3	India	7.4	Sri Lanka	5.6	India	5.6
Thailand	7.4	Korea	4.4	Korea	4.2	Sri Lanka	5.4	ROC	4.9	Vietnam	4.8
Indonesia	6.5	Bangladesh	4.1	Cambodia	4.0	Iran	4.9	Korea	4.8	Korea	4.3
Malaysia	6.4	Singapore	3.7	India	3.9	Korea	4.4	Thailand	3.9	Cambodia	4.1
Cambodia	5.6	Vietnam	3.1	Indonesia	3.3	Cambodia	4.2	Singapore	3.7	Iran	3.6
ROC	5.2	India	2.5	Hong Kong	3.1	ROC	3.6	Vietnam	3.7	ROC	3.3
Korea	5.2	Sri Lanka	2.2	ROC	3.1	Hong Kong	3.5	Malaysia	3.6	Hong Kong	3.3
Hong Kong	4.6	Japan	2.0	Thailand	2.9	Vietnam	3.2	Bangladesh	3.3	Sri Lanka	3.1
Vietnam	4.3	Philippines	1.9	Malaysia	2.8	Malaysia	3.0	India	3.0	Malaysia	2.9
Singapore	3.8	Cambodia	1.7	Singapore	2.7	Bangladesh	2.9	Cambodia	2.8	Thailand	2.4
India	3.4	Iran	1.0	Iran	2.3	Philippines	2.7	Indonesia	2.7	Philippines	2.0
Pakistan	3.1	Malaysia	0.8	Pakistan	2.2	Thailand	1.8	Hong Kong	2.4	Singapore	1.9
Bangladesh	2.5	Pakistan	0.6	Japan	1.8	Singapore	1.1	Japan	2.0	Indonesia	1.8
Japan	2.0	Thailand	0.4	Philippines	1.4	Japan	1.1	Pakistan	1.9	Japan	1.5
Iran	1.4	Hong Kong	0.2	Sri Lanka	0.8	Pakistan	0.6	Iran	1.2	Pakistan	1.4
Philippines	0.1	Indonesia	−1.2	Bangladesh	−0.5	Indonesia	0.2	Philippines	1.0	Bangladesh	1.2
(reference)		(reference)		(reference)		(reference)		(reference)		(reference)	
US	1.4	US	2.3	US	2.4	US	1.4	US	1.9	US	1.9
		EU15	1.9	EU15	1.3	EU15	0.7	EU15	1.9	EU15	1.0
Australia	2.2	Australia	2.3	Australia	1.8	Australia	0.7	Australia	2.2	Australia	1.3

Unit: Percentage.
Source: APO Productivity Database 2012.01.
Note: The annual average growth rates for Cambodia and Vietnam during 1990–1995 are their annual average growth over 1993–1995 because of the lack of hours worked data.

However, the divergence has been narrowing to 0.5 percentage points in the 2000s. Korea is another country in which hourly productivity growth was consistently higher than its per worker counterpart, but instead of narrowing, the divergence widened to 1.4 percentage points in the second half of the 2000s. Hours worked in the ROC have also been growing slower than the number of workers, but the wedge ranged from 0.4 to 0.6 percentage points. Such a trend has not been discerned in Singapore or Hong Kong.

Sometimes, the two labor productivity measures can paint different pictures.[42] For example, in Hong Kong, labor productivity growth decelerated according to the per worker measure (from 3.3 per cent to 3.0 per cent) but accelerated according to the hourly measure (from 3.1 per cent to 3.5 per cent) between the two halves of the 2000s. Similarly in India, per worker productivity growth accelerated from 2.4 per cent to 3.4 per cent between the two halves of the 1990s while hourly productivity growth decelerated from 3.4 per cent to 2.5 per cent over the same period. For Cambodia and Vietnam, hourly productivity growth is much more volatile than per worker productivity.

We can identify where countries are today in hourly productivity performance against Japan's historical experience.[43] Figure 45 traces the long-term path of Japan's per hour labor productivity for the period 1885–2010 along the red line, expressed as relative to Japan's 2010 level (set equal to 1.0). A structural break is observed during World War II when output collapsed. Countries' relative hourly

42: For China and Thailand, both measures give the same productivity growth. This is a result of a statistical construct in our current database rather than the underlying trend.
43: While we are mindful that level comparisons of productivity among countries and over periods are subject to a great degree of data uncertainty, they should provide a rough sketch of the productivity divergence in Asia.

productivity levels against Japan in 2010 are then mapped against Japan's growth experience (as circles). By so doing, we locate the corresponding year when Japan's hourly productivity level was the closest to that of the country under concern. The three countries (i.e., Cambodia, Nepal, and Bangladesh) with the lowest hourly productivity in 2010 have their levels corresponding to Japan's in the 1900s. This means that even if they manage Japan's long-term productivity growth of 2.8 per cent on average per year, it will still take them over a century to catch up with the Asian leaders (i.e., Singapore, Hong Kong, and Japan) today. However, Nepal's productivity growth has been slower than what has been achieved in Japan, whereas those of Cambodia and Bangladesh are doing better. Most Asian countries are clustered around Japan's level achieved in the 1950s and early 1960s. Among them, China has been leading in the catch-up effort, with productivity growing three times faster than Japan's long-term average (Table 11), followed by India and Vietnam.

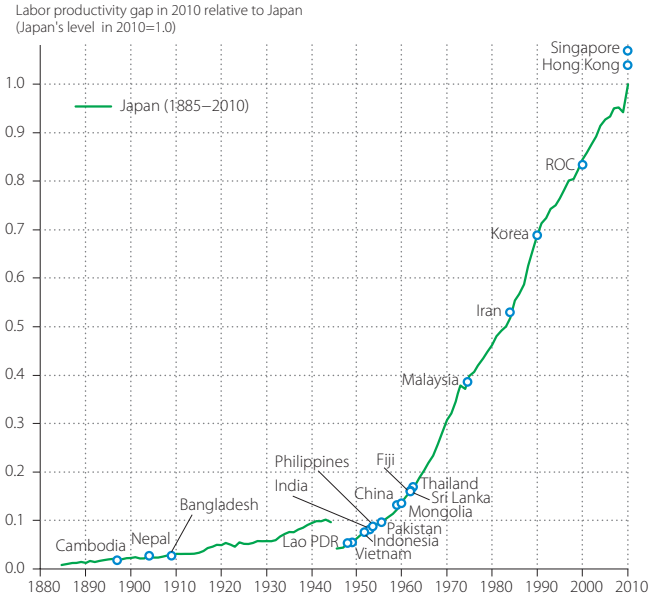

Figure 45 Labor Productivity Trends of Japan over Century and Levels of Asian Countries in 2010
——GDP at constant basic prices per hour, using 2005 PPPs

Sources: For historical data of Japan, the sources of GDP are Long-Term Economic Statistics by Ohkawa et al. (1974) during 1885–1954 and the JSNA by ESRI, Cabinet Office of Japan, during 1955–2010 (including author adjustments). Hours worked data is based on KEO Database (Kuroda et al. 1997), Keio University, during 1955–2010. During 1885–1954, the average hours worked per person are assumed to be constant. For the labor productivity level of Asian countries in 2010, it is based on the APO Productivity Database 2012.01. The estimates for Fiji, Iran, the Lao PDR, Mongolia, and Nepal are defined by per-worker labor productivity due to data constraints.

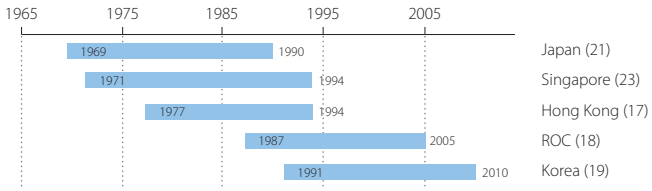

Figure 46 Time Durations Taken to Improve Labor Productivity by Japan and the Asian Tigers

Sources: See Figure 45.

At the top end are the Asian Tigers, among which Singapore and Hong Kong have already surpassed Japan. Figure 46 compares the time periods taken by each country to raise its labor productivity from 0.3 to 0.7 of Japan's level today (i.e., unit of measurement on the y-axis of Figure 45). What Japan and Singapore had achieved in 21 years (from 1969 to 1990) and 23 years (from 1971 to 1994), respectively, Hong Kong, the ROC, and Korea achieved in less than two decades (Figure 46). Although the speed of catch-up for latecomers is increasing, it will still take a long time to catch up with the leaders for most Asian countries that currently cluster around the level Japan achieved in the 1960s.

5.3 Total Factor Productivity

Labor productivity in the previous sections is only a one-factor or partial-factor productivity measure and does not provide a full perspective of production efficiency. An observation of low labor productivity could suggest production inefficiency, but it could also be a mere reflection of different capital intensities in the chosen production method under the relative labor–capital price faced by the economy concerned. By observing relative movements in labor productivity alone, it is not easy to distinguish which is the case. In populous Asian economies, which are relatively abundant in low-skilled labor, production lines may be deliberately organized in a way that utilizes this abundant, and hence relatively cheap, resource. It follows that the chosen production method is most likely to be (low-skilled) labor-intensive with little capital, manifested in low labor productivity. This is why economists analyze TFP, which is GDP per unit of combined inputs, to get a more complete picture of a country's production efficiency.[44]

Capital input is a key factor for measuring TFP, and is defined by capital services – the flow of services from productive capital stock, as recommended in the new system of national accounts.[45] The required basis for estimating capital services is the appropriate measures of capital stock. The SNA recommended constructing the national balance-sheet accounts for official national accounts, but this is still not a common practice in the national accounts of many Asian countries.[46] Even where estimates of net capital stocks are available for the whole economy, the assumptions and methodologies can differ considerably among countries. In response to this challenge, harmonized estimates for productive capital stocks and capital services have been constructed and compiled within the APO Productivity Database built on the same methodology and assumptions.[47] In our methodology, changes in the quality of capital are incorporated into the measurement of capital services in two ways: changes in the composition are captured by explicitly differentiating assets into ten types, and an appropriate and harmonized deflator is used for IT capital to reflect the rapid quality change embodied in IT-related assets (see Appendix A.2).

The current APO Productivity Database estimates capital services and TFP for 15 Asian countries for which long-time investment data by type of asset are available or estimated.[48] Their economic growth is decomposed into its sources from factor inputs and TFP based on the methodology developed by Jorgenson and Griliches (1967). This report defines output as GDP at basic prices, and factor inputs as

44: Different types of inputs and outputs are aggregated by using index numbers, and TFP is calculated as the output quantity index divided by the input quantity index. In this chapter, the Törnqvist index is used for aggregating labor and 10 types of capital inputs.

45: See the chapter on capital services and the national accounts of the 2008 SNA (United Nations 2009). The second edition of the *OECD Capital Manual* (2009) provides a comprehensive framework for constructing prices and quantities of capital services.

46: Based on our metadata survey, half of APO member economies do not estimate the balance-sheet accounts within the official national accounts; these countries are Bangladesh, the ROC, Iran, Korea, the Lao PDR, Mongolia, Nepal, Pakistan, Sri Lanka, and Vietnam (but the National Wealth Survey is available in the ROC and Korea for some selected years).

47: The Department of Statistics Malaysia (2011) published a new set of comprehensive capital stock statistics in April 2011, by following the *OECD Capital Manual* (2009). The correlations between these official estimates and our estimates for the period of 1970–2010 are high; they are 89.9 per cent and 94.0 per cent for the growth rates of net and productive capital stock, respectively. In this report, capital input is defined as capital services computed from our estimates of productive capital stock, so as to ensure that the same methodology and same asset classification are applied for the 15 Asian countries compared.

48: In measuring TFP, income generated from domestic production should be separated into labor compensation and returns to capital. The national accounts readily provide the estimates of labor compensation for employees as a component of value added; labor compensation for the self-employed is not separately estimated but is combined with returns to capital in *mixed income*. As a crude approximation in this *Databook*, we assume that the per worker wages for self-employed and family workers are 30 per cent of the per worker wage for employees, using the evidence in the studies for Japan by Kuroda et al. (1997), in order to measure total labor compensation. Note that in the current database this simplification is applied to all countries except China, where labor remuneration in the national accounts includes labor income for the self-employed (Holz 2006). For sensitivity of our TFP results to our assumptions, see Box 7.

labor, IT capital, and non-IT capital.[49] Labor input is measured by total hours worked (except for Fiji and Mongolia), without adjustments for changes in labor quality.[50]

Cross-country comparisons of TFP growth for the 15 Asian countries and the US are shown in Figure 47 for the period 1970–2010, and the two sub-periods 1970–1990 and 1990–2010. Taking the US as the reference economy, with TFP growth of 0.8 per cent on average a year, countries fall into three general groups. Over the entire estimation period, China, Korea, Thailand,[51] Vietnam, Hong Kong, the ROC, and India achieved significantly higher TFP growth than the US. Within this group, China is in a league of its own, with TFP growth being 60 per cent faster than that of Korea, while TFP growth in the other countries was 50 per cent to over 100 per cent faster than the US. Indonesia and Mongolia achieved similar productivity growth as the US, whereas productivity performance in the Philippines actually deteriorated by 0.18 per cent on average per year over the same period.[52]

Looking at the sub-periods (i.e., 1970–1990 and 1990–2010), we can discern that the two were not identical and in fact had quite significant differences in terms of the magnitude of growth and countries' relative performance. Eight of the 15 Asian countries experienced acceleration in TFP growth. China and Iran accelerated the most between the two sub-periods: from 1.8 per cent to 4.7 per cent, and from −1.4 per cent to 2.1 per cent, respectively. More modestly, Mongolia's productivity growth, for example, improved from −0.1 per cent on average a year in the earlier period to 1.5 per cent since 1990.[53] Four countries saw their productivity growth more than halved: Thailand, Hong Kong, Japan, and Indonesia, all of which had a TFP growth under 1 per cent on average a year in the second half of the 2000s. TFP growth in the ROC, Malaysia, Korea,[54] and the US was little changed.

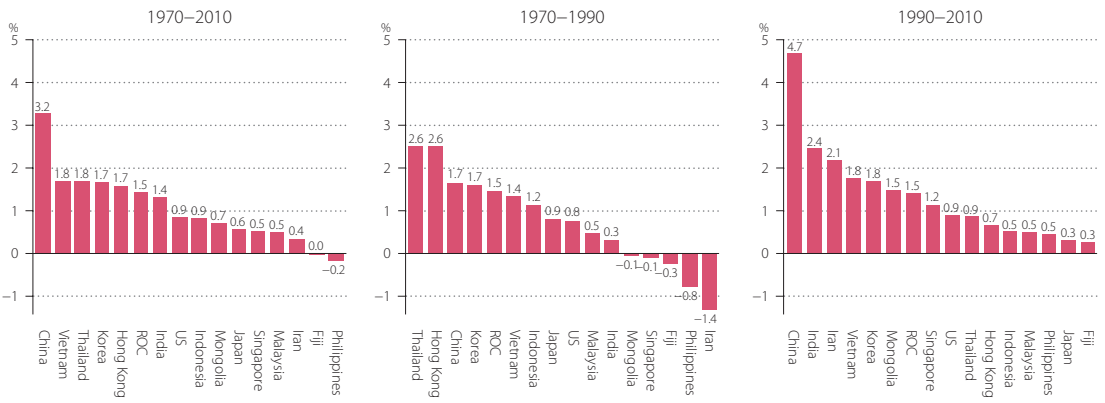

Figure 47 TFP Growth, 1970–2010, 1970–1990, and 1990–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986. The labor inputs for Fiji and Mongolia are defined by numbers of employment.

49: IT capital is defined as a composite asset of IT hardware (computers and copying machines), communications equipment, and computer software.
50: The failure to take into account improvements in labor quality leads to TFP overestimation. The current APO Productivity Database estimates the labor quality index for only a handful of countries, and covering more Asian countries is the next challenge.
51: Warr (2006) shows that the average annual TFP growths of Thailand were 2.0 per cent in the period of economic boom (1987–1996), −9.0 per cent during the Asian financial crisis (1996–98), and 1.6 per cent in the period of recovery (1998–2002). These compare with our estimates of 2.7 per cent, −8.7 per cent, and 2.5 per cent, respectively.
52: Negative TFP growth for both countries is also observed in other studies. Baier, Dwyer, and Tamura (2006) estimate the average annual growth rate of TFP of Fiji at −0.75 per cent during 1960–2000. Cororaton (2002) shows that the average annual TFP growth of the Philippines was −1.09 per cent during 1970–2000.
53: In Mongolia, subsoil assets may have a significant role in economic growth, although they are omitted in our measures of capital inputs.

In terms of its contribution to economic growth, TFP has been playing a significant role in Asian fast-growing economies in the past decades (Figures 48 and 49). During the period of 1970–2010, China achieved the fastest output growth of 8.7 per cent on average a year. This is followed by Singapore and Korea, growing at 7.1 per cent and 6.9 per cent on average a year, respectively. Annual average growth in the ROC and Hong Kong was 6.6 per cent and 5.7 per cent, respectively, while it was 5.9 per cent in India. Japan achieved a growth similar to the US at 2.7 per cent. Out of these GDP growths, the TFP contribution accounted for over 20 per cent of economic growth in 7 of the 15 Asian countries compared. Among them, the TFP contribution was the largest in China (37 per cent), Thailand (31 per cent), and Hong Kong (29 per cent). This compares with 31 per cent in the US. Its contribution was among the lowest in Singapore and Malaysia (8 per cent), and was negative in the Philippines. Negative TFP growth, if not due to measurement errors, is not sustainable in the long run. Looking at the breakdown of the period in Figure 50, we can see that the Philippines was running an overall negative TFP growth only in the period 1970–1985, at −2.0 per cent on average per annum,[55] whereas its TFP growth was positive in the subsequent two periods.

It is clear from Figure 49 that economic growth was predominantly explained by the contribution of capital input in most of the Asian countries, which ranged from 39 per cent in Fiji to 80 per cent in Japan. Among the Asian Tigers, the contribution of capital services ranges from 56 per cent in Hong Kong to 67 per cent in Singapore, whereas in China and India, it accounted for 51 per cent and 55 per cent of their economic growth, respectively. This compares with 43 per cent in the US, of which 16 percentage points were contributed by IT capital, a share unmatched by Asian countries. Japan

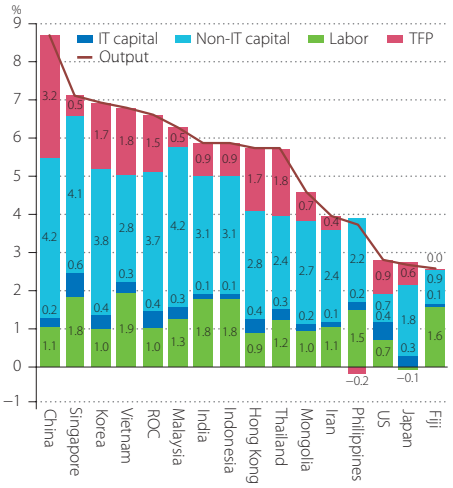

Figure 48 Sources of Economic Growth, 1970–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986. The labor input for Fiji is defined by numbers of employment.

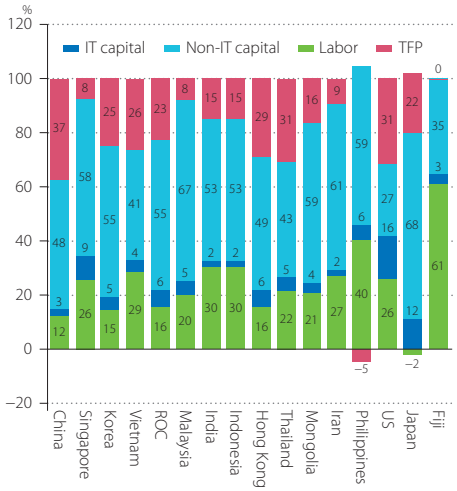

Figure 49 Contribution Shares of Economic Growth, 1970–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986. The labor input for Fiji is defined by numbers of employment.

54: Note that economic growth at the aggregate level for Korea has been revised upward considerably in the KSNA published in 2010. The main revisions stem from the introduction of a chain index in Korea's system of national accounts. As a result, Korea's GDP growth at constant market prices has been revised up from 7.0 per cent to 8.6 per cent on average in the 1970s, from 8.4 per cent to 9.3 per cent in the 1980s, and from 5.9 per cent to 6.3 per cent in the 1990s.

55: The Philippine economy shrank by 15.2 per cent for two years from 1983 to 1985 under the regime of Ferdinand Marcos (see Figure 37).

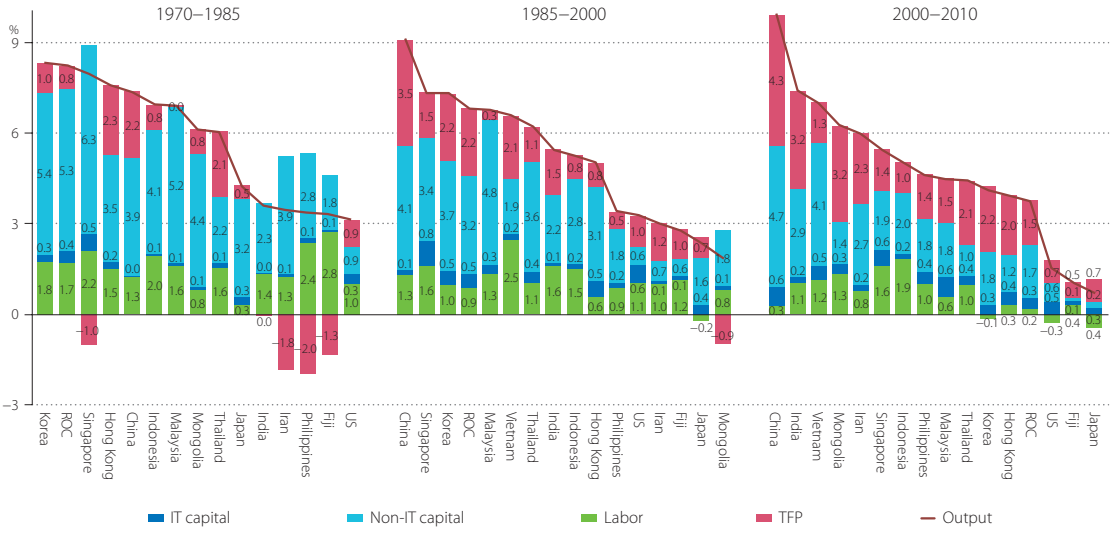

Figure 50 Sources of Economic Growth, 1970–1985, 1985–2000, and 2000–2010

Source: APO Productivity Database 2012.01.

has been leading Asian countries in terms of contribution from IT capital (12 per cent of economic growth) whereas it has been 3–10 per cent in other Asian countries, with China and India at the low end. However, labor input growth explained 61 per cent and 40 per cent of economic growth in Fiji and the Philippines, respectively, during this period. In Japan, the contribution of labor input has been negative overall.

China's productivity performance has been outstanding in this period. The average TFP growth was 3.2 per cent per year during 1970–2010 (Figure 48). This compares to the long-run estimates of 3.8 per cent during 1978–2005 in Holz (2006) and also 3.8 per cent during 1978–2004 in Bosworth and Collins (2008). The Chinese experience of long-term TFP growth of about 3 per cent is not unprecedented in Asia. According to Jorgenson and Nomura (2005), Japan achieved an annual TFP growth of 3.1 per cent during 1960–1973, even after improvements in labor quality had been taken into account in the estimation of labor growth (and, as such, eliminating overestimation in TFP).[56] Both the ROC and Korea also achieved a TFP growth of 2.2 per cent during the period 1985–2000,[57] as shown in the second chart of Figure 50, whereas in the last decade, TFP growth was 3.2 per cent in India.

One prevalent characteristic of Asian countries is their investment intensity as a share of GDP (Figure 30) and in turn its contribution to economic growth (Figures 49 and 51). There is policy significance in identifying the driver(s) behind the rapid economic growth in Asian countries. If growth has been driven more by capital accumulation rather than capital assimilation, the Asian model may prove to be too expensive for many less well-off countries to be relevant. According to our findings (Figures 50 and 51), it is true that, historically, capital accumulation has played a much more significant role in the

56: In the same period 1960–1973, the average annual contribution rate of labor quality improvement to growth is measured as 0.54 per cent in Jorgenson and Nomura (2005). As a measure of the TFP contribution that is comparable with the estimates in this *Databook*, their estimate can be recognized as 3.6 per cent per year during the same period.

57: The National Statistics, Republic of China, published the TFP estimates for the period 1982–1999. The correlation of TFP growth rates between their estimates and ours is 0.76 for the whole period. For 1985–2000, our estimate is around 1 percentage point smaller than their estimate of 3.6 per cent (1985–1999), but closer to the 2.0 per cent (1985–1996) in Timmer and van Ark (2000).

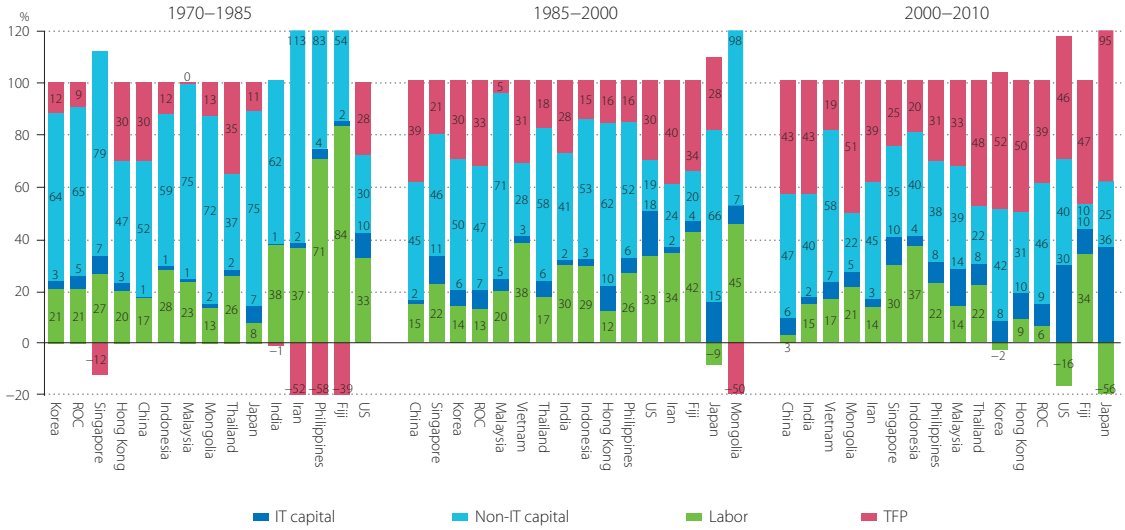

Figure 51 Contribution Shares of Economic Growth, 1970–1985, 1985–2000, and 2000–2010

Source: APO Productivity Database 2012.01.

Asian countries than in the US. However, the relative contribution shares are not constant across countries and over time; there have been periods when (and in some countries where) capital assimilation as reflected in TFP growth also contributed significantly toward driving growth.

Looking at Figure 51, capital accumulation was the dominant factor in the early period 1970–1985, typically explaining two-thirds to three-quarters of economic growth achieved. In China, Hong Kong, and Thailand, however, the contribution of TFP growth was still significant, accounting for 30–35 per cent of their respective economic growth. In the subsequent periods, the contribution of capital input became progressively smaller, falling to a share of below 50 per cent on average, while the contribution of TFP became progressively more significant, rising to a share of above 40 per cent on average in the 2000s. The evident rise in the contribution of IT capital is also noteworthy. In 1970–1985, IT capital accounted for below 5 per cent of economic growth in all Asian countries, except Japan. By the 2000s, the IT capital share rose to above 5 per cent in most countries, with the exceptions being India, Iran, and Indonesia. Between 1985–2000 and 2000–2010, the contribution of IT capital more than doubled in Fiji, Malaysia, and Japan, from 4 per cent to 10 per cent, from 5 per cent to 14 per cent, and from 15 per cent to 36 per cent, respectively. Hong Kong sustained an IT share of 10 per cent over the same periods. This yearly accumulation of IT investment may have paved the way for countries to capitalize on the productivity gain from the IT revolution. Reflecting on these results, capital accumulation appears to be a necessary step to economic growth, and countries may go through cycles of capital accumulation and assimilation. Although a prerequisite, capital accumulation does not guarantee TFP growth. Some countries may be more capable than others in reaping the benefits through capital assimilation, but the reasons as to why this is so are beyond the scope of this report.

Figure 52 places our estimates among those of OECD for 16 other OECD countries to give readers a wider perspective.[58] Countries are arranged according to their average economic growth per annum for the past decade in descending order. In so doing, the wedge in economic growth is clearly displayed, with all Asian countries (barring Fiji and Japan) having been filtered out to occupy the top end. Ireland is the only fast-growing economy from Europe. Asian countries are also among those that experienced the fastest TFP growth in the 2000s: 4.3 per cent in China, 3.2 per cent in India and Mongolia,

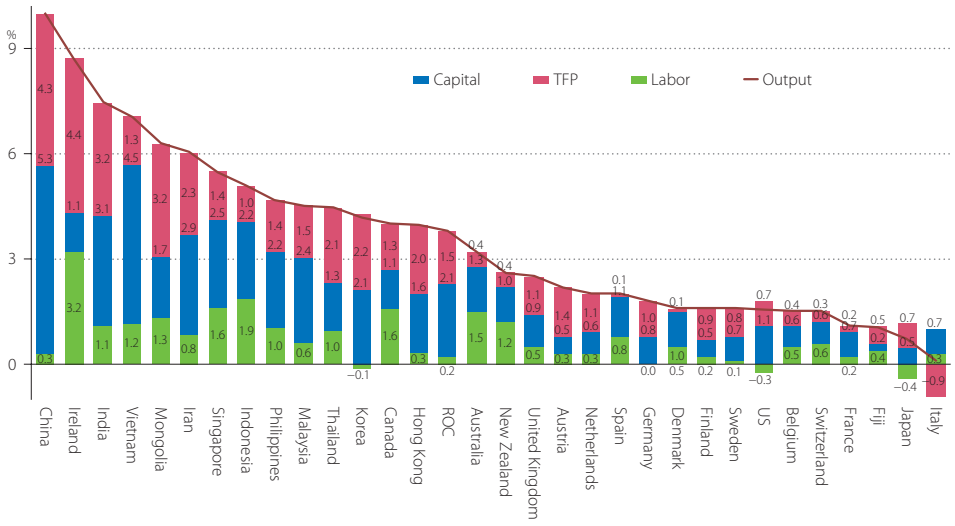

Figure 52 Comparison of Sources of Economic Growth with OECD Countries, 2000–2010

Sources: APO Productivity Database 2012.01 for APO member economies and China and the US; OECD Stat (Dataset: Multi-Factor Productivity) for OECD countries (except Japan and Korea). The ending years are different: Denmark, the Netherlands, and the UK are until 2008 and Australia is until 2009.

2.2 per cent in Korea, and 2.0 per cent in Hong Kong. Their performance was only beaten by Ireland, with TFP growth at 4.4 per cent. Though growing at a more subdued pace, the contribution made by TFP in the slower-growing, mature economies should not be underestimated: TFP accounted for half or more of economic growth in, for example, Austria, the Netherlands, Finland, Germany, and the US.

Figure 53 and Table 12 show the growth accounting decomposition for individual countries in five-year intervals covering the period 1970–2010. It is clear that there has been a slowdown in long-term overall growth in Japan and the Asian Tigers when compared with their own performance in the 1970s. The deceleration, from 4.9 per cent in the late 1980s to 1.4 per cent in the early 1990s, was particularly sharp in Japan, and since then, its growth has never recovered. Korea and Singapore achieved their peaks in economic growth in the late 1980s, whereas Hong Kong and the ROC achieved theirs in the late 1970s. Although their growth performance in the most recent period of 6 per cent for Singapore and 3–4 per cent for the other three Tigers is still robust compared to other mature economies, it is a shadow of their own heydays. In contrast, in the past four decades, growth in China and India has been on a clear path of acceleration. Still, the experience of the Asian Tigers lends support to the likelihood of a slowdown; the question is more likely to be when than if (See Box 5). In other countries, their development efforts have been more interrupted. Since the Asian financial crisis, growth in Thailand, Malaysia, and Indonesia has not yet returned to these countries' former peaks even after more than a decade.

58: The multi-factor productivity in the OECD Productivity Database, referred as TFP in this report, defines total input as the weighted average of the growth rates of total hours worked and capital services. Comparing OECD's TFP estimates for the whole economy with ours, there are mainly two differences in assumptions. First, capital services of residential buildings are included in our estimates of capital input in order to be consistent with output that includes the imputed cost of owner-occupied housing. Second, the compensation of capital is defined in our estimates as the residual of the value added and the compensation of labor (compensations for employees, self-employed persons, and contributing family workers), whereas the OECD defines it as the imputed value of capital services based on the assumptions of an ex-ante rate of returns on capital. Thus, although both apply the same Törnqvist index, the weights to aggregate labor and capital can differ. Other than these, our methodology and assumptions in measuring capital services are designed to be largely consistent with the OECD methodology, and the impact of the differences in assumptions on the volume estimates of capital services is judged to be limited.

Figure 53 Individual Countries' Growth Accounting Decomposition, 1970–2010

Source: APO Productivity Database 2012.01.

Table 12 Output Growth and Contributions of Labor, Capital, and TFP

	Output	Labor	Capital		TFP
			IT	Non-IT	
China					
1970–1975	5.7	1.0 (18)	0.0 (1)	4.2 (73)	0.5 (9)
1975–1980	6.3	1.1 (17)	0.0 (1)	4.0 (64)	1.2 (19)
1980–1985	10.2	1.8 (18)	0.0 (0)	3.4 (33)	4.9 (48)
1985–1990	7.6	2.8 (37)	0.1 (1)	4.3 (57)	0.4 (5)
1990–1995	11.6	0.6 (5)	0.1 (1)	3.8 (33)	7.1 (61)
1995–2000	8.3	0.7 (8)	0.2 (3)	4.3 (52)	3.1 (37)
2000–2005	9.3	0.4 (4)	0.7 (7)	4.2 (45)	4.1 (44)
2005–2010	10.6	0.2 (2)	0.6 (5)	5.3 (50)	4.6 (43)
1970–2010	8.7	1.1 (12)	0.2 (3)	4.2 (48)	3.2 (37)
Fiji					
1970–1975	5.6	4.1 (73)	0.1 (1)	2.0 (36)	−0.6 (−11)
1975–1980	3.7	2.8 (76)	0.0 (1)	2.1 (56)	−1.2 (−34)
1980–1985	0.7	1.5 (204)	0.0 (6)	1.3 (178)	−2.1 (−289)
1985–1990	3.8	1.0 (27)	0.1 (3)	−0.2 (−5)	2.8 (75)
1990–1995	2.7	1.9 (70)	0.3 (10)	1.2 (44)	−0.6 (−24)
1995–2000	2.1	0.7 (32)	0.0 (−2)	0.7 (34)	0.7 (36)
2000–2005	2.0	0.3 (15)	0.1 (5)	0.2 (12)	1.3 (68)
2005–2010	0.1	0.4 (286)	0.1 (72)	0.0 (−27)	−0.3 (−231)
1970–2010	2.6	1.6 (61)	0.1 (3)	0.9 (35)	0.0 (0)
India					
1970–1975	2.9	1.1 (37)	0.0 (1)	2.2 (76)	−0.4 (−14)
1975–1980	3.1	1.1 (36)	0.0 (1)	2.3 (76)	−0.4 (−13)
1980–1985	5.0	2.0 (39)	0.0 (1)	2.3 (46)	0.7 (13)
1985–1990	5.8	2.1 (36)	0.1 (1)	2.2 (38)	1.4 (25)
1990–1995	5.0	0.9 (18)	0.1 (2)	2.2 (45)	1.8 (36)
1995–2000	5.7	1.9 (33)	0.1 (3)	2.3 (41)	1.3 (23)
2000–2005	6.8	1.8 (27)	0.2 (2)	2.2 (33)	2.6 (38)
2005–2010	8.1	0.4 (5)	0.2 (3)	3.6 (45)	3.8 (48)
1970–2010	5.3	1.4 (27)	0.1 (2)	2.4 (46)	1.4 (26)
Iran					
1970–1975	9.4	1.1 (11)	0.0 (0)	4.4 (47)	3.9 (41)
1975–1980	−2.9	1.6 (−55)	0.0 (−2)	5.3 (−183)	−9.7 (340)
1980–1985	3.8	1.2 (31)	0.0 (1)	2.1 (56)	0.5 (12)
1985–1990	1.4	1.2 (89)	0.1 (4)	0.2 (16)	−0.1 (−9)
1990–1995	3.7	0.8 (23)	0.1 (2)	0.9 (24)	1.9 (52)
1995–2000	4.1	1.1 (26)	0.1 (2)	1.1 (26)	1.9 (45)
2000–2005	6.8	1.6 (23)	0.2 (3)	2.4 (35)	2.6 (39)
2005–2010	5.2	0.1 (1)	0.2 (3)	3.0 (57)	2.0 (39)
1970–2010	4.0	1.1 (27)	0.1 (2)	2.4 (61)	0.4 (9)
Korea					
1970–1975	9.3	1.9 (20)	0.2 (2)	5.7 (62)	1.5 (16)
1975–1980	7.3	2.2 (30)	0.3 (4)	6.5 (90)	−1.8 (−24)
1980–1985	8.5	1.2 (14)	0.3 (3)	3.9 (45)	3.2 (37)
1985–1990	9.7	1.4 (14)	0.5 (5)	4.0 (42)	3.8 (40)
1990–1995	7.4	1.4 (19)	0.4 (5)	4.1 (56)	1.5 (20)
1995–2000	4.9	0.3 (6)	0.5 (11)	2.9 (58)	1.3 (26)
2000–2005	4.5	0.1 (3)	0.5 (12)	1.9 (43)	1.9 (42)
2005–2010	3.9	−0.3 (−9)	0.2 (5)	1.6 (41)	2.4 (63)
1970–2010	6.9	1.0 (15)	0.4 (5)	3.8 (55)	1.7 (25)
Mongolia					
1970–1975	6.5	0.6 (9)	0.0 (1)	3.0 (46)	2.9 (45)
1975–1980	5.4	0.9 (17)	0.1 (1)	3.3 (62)	1.1 (20)
1980–1985	6.6	1.0 (15)	0.2 (3)	7.0 (106)	−1.6 (−25)
1985–1990	3.8	2.3 (59)	0.2 (4)	4.0 (105)	−2.6 (−68)
1990–1995	−1.8	−0.2 (12)	0.1 (−5)	1.0 (−57)	−2.6 (150)
1995–2000	3.6	0.5 (14)	0.1 (4)	0.5 (14)	2.4 (68)
2000–2005	6.3	2.0 (31)	0.3 (4)	0.5 (8)	3.5 (56)
2005–2010	6.3	0.7 (11)	0.4 (7)	2.3 (37)	2.9 (46)
1970–2010	4.6	1.0 (21)	0.2 (4)	2.7 (59)	0.7 (16)
Singapore					
1970–1975	9.1	2.6 (28)	0.6 (6)	7.9 (87)	−1.9 (−21)
1975–1980	8.2	2.4 (29)	0.4 (5)	5.3 (64)	0.2 (2)
1980–1985	6.6	1.5 (22)	0.6 (9)	5.7 (86)	−1.1 (−17)
1985–1990	8.3	2.0 (24)	0.8 (10)	3.0 (36)	2.5 (30)
1990–1995	8.2	2.0 (25)	0.9 (11)	3.3 (41)	1.9 (23)
1995–2000	5.6	0.9 (16)	0.7 (12)	3.9 (70)	0.1 (3)
2000–2005	4.7	0.9 (20)	0.6 (13)	2.0 (42)	1.2 (25)
2005–2010	6.3	2.3 (37)	0.6 (9)	1.8 (29)	1.6 (25)
1970–2010	7.1	1.8 (26)	0.6 (9)	4.1 (58)	0.5 (8)
Vietnam					
1986–1990	4.8	1.6 (34)	0.2 (4)	1.6 (33)	1.4 (29)
1990–1995	7.9	3.0 (38)	0.1 (1)	1.2 (15)	3.6 (46)
1995–2000	6.7	2.7 (40)	0.3 (4)	2.7 (41)	1.1 (16)
2000–2005	7.2	0.5 (7)	0.3 (4)	3.3 (45)	3.1 (43)
2005–2010	6.8	1.8 (26)	0.6 (9)	4.9 (71)	−0.4 (−6)
1970–2010	6.8	1.9 (29)	0.3 (4)	2.8 (41)	1.8 (26)

	Output	Labor	Capital		TFP
			IT	Non-IT	
ROC					
1970–1975	8.5	1.9 (22)	0.5 (6)	6.7 (79)	−0.6 (−7)
1975–1980	10.1	2.1 (21)	0.4 (4)	5.3 (53)	2.2 (22)
1980–1985	6.2	1.2 (19)	0.4 (6)	4.0 (65)	0.6 (10)
1985–1990	8.5	1.3 (15)	0.3 (4)	3.1 (36)	3.8 (45)
1990–1995	7.0	1.1 (15)	0.3 (5)	3.4 (49)	2.2 (31)
1995–2000	5.1	0.3 (6)	0.8 (16)	3.3 (64)	0.7 (15)
2000–2005	3.5	0.2 (6)	0.6 (18)	2.1 (59)	0.6 (17)
2005–2010	4.0	0.2 (6)	0.0 (1)	1.4 (34)	2.4 (59)
1970–2010	6.6	1.0 (16)	0.4 (6)	3.7 (55)	1.5 (23)
Hong Kong					
1970–1975	6.2	1.9 (30)	0.2 (3)	2.8 (44)	1.4 (23)
1975–1980	11.0	1.9 (17)	0.2 (2)	3.7 (33)	5.2 (47)
1980–1985	5.6	0.9 (16)	0.3 (5)	4.2 (76)	0.2 (3)
1985–1990	7.4	0.4 (5)	0.4 (6)	3.1 (42)	3.6 (48)
1990–1995	5.1	0.2 (5)	0.4 (8)	3.5 (68)	1.0 (19)
1995–2000	2.6	1.2 (48)	0.7 (25)	2.8 (109)	−2.1 (−81)
2000–2005	4.1	0.5 (12)	0.5 (13)	1.3 (32)	1.8 (43)
2005–2010	3.9	0.2 (5)	0.3 (8)	1.2 (30)	2.2 (57)
1970–2010	5.7	0.9 (16)	0.4 (6)	2.8 (49)	1.7 (29)
Indonesia					
1970–1975	8.3	2.0 (25)	0.0 (1)	3.8 (46)	2.4 (29)
1975–1980	7.8	1.6 (20)	0.1 (2)	4.5 (58)	1.6 (21)
1980–1985	4.8	2.3 (48)	0.1 (3)	3.9 (81)	−1.5 (−32)
1985–1990	7.5	2.6 (35)	0.1 (2)	2.5 (33)	2.3 (30)
1990–1995	7.6	0.7 (9)	0.2 (3)	3.1 (41)	3.5 (47)
1995–2000	0.8	1.2 (152)	0.1 (18)	2.9 (356)	−3.4 (−426)
2000–2005	4.6	0.8 (17)	0.2 (3)	1.7 (38)	1.9 (42)
2005–2010	5.5	2.9 (53)	0.2 (4)	2.3 (41)	0.1 (2)
1970–2010	5.9	1.8 (30)	0.1 (2)	3.1 (53)	0.9 (15)
Japan					
1970–1975	4.4	−0.3 (−6)	0.4 (8)	5.0 (114)	−0.7 (−16)
1975–1980	4.3	0.9 (22)	0.2 (5)	2.7 (62)	0.5 (11)
1980–1985	4.2	0.4 (9)	0.2 (6)	2.0 (47)	1.6 (39)
1985–1990	4.9	0.4 (8)	0.4 (9)	2.0 (41)	2.0 (42)
1990–1995	1.4	−0.4 (−26)	0.3 (23)	1.8 (125)	−0.3 (−23)
1995–2000	0.8	−0.7 (−80)	0.3 (39)	0.9 (111)	0.2 (30)
2000–2005	1.2	−0.4 (−32)	0.4 (34)	0.3 (26)	0.9 (72)
2005–2010	0.3	−0.5 (−156)	0.1 (47)	0.1 (20)	0.5 (189)
1970–2010	2.7	−0.1 (−2)	0.3 (12)	1.8 (68)	0.6 (22)
Malaysia					
1970–1975	7.7	1.7 (23)	0.1 (1)	4.8 (62)	1.1 (14)
1975–1980	8.2	1.7 (21)	0.1 (1)	4.9 (59)	1.5 (19)
1980–1985	5.0	1.5 (30)	0.1 (2)	6.0 (120)	−2.6 (−52)
1985–1990	6.6	1.5 (23)	0.2 (2)	3.1 (46)	1.9 (28)
1990–1995	9.1	1.1 (12)	0.3 (3)	6.0 (67)	1.6 (18)
1995–2000	4.7	1.4 (30)	0.5 (11)	5.3 (113)	−2.5 (−54)
2000–2005	4.6	0.6 (12)	0.7 (15)	2.0 (43)	1.4 (30)
2005–2010	4.4	0.7 (16)	0.6 (13)	1.5 (35)	1.6 (36)
1970–2010	6.3	1.3 (20)	0.3 (5)	4.2 (67)	0.5 (8)
Philippines					
1970–1975	5.6	3.3 (59)	0.1 (2)	2.0 (36)	0.2 (3)
1975–1980	5.9	2.0 (35)	0.1 (2)	3.5 (59)	0.3 (5)
1980–1985	−1.3	1.9 (−146)	0.1 (−11)	3.1 (−239)	−6.4 (496)
1985–1990	4.6	1.0 (22)	0.1 (3)	0.8 (18)	2.6 (57)
1990–1995	2.2	1.0 (47)	0.1 (3)	1.9 (86)	−0.8 (−36)
1995–2000	3.5	0.7 (19)	0.4 (11)	2.6 (75)	−0.2 (−5)
2000–2005	4.5	1.2 (27)	0.5 (11)	1.9 (42)	0.9 (20)
2005–2010	4.8	0.9 (18)	0.3 (5)	1.7 (35)	2.0 (41)
1970–2010	3.7	1.5 (40)	0.2 (6)	2.2 (59)	−0.2 (−5)
Thailand					
1970–1975	5.5	−0.2 (−3)	0.1 (1)	2.2 (41)	3.4 (61)
1975–1980	7.4	4.0 (54)	0.2 (2)	2.2 (29)	1.1 (15)
1980–1985	5.3	0.9 (17)	0.2 (4)	2.3 (43)	1.9 (36)
1985–1990	9.8	2.7 (28)	0.3 (3)	2.8 (28)	4.0 (41)
1990–1995	8.2	0.3 (4)	0.6 (7)	5.4 (66)	1.9 (23)
1995–2000	0.7	0.2 (23)	0.3 (44)	2.7 (381)	−2.5 (−348)
2000–2005	5.3	1.2 (22)	0.3 (6)	0.7 (12)	3.2 (59)
2005–2010	3.6	0.8 (22)	0.4 (11)	1.3 (36)	1.1 (31)
1970–2010	5.7	1.2 (22)	0.3 (5)	2.4 (43)	1.8 (31)
US					
1970–1975	2.7	0.5 (20)	0.2 (8)	1.1 (42)	0.8 (30)
1975–1980	3.6	1.7 (48)	0.3 (7)	1.0 (28)	0.6 (17)
1980–1985	3.2	0.9 (27)	0.4 (14)	0.7 (22)	1.2 (37)
1985–1990	3.2	1.3 (41)	0.5 (16)	0.7 (22)	0.7 (20)
1990–1995	2.5	0.7 (28)	0.5 (18)	0.5 (19)	0.9 (34)
1995–2000	4.2	1.2 (29)	0.8 (18)	0.7 (17)	1.5 (35)
2000–2005	2.4	−0.1 (−3)	0.6 (25)	0.7 (29)	1.2 (49)
2005–2010	0.7	−0.4 (−61)	0.3 (47)	0.6 (77)	0.3 (37)
1970–2010	2.8	0.7 (26)	0.4 (16)	0.7 (27)	0.9 (31)

Unit: Average annual growth rate (percentage).
Source: APO Productivity Database 2012.01.

The relative importance of drivers behind economic growth changes over time. It is a common experience in most countries that a large part of the vibrant growth in the initial period was driven by input growth while TFP growth became more prominent and made a steady contribution in the later periods. Hong Kong's TFP growth peaked at 5.2 per cent in 1975–1980, and was robust at 3.5 per cent in 1985–1990, when TFP growth also peaked in the ROC, Korea, Japan, and Singapore, at 3.8 per cent, 3.8 per cent, 2.0 per cent, and 2.5 per cent, respectively. Thereafter, TFP growth slowed until recent years when countries experienced a productivity growth resurgence. This resurgence is also shared by Malaysia and the Philippines. TFP growth in Mongolia has been particularly strong since 1995. It has also bounced back in Indonesia[59] and Thailand[60] from negative after the Asian financial crisis of the late 1990s, but has softened again since 2005. In contrast, the US experienced a surge in TFP growth in the second half of the 1990s, which was sustained into the early 2000s before the adverse cyclical effect hit in 2005–2010. Over the whole period of estimation, TFP accounted for a quarter or more of economic growth in Hong Kong (29 per cent), the ROC (23 per cent), and Korea (25 per cent), while it was 22 per cent in Japan. In contrast, TFP performance has been erratic in Singapore, resulting in its relatively small contribution of only 8 per cent to economic growth over the same period. Among the less developed economies, TFP has been contributing 31 per cent to economic growth in Thailand, 15 per cent in Indonesia, and 8 per cent in Malaysia.

Looking at the decomposition of economic growth in China and in India, the two key drivers have been non-IT capital input growth and TFP growth. While the contribution from non-IT capital has been relatively stable in terms of percentage points, it is their TFP performance that has more bearing in determining the overall economic growth over time. For example, the trough of economic growth that China experienced in 1985–1990 was largely explained by the lack of TFP growth. Similarly, when output growth slowed from its peak in the latter half of the 1990s, it was due to the slowdown in TFP growth from 7.1 per cent on average per annum in the previous period to 3.1 per cent. Thereafter, output growth has accelerated to reflect largely the pickup in TFP growth in the 2000s. In India, TFP growth was insignificant in the 1970s; since then, it has been accelerating and increasingly accounting for a greater proportion of economic growth. In the second half of the 2000s, India achieved TFP growth of 3.8 per cent – its highest in the past four decades. Through trials and errors, China and India invested first and then learned how to combine the inputs efficiently. They have reaped the benefits of their efforts in robust TFP growth, while the contribution from labor input growth dwindles in both countries over time.

Tracking the size and growth of IT capital has become a standard practice in productivity research, following attempts to establish the driving force behind productivity resurgence in developed economies, starting with the US in the 1990s. Unlike technological advancements in the past, which were largely confined to manufacturing, IT is a technology that can permeate the economy and bring about significant production gains in, for example, wholesale and retail, banking and finance, and transportation and telecommunications (i.e., service sectors that traditionally have struggled with slow productivity growth). Given the weight of the service sector in the economy (Figure 67), its potential and implications for economic development and productivity gains could therefore be immense. A frequent question asked by policymakers and researchers is how best to capitalize on the productivity potential brought forth by this IT revolution. As with non-IT capital, it involves a process of accumula-

59: Van der Eng (2008) provides estimates of capital stock for Indonesia and Van der Eng (2009) shows that annual average TFP growth increased from –4.4 per cent during 1995–2000 to 1.7 per cent during 2000–2007 in Indonesia. Warr (2006) also finds that TFP growth increased from –8.4 per cent during 1996–1998 to 1.5 per cent during 1998–2002.

60: Bosworth (2005) shows that annual average TFP growth increased from –4.6 per cent during 1996–1999 to 2.1 per cent during 1999–2004 in Thailand. Warr (2006) also finds that TFP growth increased from –9.0 per cent during 1996–1998 to 1.6 per cent during 1998–2002.

tion and assimilation. IT capability becomes a factor that determines an economy's long-term growth prospects. Formally acknowledging the importance of the IT sector to the modern economy, the 2008 SNA makes the IT sector more easily identified and separable in industry classification and asset type (see Appendix A.1).

Japan has been leading Asian countries in terms of IT capital contribution to economic growth (Figures 49 and 51). Japan's shift in capital allocation took off in earnest in the mid-1990s, with the contribution of IT capital to capital input growth rising from a low of 11 per cent in 1995 to a peak of 65 per cent in 2005 (Figure 54).[61] It took place in a period when Japan's overall investment growth slowed significantly after the burst of its bubble economy in the early 1990s (Figure 37); after years of excesses, Japan shifted away from non-IT to IT capital as a profitable investment. In contrast, the US started its shift toward IT capital much earlier than any Asian economy and over a longer period of time. For two decades (i.e., between 1983 and 2003), IT capital accounted for over 40 per cent of capital input growth, reaching its height of over 50 per cent at the turn of the millennium. In the most recent years, the slowdown in total capital growth concentrated more on non-IT capital, resulting in spikes in the contribution of IT capital in both Japan and the US. Our findings are in accordance with Jorgenson, Ho, and Stiroh (2005). Based on their measurement, IT capital in the 1980s contributed 31.9 per cent of the growth of total capital inputs in the US, but only 13.5 per cent in Japan.[62] Since 1995, the Japanese economy had been rapidly shifting its capital allocation from non-IT to IT capital. In 2002, the contribution of IT capital in Japan rose to 54.1 per cent, which is higher than the 49.8 per cent in the US.

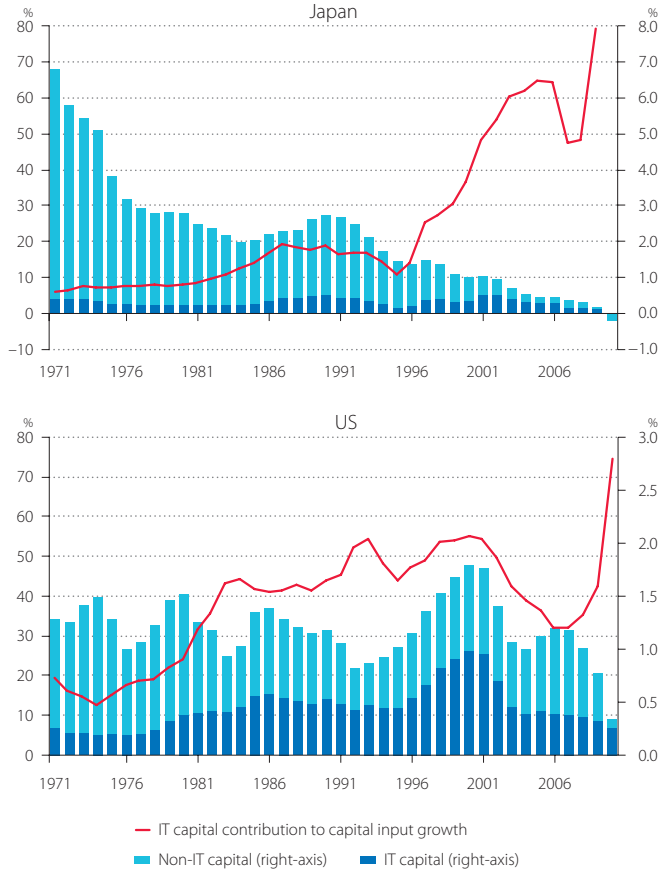

Figure 54 IT Capital Contribution to Capital Input Growth of Japan and the US, 1970–2010

Source: APO Productivity Database 2012.01.

A similar allocation shift to IT capital is also found in the Asian Tigers (Figure 55).[63] In Korea, the ROC, and Hong Kong, the contribution

61: Japan's capital services recorded negative growth in 2009–2010, for the first time after World War II, although IT capital services increased. We omitted this period from our calculations of the IT capital contribution share in total capital input.

62: Based on our own estimates presented, IT capital contributes 38.5 per cent in the US and 18.5 per cent in Japan to the growth of total capital input. Although the estimates in the 1980s in this report are somewhat higher than the industry-level estimates in Jorgenson, Ho, and Stiroh (2005) and Jorgenson and Nomura (2005), the trends of both the US and Japan shown in Figure 54 are very similar to Figure 3 in Jorgenson and Nomura (ibid.).

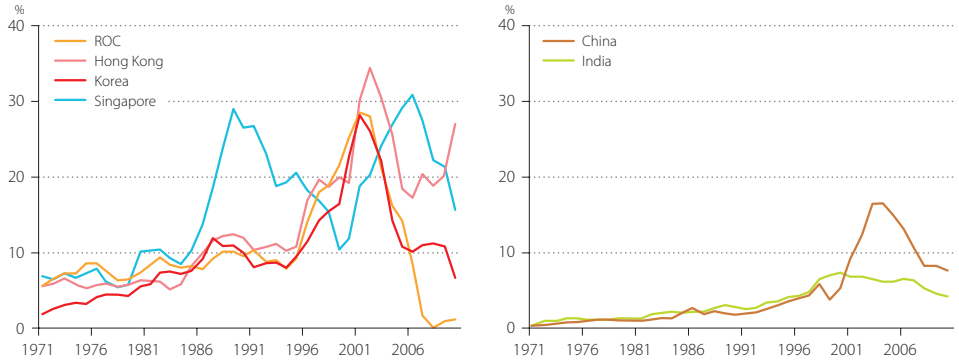

Figure 55 IT Capital Contribution to Capital Input Growth of Asian Tigers, China, and India, 1970–2010

Source: APO Productivity Database 2012.01.

of IT capital to total capital input peaked at 30 per cent or above at the turn of the millennium, from a share of 10 per cent or below before 1995. In contrast, Singapore had two local peaks. The earlier one was reached in the mid-1990s when the contribution of IT capital reached 29 per cent, and the other was in 2005–2006, when it peaked at 31 per cent. China has been a latecomer as far as investing in IT capital is concerned. Its surge in the contribution of IT capital took off around 2000 and peaked at 16 per cent in the early 2000s. We have not observed as big a push in IT pickup in India as in other Asian countries. Rather, the process has been gradual with a clear step-up in effort from a minimal level in the early 1990s. The share of IT capital reached 7 per cent in the early 2000s before softening recently.

5.4 Enhancement of Labor Productivity

Although TFP more accurately measures how efficiently an economy utilizes its factor inputs, labor productivity and its drivers are of interest not least because of the close link to GDP per capita. Within the same growth accounting framework, average labor productivity growth at the aggregate level can be decomposed into effects of capital deepening (as measured by capital input per hour worked), which reflects the capital–labor substitution, and of TFP. In other words, these factors are key in fostering labor productivity.

Capital deepening has been taking place in all the countries compared, albeit to various degrees (Figure 56). Experience of countries suggests that capital deepening is an accompanying process of rapid economic development. The relatively early starters (i.e., Japan and the Asian Tigers) underwent

63: The quality of the data on investment for IT capital (IT hardware, communications equipment, and computer software) varies considerably among countries. If the official estimates are not available in their national accounts, the investment data by type of asset in benchmark Input–Output Tables (IOT) and the time-series IOTs (if available) are used to separate IT capital investment from GFCF in the national accounts. In the years when the IOTs are not available, domestic production and import data (UN Comtrade Database) for IT hardware and communication equipment is used to interpolate the estimates of IT investments. Data inconsistency could be a problem. Where software is excluded from the GFCF definition compliant to the 1968 SNA, software investment is estimated as described in Appendix A.1. In addition, the constant-quality prices for IT capital are hardly available for most Asian countries. If they are not available, the prices for IT capital are estimated by harmonizing Japan's price indices, as described in Appendix A.2. Thus, readers are cautioned about data uncertainty here and should expect that the decompositions of contributions of capital services into IT and non-IT capital can be considerably revised for some countries, when more reliable data sources for estimation become available.

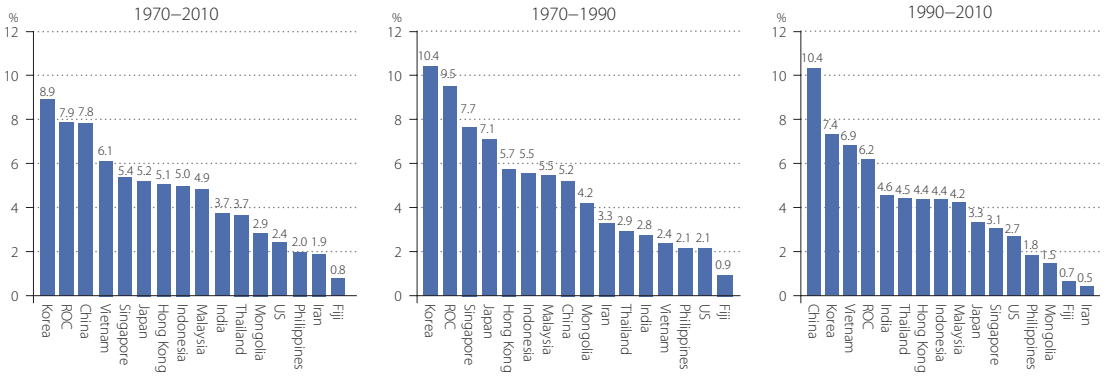

Figure 56 Capital Deepening, 1970–2010, 1970–1990, and 1990–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986. The labor input for Fiji is defined by numbers of employment.

more rapid capital deepening than any other countries compared, and in the earlier rather than the latter period. The reverse is true for the emerging Asian economies where concerted effort was made to increasing their capital intensity in the later period. In 1990–2010, China, Vietnam, India, and Thailand moved up to occupy the top spots among the Asian Tigers, while Singapore and Japan moved down in the rankings. In 1970–1990, the capital–labor ratio was rising by 10.4 per cent and 9.5 per cent on average a year in Korea and the ROC, respectively; it slowed to 7.4 per cent and 6.2 per cent in the subsequent two decades. Meanwhile, China's pace doubled between the two periods, from 5.2 per cent to 10.4 per cent on average a year. In Vietnam, it more than doubled from 2.4 per cent to 6.9 per cent. The pace of capital deepening also hastened in the US from 2.1 per cent to 2.7 per cent between the two sub-periods.

While labor productivity steadily improved for all countries (Figure 43), the growth rate of capital productivity as the other measure of partial productivity is negative for all countries during 1970–2010 (Figure 57). The rates of capital deepening in Korea and the ROC have been outstanding, at 8.9 per cent and 7.9 per cent per year, but their capital productivity experienced the sharpest decline of over 3.0 per cent per year on average during this period (Figure 58). In contrast, the deterioration of capital productivity (by 1.1 per cent) was relatively mild in China as shown in Figure 59, despite its fast capital deepening of 7.8 per cent (Figure 56). Looking at the two sub-periods, overall the rate of deterioration in capital productivity for all countries was slower in the latter period. China's performance is particularly impressive. Its acceleration in capital deepening in the latter period did not compromise its capital productivity as much as the early starters. In 1990–2010, China's capital–labor ratio rose by 10.4 per cent whereas capital productivity fell by 1.3 per cent. This compares with Korea's performance in 1970–1990 when its capital–labor ratio rose by 10.4 per cent but capital productivity fell by 4.5 per cent.

Labor productivity growth can be decomposed into contributions from capital deepening and TFP growth. Capital deepening should raise labor productivity, other things being equal. However, by comparing Figures 56 and 60, it is observed that countries that underwent the fastest capital deepening were not necessarily those enjoying the fastest labor productivity growth. In other words, TFP growth can make a significant difference to labor productivity performance. China achieved the fastest labor productivity of 6.7 per cent on average a year in the period of 1970–2010, while it was only third in its pace of capital deepening. This was because China's labor productivity was bolstered by the fastest TFP growth of 3.2 per cent over the same period, compared with 1.7 per cent and 1.5 per cent

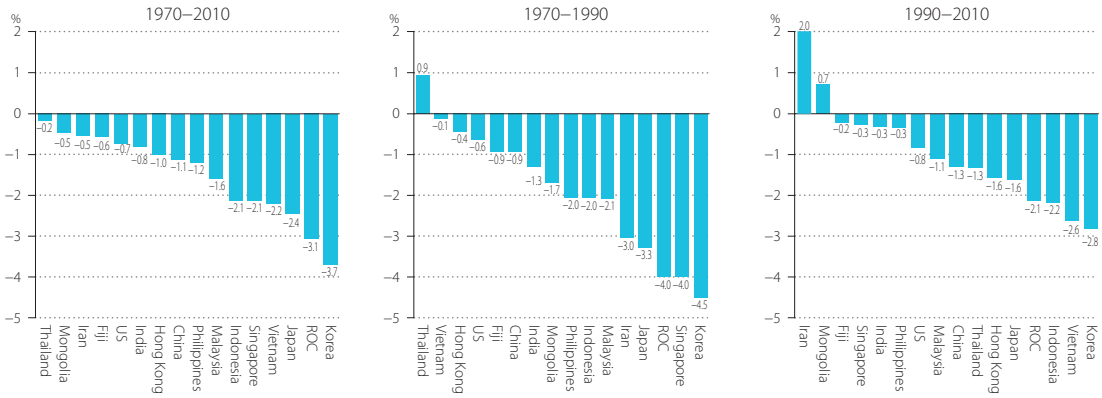

Figure 57 Capital Productivity Growth, 1970–2010, 1970–1990, and 1990–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986.

achieved by Korea and the ROC, respectively. Japan was sixth in terms of capital deepening but came in 11th place in labor productivity growth because of its lackluster TFP growth of 0.6 per cent over the period. Thailand, on the other hand, fared well on labor productivity growth in sixth place, compared to its 11th place ranking on capital deepening, because of its robust TFP growth of 1.8 per cent.

Despite that, capital deepening remains the prime cause of labor productivity growth, generally explaining 50 per cent or more of labor productivity growth; the US is the only exception to this observation (Figure 61). Within this long period, the composition of labor productivity growth has been shifting (Figures 62 and 63). In the earlier period of 1970–1985, TFP growth was enjoyed by just over eight out of the 15 Asian countries compared, and it was a significant drag on labor productivity growth in four countries (i.e., Singapore, Iran, the Philippines, and Fiji). During the middle period of 1985–2000, all countries (except Mongolia) achieved positive

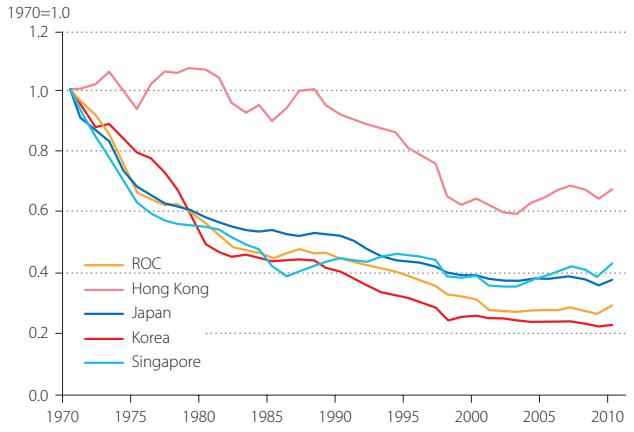

Figure 58 Capital Productivity Trends in Japan and the Four Asian Tigers, 1970–2010

Source: APO Productivity Database 2012.01.

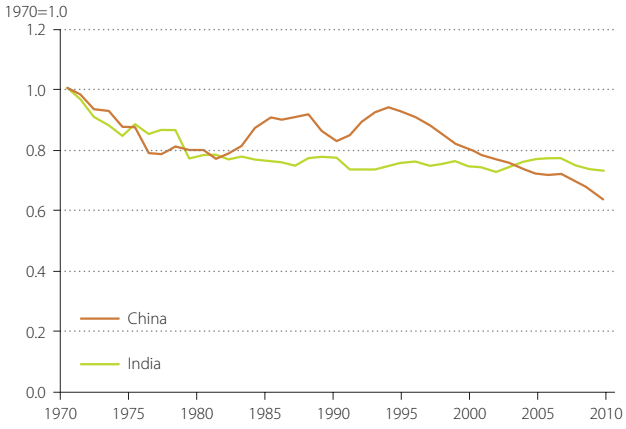

Figure 59 Capital Productivity Trends in China and India, 1970–2010

Source: APO Productivity Database 2012.01.

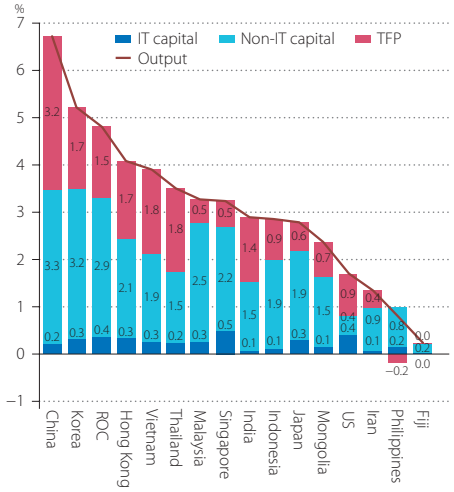

Figure 60 Sources of Labor Productivity Growth, 1970–2010

Source: APO Productivity Database 2012.01.

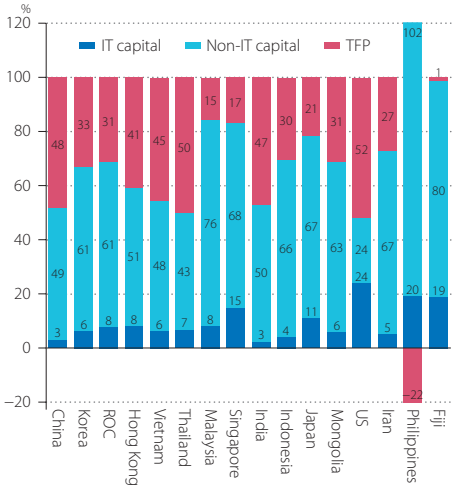

Figure 61 Contribution Shares of Labor Productivity Growth, 1970–2010

Source: APO Productivity Database 2012.01.

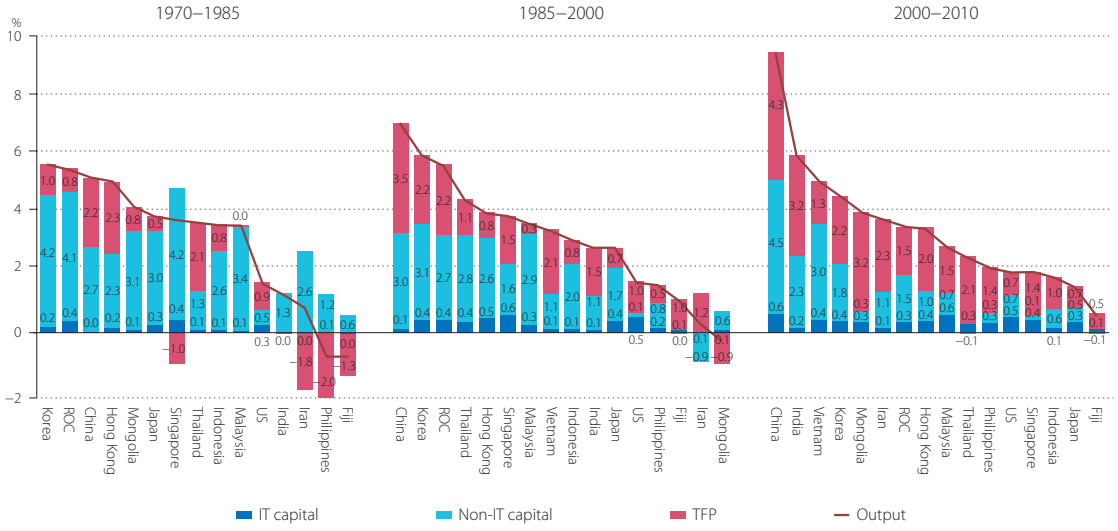

Figure 62 Sources of Labor Productivity Growth, 1970–1985, 1985–2000, and 2000–2010

Source: APO Productivity Database 2012.01.

TFP growth to bolster labor productivity growth. By 2000–2010, TFP growth had become the dominant driver of labor productivity growth in 11 out of the 15 countries compared. At the same time, the contribution from IT capital deepening is also strengthening, from a range of 1–12 per cent in 1970–1985, to 2–17 per cent in 1985–2000, and 3–21 per cent in 2000–2010. This may have boosted countries' TFP performance. In contrast, the contribution of non-IT capital was negative in Thailand and Fiji in 2000–2010. The contribution of IT capital deepening in the US is always ahead of Asian countries, but it was the largest in the middle period of 1985–2000, accounting for 32 per cent of labor productivity growth. Coincidentally, it was also the period when the share of TFP growth was the largest, at 61 per cent.

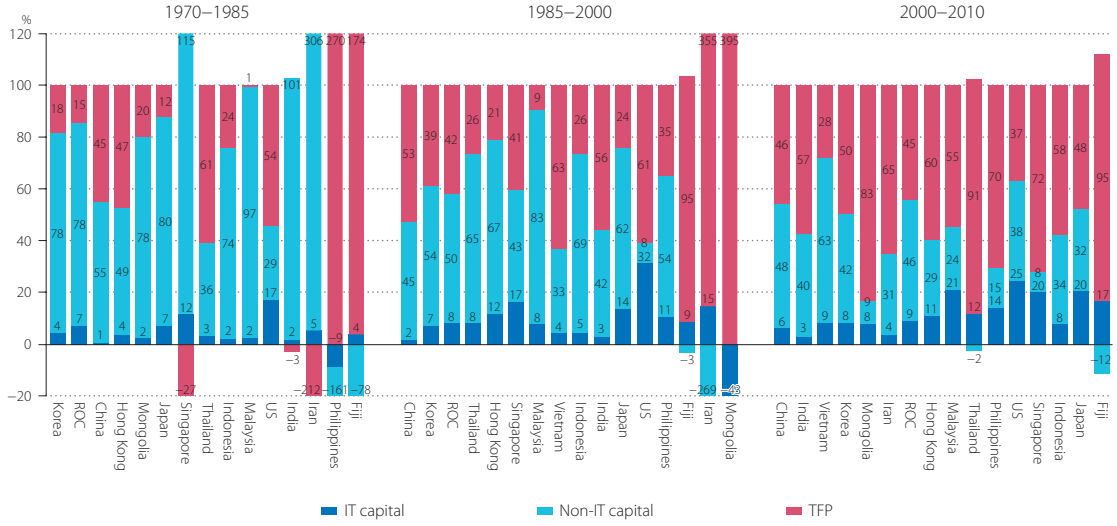

Figure 63 Contribution Shares of Labor Productivity Growth, 1970–1985, 1985–2000, and 2000–2010

Source: APO Productivity Database 2012.01.

Figure 64 and Table 13 show the decomposition of labor productivity growth for individual countries in five-year intervals covering the period 1970–2010. Productivity is procyclical in nature, and, in turn, it is difficult to discern fundamental shifts from short-term fluctuations. However, over a period spanning four decades, it can be observed that labor productivity growth in the two fast-growing emerging Asian economies (i.e., China and India) is accelerating. China clearly has leapt from a growth rate of around 4 per cent in the 1970s to a rate of 8–10 per cent in the 2000s, and the transition period was in the early 1990s. India's passage to accelerating labor productivity growth is more gradual than China's, from around 1 per cent in the 1970s to 7.4 per cent in the second half of the 2000s. Both TFP growth and capital deepening took a leap in 2005–2010 to reinforce the positive trend. In contrast, the early starters (i.e., Japan and the Asian Tigers) have been experiencing a slowdown in labor productivity growth since their peaks achieved in the later 1980s. Labor productivity growth appeared to have stabilized in the 2000s, but at a lower rate than previously, in both Hong Kong and Korea. Singapore's productivity performance, albeit robust compared with other mature economies like the US, has been very modest against its Asian counterparts. Its recent peak was 3.7–3.8 per cent in the 1990s, compared with over 6 per cent in Hong Kong and the ROC, and 7.4 per cent in Korea in the late 1980s. The US clearly enjoyed a labor productivity growth spurt in the late 1990s (2.3 per cent) and early 2000s (2.4 per cent), the origin of which attracted a lot of research attention at the time. In the recent years, it has returned to its long-term average of under 2 per cent.

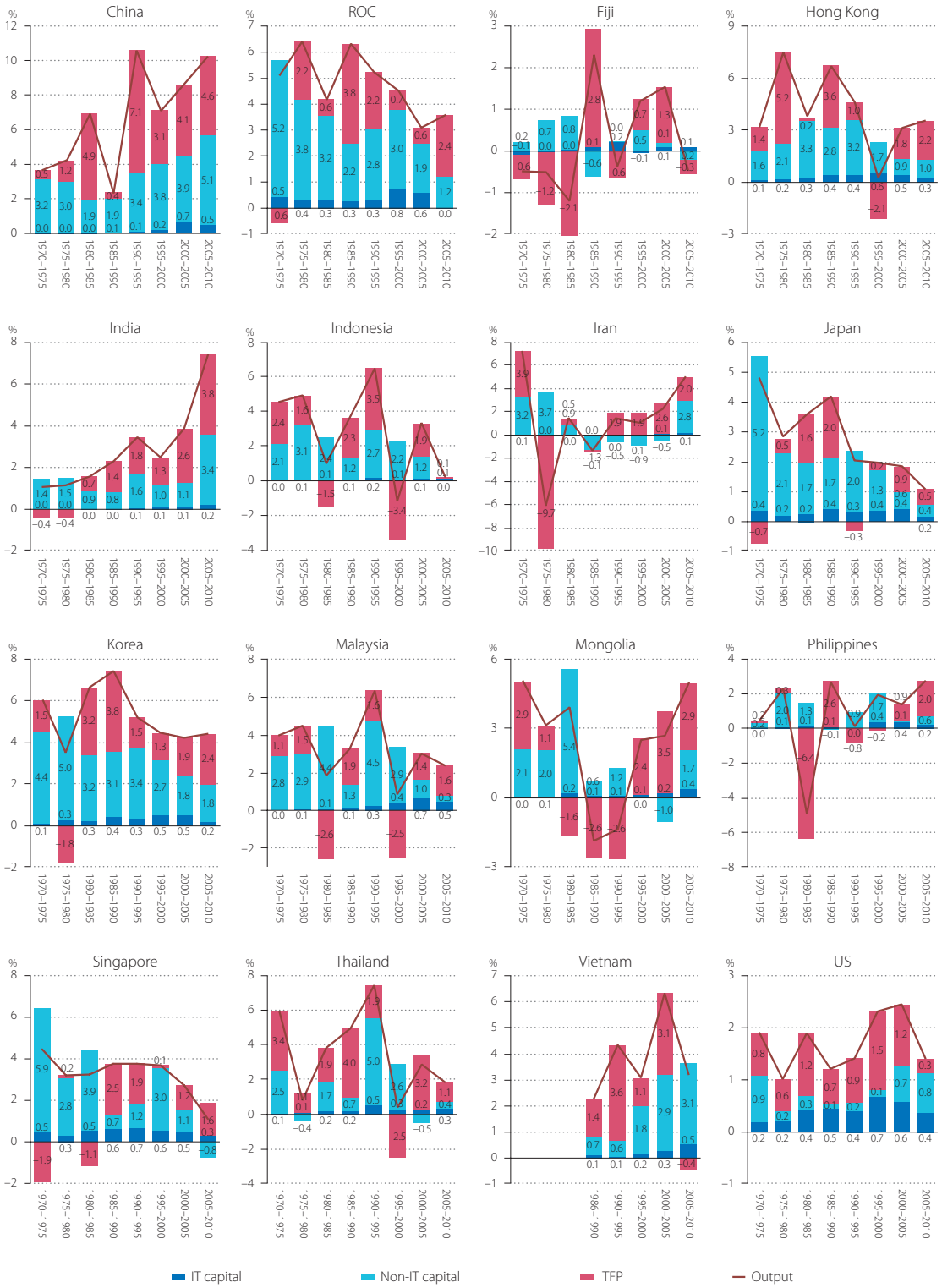

Figure 64 Decomposition of Labor Productivity Growth, 1970–2010

Source: APO Productivity Database 2012.01.

Table 13 Role of TFP and Capital Deepening in Labor Productivity Growth, 1970–2010

	Labor Productivity	Capital Deepening		TFP
		IT	Non-IT	
China				
1970–1975	3.7	0.0 (1)	3.2 (86)	0.5 (13)
1975–1980	4.2	0.0 (1)	3.0 (71)	1.2 (28)
1980–1985	6.9	0.0 (1)	1.9 (28)	4.9 (71)
1985–1990	2.4	0.1 (3)	1.9 (82)	0.4 (15)
1990–1995	10.6	0.1 (1)	3.4 (32)	7.1 (67)
1995–2000	7.1	0.2 (3)	3.8 (54)	3.1 (43)
2000–2005	8.6	0.7 (8)	3.9 (45)	4.1 (47)
2005–2010	10.2	0.5 (5)	5.1 (50)	4.6 (45)
1970–2010	6.7	0.2 (3)	3.3 (49)	3.2 (48)
Fiji				
1970–1975	−0.5	−0.1 (18)	0.2 (−42)	−0.6 (124)
1975–1980	−0.5	0.0 (5)	0.7 (−139)	−1.2 (234)
1980–1985	−1.2	0.0 (−2)	0.8 (−66)	−2.1 (168)
1985–1990	2.3	0.1 (4)	−0.6 (−26)	2.8 (122)
1990–1995	−0.4	0.2 (−54)	0.0 (0)	−0.6 (154)
1995–2000	1.2	−0.1 (−4)	0.5 (42)	0.7 (62)
2000–2005	1.5	0.1 (6)	0.1 (6)	1.3 (88)
2005–2010	−0.5	0.1 (−20)	−0.2 (47)	−0.3 (73)
1970–2010	0.2	0.0 (19)	0.2 (80)	0.0 (1)
India				
1970–1975	1.1	0.0 (2)	1.4 (136)	−0.4 (−38)
1975–1980	1.1	0.0 (2)	1.5 (133)	−0.4 (−35)
1980–1985	1.6	0.0 (2)	0.9 (55)	0.7 (43)
1985–1990	2.3	0.0 (2)	0.8 (34)	1.4 (64)
1990–1995	3.4	0.1 (2)	1.6 (46)	1.8 (52)
1995–2000	2.5	0.1 (5)	1.0 (42)	1.3 (53)
2000–2005	3.9	0.1 (3)	1.1 (30)	2.6 (67)
2005–2010	7.4	0.2 (3)	3.4 (45)	3.8 (52)
1970–2010	2.9	0.1 (3)	1.5 (50)	1.4 (47)
Iran				
1970–1975	7.2	0.1 (1)	3.2 (45)	3.9 (54)
1975–1980	−6.0	0.0 (−1)	3.7 (−60)	−9.7 (161)
1980–1985	1.4	0.0 (2)	0.9 (64)	0.5 (34)
1985–1990	−1.4	0.0 (−3)	−1.3 (94)	−0.1 (9)
1990–1995	1.4	0.0 (3)	−0.5 (−39)	1.9 (136)
1995–2000	1.0	0.1 (7)	−0.9 (−89)	1.9 (182)
2000–2005	2.3	0.1 (6)	−0.5 (−22)	2.6 (116)
2005–2010	4.9	0.1 (3)	2.8 (56)	2.0 (41)
1970–2010	1.3	0.1 (5)	0.9 (67)	0.4 (27)
Korea				
1970–1975	6.0	0.1 (2)	4.4 (73)	1.5 (25)
1975–1980	3.5	0.3 (8)	5.0 (143)	−1.8 (−51)
1980–1985	6.6	0.3 (4)	3.2 (48)	3.2 (48)
1985–1990	7.4	0.4 (6)	3.1 (42)	3.8 (52)
1990–1995	5.2	0.3 (6)	3.4 (65)	1.5 (29)
1995–2000	4.4	0.5 (11)	2.7 (60)	1.3 (29)
2000–2005	4.2	0.5 (12)	1.8 (44)	1.9 (44)
2005–2010	4.4	0.2 (5)	1.8 (40)	2.4 (55)
1970–2010	5.2	0.3 (6)	3.2 (61)	1.7 (33)
Mongolia				
1970–1975	5.1	0.0 (1)	2.1 (42)	2.9 (58)
1975–1980	3.1	0.1 (2)	2.0 (64)	1.1 (34)
1980–1985	3.9	0.2 (5)	5.4 (136)	−1.6 (−41)
1985–1990	−1.9	0.1 (−5)	0.6 (−34)	−2.6 (138)
1990–1995	−1.3	0.1 (−7)	1.2 (−89)	−2.6 (196)
1995–2000	2.5	0.1 (5)	0.0 (−2)	2.4 (96)
2000–2005	2.7	0.2 (8)	−1.0 (−39)	3.5 (131)
2005–2010	5.0	0.4 (8)	1.7 (34)	2.9 (58)
1970–2010	2.4	0.1 (6)	1.5 (63)	0.7 (31)
Singapore				
1970–1975	4.5	0.5 (11)	5.9 (133)	−1.9 (−43)
1975–1980	3.2	0.3 (9)	2.8 (86)	0.2 (5)
1980–1985	3.2	0.5 (16)	3.9 (119)	−1.1 (−35)
1985–1990	3.8	0.6 (17)	0.7 (17)	2.5 (66)
1990–1995	3.8	0.7 (18)	1.2 (31)	1.9 (51)
1995–2000	3.7	0.6 (15)	3.0 (81)	0.1 (4)
2000–2005	2.7	0.5 (18)	1.1 (39)	1.2 (43)
2005–2010	1.1	0.3 (25)	−0.8 (−69)	1.6 (144)
1970–2010	3.2	0.5 (15)	2.2 (68)	0.5 (17)
Vietnam				
1986–1990	2.3	0.1 (6)	0.7 (32)	1.4 (62)
1990–1995	4.3	0.1 (2)	0.6 (14)	3.6 (84)
1995–2000	3.1	0.2 (7)	1.8 (59)	1.1 (34)
2000–2005	6.3	0.3 (4)	2.9 (46)	3.1 (49)
2005–2010	3.2	0.5 (16)	3.1 (97)	−0.4 (−13)
1970–2010	3.9	0.3 (6)	1.9 (48)	1.8 (45)

	Labor Productivity	Capital Deepening		TFP
		IT	Non-IT	
ROC				
1970–1975	5.1	0.5 (9)	5.2 (102)	−0.6 (−11)
1975–1980	6.4	0.4 (6)	3.8 (60)	2.2 (35)
1980–1985	4.2	0.3 (8)	3.2 (77)	0.6 (15)
1985–1990	6.3	0.3 (4)	2.2 (35)	3.8 (60)
1990–1995	5.2	0.3 (6)	2.8 (53)	2.2 (42)
1995–2000	4.5	0.8 (17)	3.0 (67)	0.7 (16)
2000–2005	3.1	0.6 (19)	1.9 (61)	0.6 (20)
2005–2010	3.6	0.0 (1)	1.2 (33)	2.4 (66)
1970–2010	4.8	0.4 (8)	2.9 (61)	1.5 (31)
Hong Kong				
1970–1975	3.2	0.1 (4)	1.6 (51)	1.4 (45)
1975–1980	7.5	0.2 (3)	2.1 (28)	5.2 (70)
1980–1985	3.8	0.3 (7)	3.3 (88)	0.2 (5)
1985–1990	6.7	0.4 (6)	2.8 (41)	3.6 (53)
1990–1995	4.6	0.4 (9)	3.2 (70)	1.0 (21)
1995–2000	0.2	0.6 (273)	1.7 (838)	−2.1 (−1012)
2000–2005	3.1	0.5 (15)	0.9 (29)	1.8 (56)
2005–2010	3.5	0.3 (8)	1.0 (29)	2.2 (63)
1970–2010	4.1	0.3 (8)	2.1 (51)	1.7 (41)
Indonesia				
1970–1975	4.5	0.0 (1)	2.1 (47)	2.4 (53)
1975–1980	4.9	0.1 (2)	3.1 (64)	1.6 (33)
1980–1985	1.0	0.1 (10)	2.4 (247)	−1.5 (−157)
1985–1990	3.6	0.1 (3)	1.2 (34)	2.3 (63)
1990–1995	6.5	0.2 (3)	2.7 (42)	3.5 (55)
1995–2000	−1.2	0.1 (−10)	2.2 (−183)	−3.4 (293)
2000–2005	3.3	0.1 (4)	1.2 (37)	1.9 (59)
2005–2010	0.2	0.1 (60)	0.0 (−5)	0.1 (45)
1970–2010	2.9	0.1 (4)	1.9 (66)	0.9 (30)
Japan				
1970–1975	4.8	0.4 (8)	5.2 (107)	−0.7 (−15)
1975–1980	2.8	0.2 (7)	2.1 (76)	0.5 (17)
1980–1985	3.6	0.2 (6)	1.7 (48)	1.6 (45)
1985–1990	4.2	0.4 (10)	1.7 (41)	2.0 (49)
1990–1995	2.0	0.3 (17)	2.0 (98)	−0.3 (−16)
1995–2000	2.0	0.4 (19)	1.3 (69)	0.2 (13)
2000–2005	1.8	0.4 (23)	0.6 (30)	0.9 (47)
2005–2010	1.1	0.2 (16)	0.4 (34)	0.5 (50)
1970–2010	2.8	0.3 (11)	1.9 (67)	0.6 (21)
Malaysia				
1970–1975	4.0	0.0 (1)	2.8 (71)	1.1 (28)
1975–1980	4.5	0.1 (2)	2.9 (64)	1.5 (34)
1980–1985	1.9	0.1 (4)	4.4 (235)	−2.6 (−139)
1985–1990	3.3	0.1 (4)	1.3 (39)	1.9 (57)
1990–1995	6.4	0.3 (4)	4.5 (70)	1.6 (26)
1995–2000	0.8	0.4 (51)	2.9 (349)	−2.5 (−301)
2000–2005	3.0	0.7 (22)	1.0 (33)	1.4 (46)
2005–2010	2.4	0.5 (20)	0.3 (13)	1.6 (67)
1970–2010	3.3	0.3 (8)	2.5 (76)	0.5 (15)
Philippines				
1970–1975	0.4	0.0 (8)	0.2 (54)	0.2 (37)
1975–1980	2.3	0.1 (3)	2.0 (85)	0.3 (12)
1980–1985	−4.9	0.1 (−2)	1.3 (−27)	−6.4 (129)
1985–1990	2.6	0.1 (4)	−0.1 (−2)	2.6 (99)
1990–1995	0.1	0.0 (36)	0.9 (838)	−0.8 (−774)
1995–2000	1.9	0.4 (19)	1.7 (89)	−0.2 (−8)
2000–2005	1.4	0.4 (29)	0.1 (5)	0.9 (66)
2005–2010	2.7	0.2 (7)	0.6 (20)	2.0 (73)
1970–2010	0.8	0.2 (20)	0.8 (102)	−0.2 (−22)
Thailand				
1970–1975	5.9	0.1 (1)	2.5 (42)	3.4 (57)
1975–1980	0.8	0.1 (12)	−0.4 (−48)	1.1 (136)
1980–1985	3.8	0.2 (5)	1.7 (45)	1.9 (50)
1985–1990	5.0	0.2 (4)	0.7 (15)	4.0 (81)
1990–1995	7.4	0.5 (7)	5.0 (68)	1.9 (25)
1995–2000	0.4	0.3 (79)	2.6 (672)	−2.5 (−651)
2000–2005	2.9	0.2 (8)	−0.5 (−17)	3.2 (109)
2005–2010	1.8	0.3 (18)	0.4 (21)	1.1 (61)
1970–2010	3.5	0.2 (7)	1.5 (43)	1.8 (50)
US				
1970–1975	1.9	0.2 (10)	0.9 (47)	0.8 (42)
1975–1980	1.0	0.2 (21)	0.2 (19)	0.6 (60)
1980–1985	1.9	0.4 (22)	0.3 (15)	1.2 (63)
1985–1990	1.2	0.5 (38)	0.1 (9)	0.7 (54)
1990–1995	1.4	0.4 (29)	0.2 (11)	0.9 (60)
1995–2000	2.3	0.7 (30)	0.1 (6)	1.5 (64)
2000–2005	2.4	0.6 (24)	0.7 (29)	1.2 (47)
2005–2010	1.4	0.4 (26)	0.8 (55)	0.3 (19)
1970–2010	1.7	0.4 (24)	0.4 (24)	0.9 (52)

Unit: Average annual growth rate (percentage).
Source: APO Productivity Database 2012.01.

Box 7 Sensitivity of TFP Estimates

TFP computations based on the growth accounting framework depends on data that are sometimes hard to observe. One difficult task is to observe the wages for the self-employed and unpaid family workers. As a crude approximation in this report, we assume that per worker wages for the self-employed and unpaid family workers are 30 per cent of the per worker wage for employees in order to estimate the labor compensation for total employment. The future review on this assumption affects TFP estimates directly through the revision of factor income shares and indirectly through the estimates of the ex post rate of return and thus the aggregate measure of capital services.

The right-hand chart of Figure B7.1 presents the labor income share (the ratio of compensation for employees to the basic-price GDP) based on the official national accounts (including author adjustments in basic-price GDP for some countries) in 15 Asian countries and the US in 2010. There is a large divergence in labor income share for employees among the Asian countries. Roughly, we find two groups: countries with an approximately 50 per cent share and countries with an approximately 30 per cent share of compensation for employees. This does not necessarily reflect the differences in the number of employees to total employment. The left chart provides the employee share to total employment. Although Malaysia has a high employee share of 78 per cent, the labor income share is only 28 per cent.

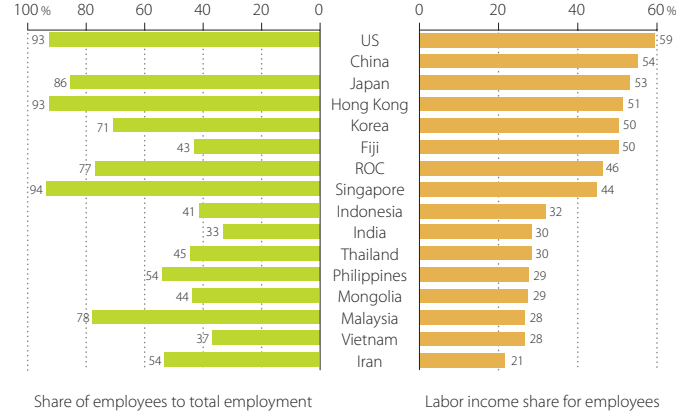

Figure B7.1 Labor Income Share for Employees, 2010

Sources: Official national accounts in each country, including author adjustments.

Figure B7.2 gives the sensitivity of TFP estimates by changing the factor income share during the period 1970–2010. In general, the growth rate of capital input is higher than that of labor input, so the higher income share of labor gives higher estimates in TFP growth. In other words, labor productivity is improved much faster over a given period than capital productivity, the growth of which tends to be frequently negative (see Figures 43 and 57). The TFP estimate reflects the improvement of labor productivity more when the labor income share increases. In Malaysia, with a TFP growth of 0.6 per cent on average during the period 1970–2010, the true estimate could be 1.1 per cent if the current labor income share is underestimated by 10 per cent.

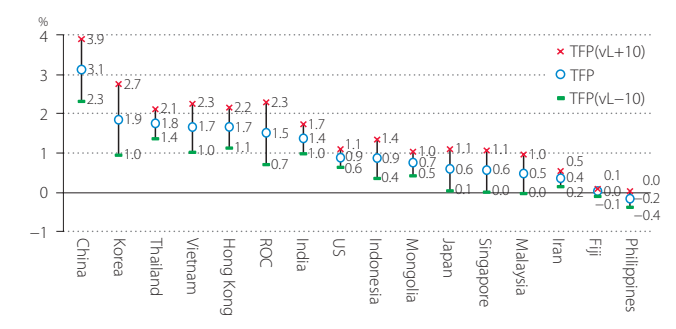

Figure B7.2 Sensitivity of TFP Estimates by the Change of Income Share, 1970–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986. The labor inputs for Fiji and Mongolia are defined by number of employment.

6 Industry Perspective

This chapter provides the industry origins of economic growth and labor productivity growth in Asian countries. Industry decomposition allows an insight into the source of a country's economic dynamics, which in turn determines its overall performance and characteristics, its strengths, and its vulnerabilities. On the one hand, a broad industry base reflects diversification and sophistication in the economy, and in turn is more resourceful in weathering economic shocks. On the other hand, a narrow-based economy is vulnerable to shocks and in turn more susceptible to volatility. Industry structure is a key indicator of an economy's stage of development. As a rough sketch, at one end of the spectrum are predominantly agricultural- and rural-based economies, while at the other end the agriculture sector is negligible and the service sector is the dominant economic base. In the middle is a stage where manufacturing may be the main driver of economic growth. As an economy matures, its depth and sophistication will increase and its resilience to economic shocks should accordingly be strengthened. Furthermore, the different composition of economic activities among countries is also one of the main sources of the huge gap in average labor productivity at the aggregate level, as observed in Chapter 5. By analyzing the industry structure of Asian economies, we can clearly trace the path of economic development and identify countries' respective stages based on their characteristics.[64]

6.1 Output and Employment

Table 6 in Section 3.2 introduces a country grouping according to stages of development (as measured by per capita GDP relative to the US). Table 14 regroups countries based on the same set of criteria as in Table 6, but applied to countries' 2010 income levels. The difference in countries' relative per capita GDP between the two tables reflects the impact of their catch-up efforts since 1970 or the beginning year of the data series in this report for the countries concerned.

Comparing Table 14 with Table 6, we observe that 12 Asian countries have moved up in income group, whereas ten have been stagnant and five have stayed in the top income group. Among them, the most upwardly mobile countries are the ROC and Korea, both in the fast catch-up group, which have moved up two income levels during the past four decades to join Japan in the top income group. Singapore and Hong Kong have also moved up one income group to the L1 level. Malaysia and Thailand have moved up one level to L2. Both China and India have moved up to L3, although they are in different catch-up groups. Indonesia, the Lao PDR, Vietnam, and Pakistan (in Group-C2) have also improved their income level to L3. This means that the number of lowest-income countries has been reduced from ten at the start of the period to four (Cambodia,[65] Myanmar, Bangladesh, and Nepal) by 2010. As expected, there were few movements in country groups with little or no catch-up. Only Pakistan moved up one level (as it marginally crossed the boundary of income groups from 4.9 per cent to 5.7 per cent that of the US), whereas Saudi Arabia and Bahrain are the only two countries that have moved backward in their income level from L1 to L2.

64: Constructing the industry origins of labor productivity growth requires confronting a large volume of data from different sources. Issues of data inconsistency arising from fragmentation of national statistical frameworks can present enormous hurdles to researchers in this area. The industry data in this chapter are mainly based on official national accounts. Where back data are not available, series are spliced together using different benchmarks and growth rates. Data inconsistencies in terms of concepts, coverage, and data sources have not been fully treated. Levels of breakdown are deliberately chosen to minimize the potential impact of these data inconsistencies. In this sense, APO industry data should be treated as a work in progress and it is difficult to advise on data uncertainty. We will further develop and examine these data issues in the near future. Readers should bear these caveats in mind in interpreting the results.

65: The reason for Cambodia's failure to move up in income group is its short time series, which starts in 1987. Therefore, despite its average catch-up speed of 3.3 per cent per annum, it has had less time to catch up than other countries with series starting from 1970. Between 1987 and 2008, Cambodia's relative income moved up from 2.3 per cent to 4.6 per cent of the US level.

Table 14 Country Groups Based on the Current Economic Level and the Pace of Catch-Up

——Level and average annual growth rate of GDP at constant market prices, using 2005 PPPs

Per capita GDP level to the US in 2010	Annual rate of catch-up to the US			
	(C1) >3%	(C2) 1% <–< 3%	(C3) 0% <–< 1%	(C4) <0%
(L1) 60% <	ROC, Korea, Singapore	Hong Kong, Oman	Japan, EU15	Brunei, Kuwait, Qatar, UAE, Australia
(L2) 20% <–< 60%		Malaysia, Thailand		Iran, Bahrain, Saudi Arabia
(L3) 5% <–< 20%	China	India, Indonesia, Lao PDR, Sri Lanka, Vietnam	Mongolia, Pakistan	Fiji, Philippines
(L4) < 5%	Cambodia	Myanmar	Bangladesh, Nepal	

Sources: Official national accounts in each country, including author adjustments.
Note: The annual catch-up rates are based on the data during 1970–2010. The starting years for some countries are different due to data availability: Cambodia (1987–), the Lao PDR (1984–), and Nepal (1974–).

Countries at the low rungs of the development ladder tend to have a bigger agriculture sector as a share of value added.[66] Figure 65 shows the industry composition[67] of the Asian economies in 2009, and indicates a broad negative correlation between the share of the agriculture sector and the relative per capita GDP against the US. Half of the Asian countries compared have an agriculture sector accounting for over 10 per cent of total value added, and they all have a relative per capita GDP that is 20 per cent below that of the US. Among them, the three countries with the biggest agricultural share are all in the lowest income group (i.e., with a per capita GDP less than 5 per cent that of the US). In contrast, the agriculture sector is 10 per cent or less of the total value added for Group-L2 countries, compared to 3 per cent or less for Group-L1 economies. In particular, agriculture accounts for less than 1 per cent in the US, while it is negligible in Hong Kong and Singapore. Note also how finance, real estate, and business activities grow in weight as we move up income levels. The finance sector is especially prominent in Hong Kong (38 per cent), Singapore (30 per cent), and the US (33 per cent). Mining is what defines the oil-exporting countries, typically accounting for over 40 per cent of total value added, except in Bahrain (22 per cent), Iran (15 per cent), and the UAE (28 per cent). These countries have managed to diversify away from the dominance of mining. Finance is the biggest sector in Bahrain, accounting for 27 per cent of total value added, whereas it is the second largest sector (17 per cent) in the UAE, following mining.

Manufacturing is a key sector in propelling countries to make a leap in economic development. It accounts for around 20 per cent or above in nine of the 29 Asian countries compared. Among them, manufacturing is the largest sector in China and Thailand, equivalent to around 30 per cent of total value added, while it accounts for a quarter or more in Korea, the ROC, Malaysia, and Indonesia. At the other end are eight countries with manufacturing accounting for less than 10 per cent of total value

66: In Chapter 5, GDP is adjusted to be valued at basic prices (including our estimates, if the official estimates at basic prices are not available). However, the definition of GDP by industry differs among countries in this chapter due to data availability. GDP is valued at factor cost for Fiji, India, and Pakistan; at basic prices for Cambodia, Hong Kong, Korea, the Lao PDR, Mongolia, Nepal, and Singapore; at producers' prices for Bangladesh, the ROC, Iran, and the Philippines; and at market prices for Indonesia, Japan, Malaysia, Sri Lanka, Thailand, and Vietnam.

67: The nine industries are 1–agriculture; 2–mining; 3–manufacturing; 4–electricity, gas, and water supply; 5–construction; 6–wholesale and retail trade, hotels, and restaurants; 7–transport, storage, and communications; 8–finance, real estate, and business activities; and 9–community, social, and personal services. See Appendix A.5 for the concordance with the International Standard Industry Classification of All Economic Activities (ISIC), Revision 3.

added. Among them, five are oil-exporting countries and the other three are Hong Kong (2 per cent),[68] Mongolia (7 per cent), and Nepal (6 per cent). These compare with the values for the US at 11 per cent and Australia at 9 per cent.

Figure 66 shows the breakdown of the manufacturing sector, consisting of nine sub-industries, for 17 selected Asian countries and the US.[69] The dominance of machinery and equipment in Asian manufacturing can be clearly seen, particularly in the ROC and Singapore (close to 60 per cent of manufacturing's total value added), and Korea (50 per cent) and Japan (43 per cent). These compare with 39 per cent in the US. At the other end are countries dominated by light manufacturing (e.g., the food products, beverages, and tobacco products sector in the Philippines, Sri Lanka, Fiji, and Mongolia, and the textiles, wearing apparel, and leather products sector in Cambodia and Bangladesh). Coke, refined petroleum products, chemicals, rubber, and plastic products are also a prominent subsector, not least in Kuwait, where it accounts for two-thirds of the country's manufacturing value added.

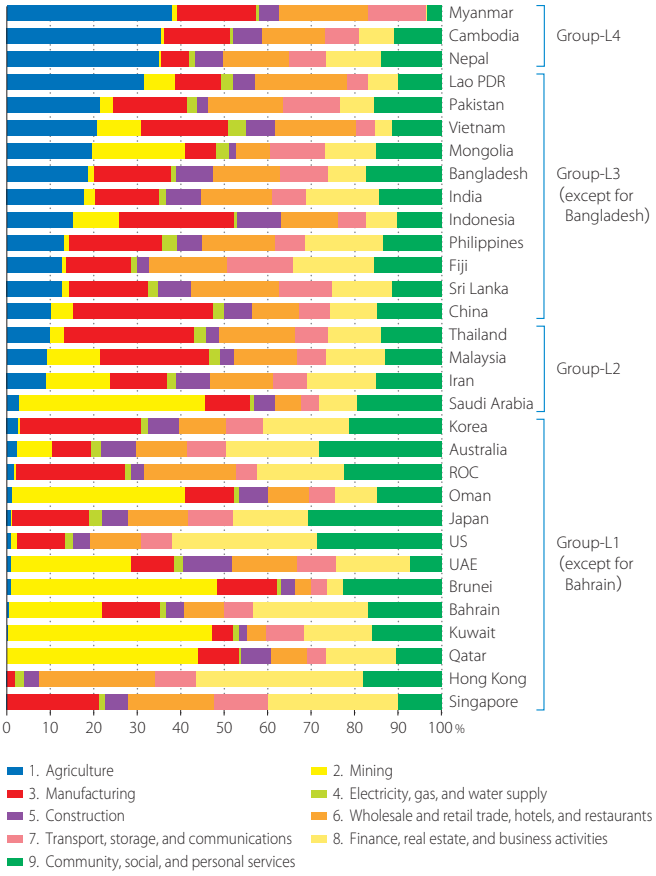

Figure 65 Industry Shares of Value Added, 2009

Sources: Official national accounts in each country, including author adjustments.

Figure 67 shows the industry shares of value added and employment by the four country groups based on 2010 income levels, compared with the Asia29 average and the US for the years 1980, 1990, 2000, and 2009.[70] The first thing to note is that in 2009, the service sector accounts for the largest share of total value added in all country groups, independent of their economic development.[71] That said, Group-L1 has always had the biggest service sector among all Asian countries, and this has become much more distinctive as the weight of the economy in this group continues to shift heavily toward services over time. By 2009, the service sector accounted for 70 per cent of total value added in Group-L1, compared to 81 per cent in the US and 52 per cent in Group-L2.[72] The weight of the service sector

68: It reflects a process of manufacturing hollowing out of Hong Kong to the hinterland of China.

69: Manufacturing consists of nine sub-industries: 3.1–food products, beverages, and tobacco products; 3.2–textiles, wearing apparel, and leather products; 3.3–wood and wood products; 3.4–paper, paper products, printing, and publishing; 3.5–coke, refined petroleum products, chemicals, rubber, and plastic products; 3.6–other non-metallic mineral products; 3.7–basic metals; 3.8–machinery and equipment; and 3.9–other manufacturing. See Appendix A.5 for the concordance with ISIC, Revision 3.

70: The group averages as industry share of value added are based on a country's industry GDP, using exchange rates for the whole economy without consideration of the differences in relative prices of industry GDP among countries.

71: The service sector is defined in this *Databook* as 6–wholesale and retail trade, hotels, and restaurants; 7–transport, storage, and communications; 8–finance, real estate, and business activities; and 9–community, social, and personal services.

is similar in Group-L3 and Group-L4 at 46–47 per cent. This reflects the relative importance of manufacturing to the former and agriculture for the latter at their particular stages of development.

Second, Asia29 is still a region dominated by agriculture as far as employment is concerned, despite its downward trend. In the past three decades, the agricultural employment share for Asia29 dropped from 62 per cent in 1980 to 41 per cent in 2009, while its share in total value added rose from 6 per cent in 1980 to 10 per cent in 2009, implying that agriculture is getting more labor-efficient. In the past three decades, the value-added share of agriculture in Group-L3 was more than halved from 31 per cent in 1980 to 13 per cent in 2009, with the most

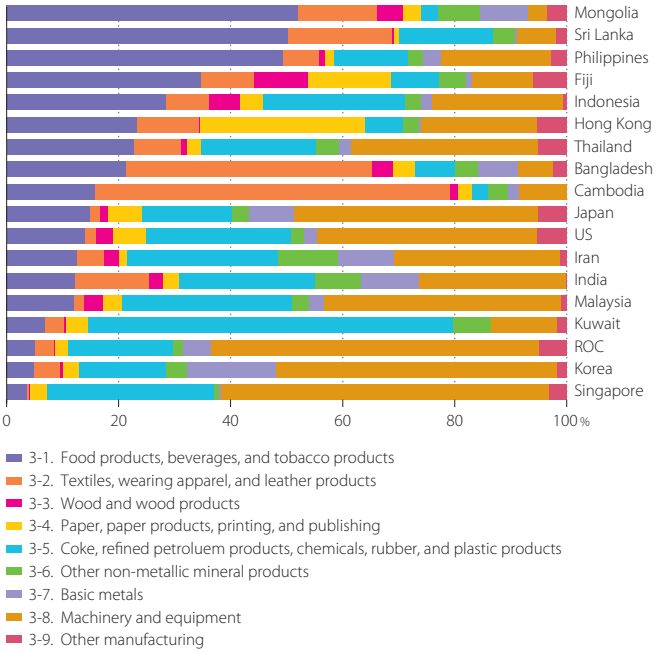

Figure 66 Industry Shares of Value Added in Manufacturing, 2009

Sources: Official national accounts in each country, including author adjustments.

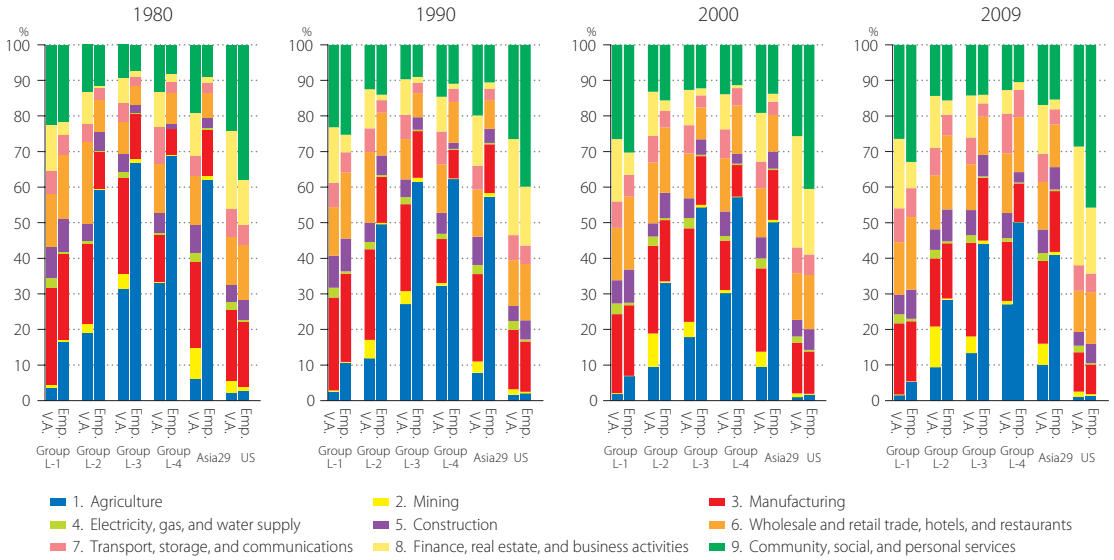

Figure 67 Industry Shares of Value Added and Employment by Country Group, 1980, 1990, 2000, and 2009

Sources: Official national accounts in each country, including author adjustments.

72: If Figure 65 was to rank by the size of the service sector, Hong Kong would top the table at 92.6 per cent, followed by the US (80.7 per cent), and other Group-L1 countries, namely the ROC (68.5 per cent), Japan (72.1 per cent), and Singapore (72.1 per cent). Fiji is an exception, with a large service sector share (67.2 per cent) relative to its per capita GDP level.

rapid shift out of the sector taking place in the 1990s; employment in the sector was also cut by one-third over the same period. The least well-off countries, in contrast, have not been as successful in diversifying away from agriculture, which accounted for 27 per cent of total value added and 50 per cent of employment in 2009, compared with 33 per cent and 69 per cent, respectively, in 1980. In the meantime, the richest economies continued to squeeze out agriculture even though it had a share of only 3 per cent in total value added and 17 per cent in total employment in 1980. By 2009, the figures had fallen to 2 per cent and 5 per cent, respectively.

Comparisons of the value added and employment shares also reveal some interesting facts. Agriculture is the only industry sector that consistently has a disproportionately higher employment share than justified by its share in value added across all country groups. This suggests that agriculture is still highly labor-intensive and/or there may be a high level of underemployment in the sector in Asia, both of which imply that the labor productivity level is low compared to other industry sectors.[73] Thus, countries with a big agriculture sector often have low per capita GDP, and shifting out of agriculture will help boost economy-wide labor productivity. The US is an exception, where its agricultural value-added share and employment share are similar, suggesting that labor productivity in this sector is higher than experienced by Asian countries. The reverse is true for the sector of finance, real estate, and business activities, which often generates a much bigger value added share than suggested by its employment share. In 2009, the sector accounted for 33 per cent of total value added generated by 19 per cent of employment in the US, and 14 per cent and 3 per cent, respectively, in Asia29. While the value-added share of the sector has grown by 50 per cent in the US over the past three decades, it has only grown by 20 per cent in Asia29.

Third, the industry structure in Asian countries differs from that in the US in the relative importance of manufacturing, even in Group-L1 countries, where manufacturing accounts for 20 per cent of the economies' value added, compared with 11 per cent in the US in 2009. The US economy is highly skewed toward the service sector, accounting for 81 per cent of the total value added, compared with an average of 70 per cent in Group-L1 countries. Especially, its share of finance, real estate, and business activities at 33 per cent is much larger than the share in Group-L1 countries, at 20 per cent. This suggests that Asian economies could experience further deindustrialization and a shift in prominence toward services as they continue to mature. The relative prominence of manufacturing in the Asian regional economy as a whole is reflected in the fact that income groups are not filtered out by the size of a country's manufacturing sector.[74] In Asia, the manufacturing employment share is typically smaller than the value-added share that it generates. Furthermore the value-added share of the sector has been shrinking in the high-income groups (i.e., Group-L1 and Group-L2) whereas it has been relatively stable in Group-L3 countries and slowly expanding in Group-L4, reflecting their different development stages.

Figure 68 shows how the share of the agriculture industry in total value added shrank over time in the Asian economies. This could reflect the actual decline in agricultural output and/or the relatively rapid expansion in other sectors. Despite the wide spread, the downward trend is unmistakable, even for Group-L4 countries. The share of the agriculture sector displays a long-term declining trend in all countries, albeit at different paces and at different starting times. Looking at the available data, the share of agriculture in most Asian countries (excluding the oil-exporting countries) clustered around

73: Gollin, Parente, and Rogerson (2004) and Caselli (2005) demonstrate the negative correlation between employment share of agriculture and GDP per worker. They show that the agriculture sector was relatively large in less well-off countries and agricultural labor productivity was lower than that in other sectors.

74: If Figure 65 was to rank by the size of the manufacturing sector, China would lead with a share of 32.3 per cent, followed by Thailand and Korea at 29.8 per cent and 27.8 per cent, respectively.

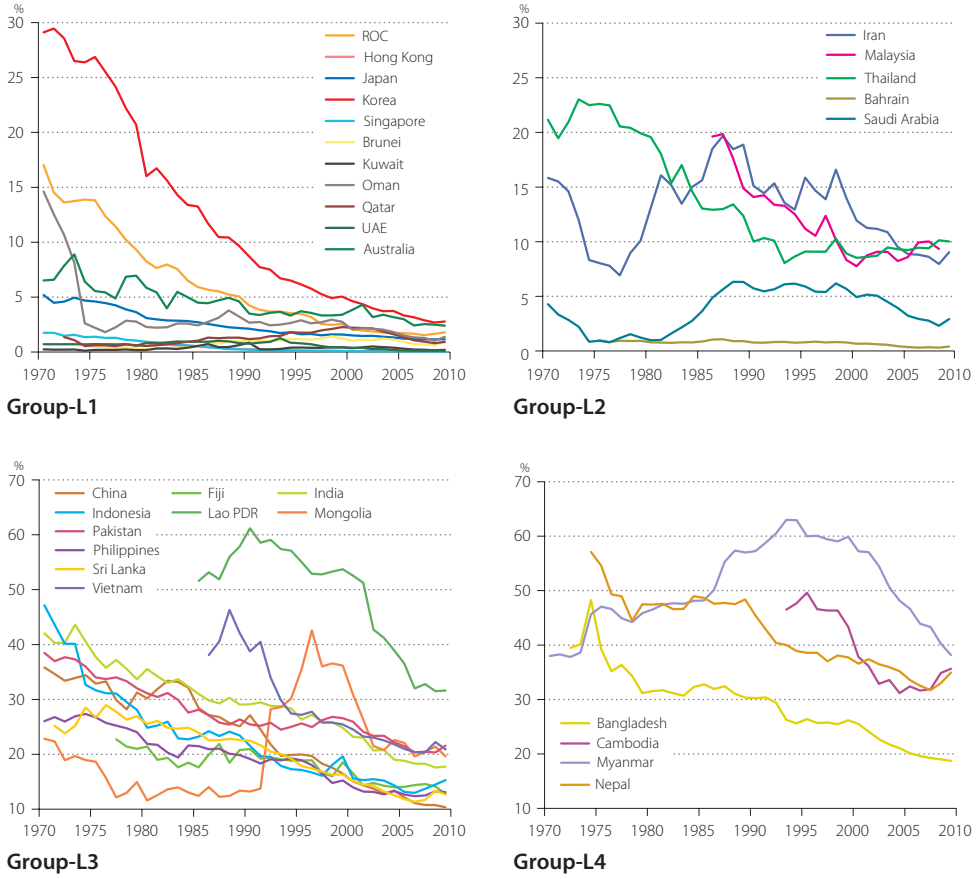

Figure 68 Long-Term Trends of Value Added Share in the Agriculture Sector, 1970–2009

Sources: Official national accounts in each country, including author adjustments.

the 30–50 per cent band in the 1970s, trending down to the 10–20 per cent band by 2009. Vietnam and Mongolia are two countries where the agriculture sector experienced similar relative decline but within a much shorter time span (from the late 1980s and mid-1990s, respectively). The relative decline of agriculture was most rapid in Korea, from 29 per cent of total value added in 1970 to 2.7 per cent in 2009. In many countries, the share of the agriculture sector was more than halved between 1970 and 2009: for example, from 47 per cent to 15 per cent in Indonesia, from 42 per cent to 18 per cent in India, and from 39 per cent in 1972 to 19 per cent in Bangladesh. In China, the share of this sector also significantly declined, from 36 per cent in 1970 to 10 per cent in 2009.

Despite the relative decline of agriculture's share in total value added, employment in the sector for Asia as a whole still accounted for 41 per cent of total employment in 2009. Figure 69 shows countries' industry shares in total employment, and ranks them by size of employment in the agriculture sector.[75] Group-L4 and Group-L3 countries plus Thailand cluster at the top end in Figure 69, with the share of agricultural employment ranging from 34 per cent (Sri Lanka) to 75 per cent (Nepal). In contrast, the service sector accounts for the biggest share in total employment in Group-L1 countries, ranging

75: Data for the Lao PDR and Myanmar are unavailable for Figure 69.

from 55 per cent (UAE) to 87 per cent (Hong Kong); Qatar is the on-ly exception with a share of 40 per cent.

The trend of employment share over time (Figure 70) suggests that the relative decline in the share of agriculture in total value added has been accompanied by a downward trend in its share in total employment. This trend is unmistakable in most countries plotted in Figure 70. However, the decline in share does not always reflect an actual fall in employment for the agriculture sector; rather, it could reflect total employment rising faster than em-ployment in agriculture. Countries that have been experiencing a consistent fall in actual employment in the agriculture sector are, for example, the ROC, Hong Kong, Japan, and Korea, whereas in Cambodia, India, Iran, Nepal, and Pakistan, actual employment has been rising. Other countries such as Thailand, Indonesia, Singapore, Malaysia, and Vietnam have no established trend in employment growth. China, however, has seen actual employment in agriculture falling since the turn of this millennium.

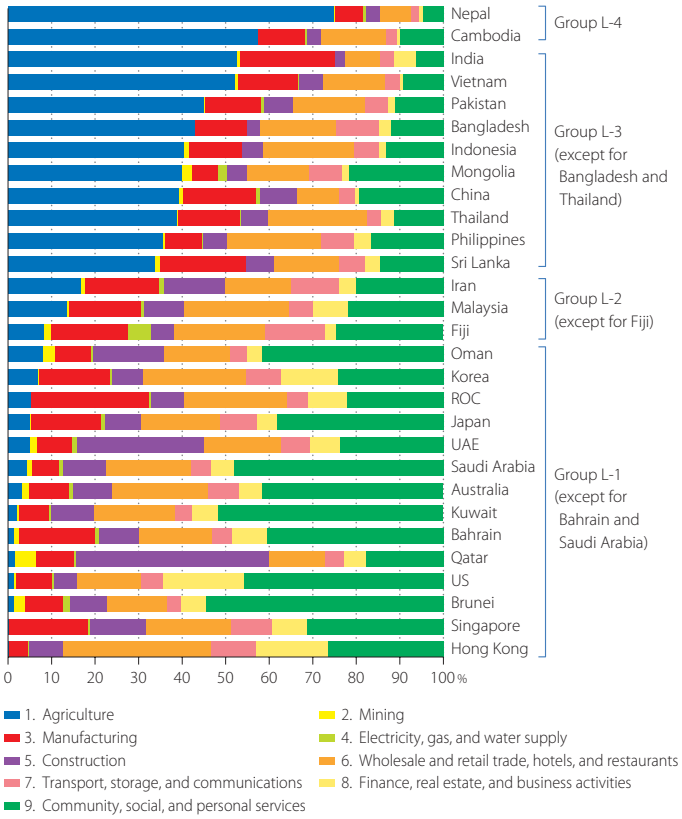

Figure 69 Industry Shares of Employment, 2009

Sources: Official national accounts in each country, including author adjustments.

As shown in Figure 70, the decline in agricultural employment share has been rapid in some countries.[76] Between 1970 and 2009, the employment share in agriculture shrank from 50 per cent to 7 per cent in Korea and from 20 per cent to 5 per cent in Japan. Employment in agriculture also fell rapidly in the ROC, from 25 per cent in 1978 to 5 per cent in 2009. In all these countries, the decline reflects an actual fall in employment in the agriculture sector. In China, the share has declined from 71 per cent in 1978 to 39 per cent in 2009.

Manufacturing is a main absorption sector for workers who have been displaced from the agriculture sector, especially in the initial stages of economic development. Figure 71 traces the time path of the growth rates of GDP and employment in combination in manufacturing for some selected Asian countries and the US for the past four decades. Each dot represents the average annual growth rate in the 1970s, 1980s, 1990s, and 2000s. If manufacturing GDP and employment grow at the same rate, it will be on a 45° line through the origin running from the lower left to upper right quadrants. In the US

76: Nepal's employment by industry is constructed by interpolating benchmark data taken from its labor force survey as well as its population census. Figure 69 indicates that its share of agriculture has increased since 1999. This reflects the employment share of agriculture at 66 per cent in the population census of 2001 and its share of 74 per cent in the labor force survey of 2008.

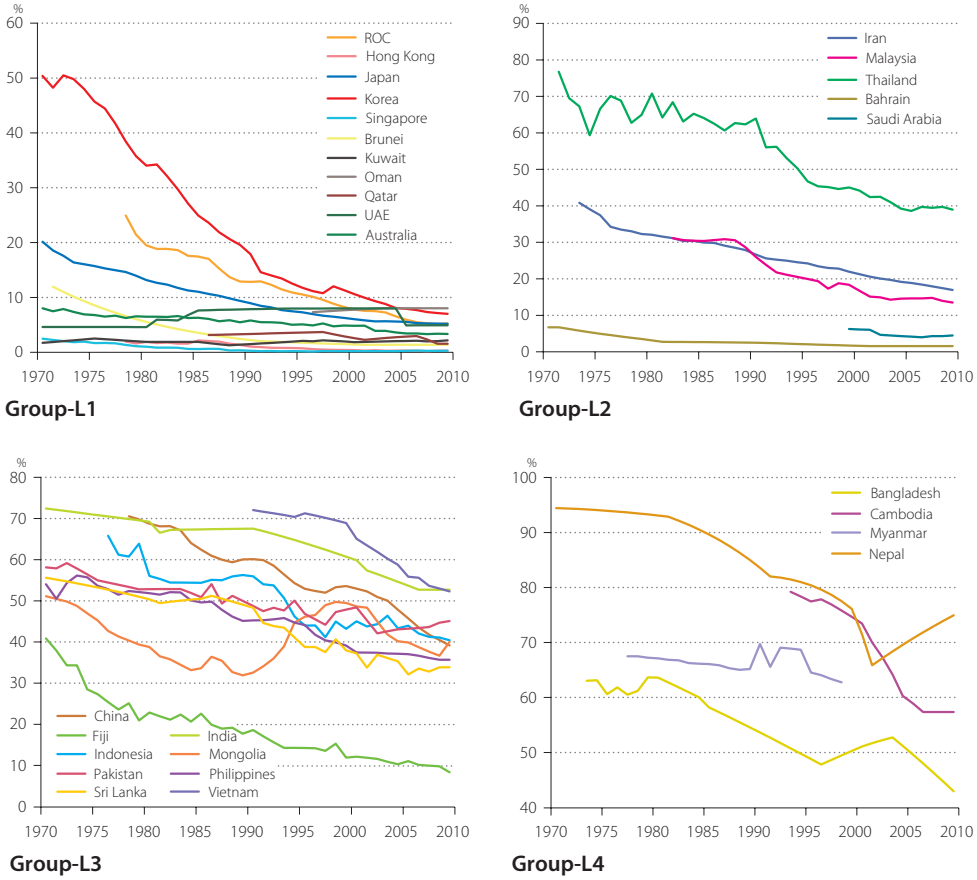

Figure 70 Long-Term Trends of Employment Share in the Agriculture Sector, 1970–2009

Sources: Official national accounts in each country, including author adjustments.

and Japan, growth in manufacturing employment has been relatively stable, whereas output growth has been fluctuating within a bigger range. In Korea, the growth of manufacturing output has been slowing the past four decades. Employment growth slowed more than output in the 1990s, implying a labor productivity boost in manufacturing during that period. The reverse is true for the 2000s. In the middle chart of Figure 71, Singapore, Indonesia, and Thailand experienced a slowdown in manufacturing output growth throughout the whole period. The bulk of the employment adjustment in Singapore took place in the 1970s when employment growth fell faster than output. Thereafter, employment growth has been relatively stable compared to output as manufacturing output growth continues to slow. In China, India, Pakistan, Sri Lanka, and Iran, the job creation role of manufacturing is still effective or becoming more important, and at times, output growth and employment growth go in different directions, meaning that employment growth is accelerating even when output growth is slowing.

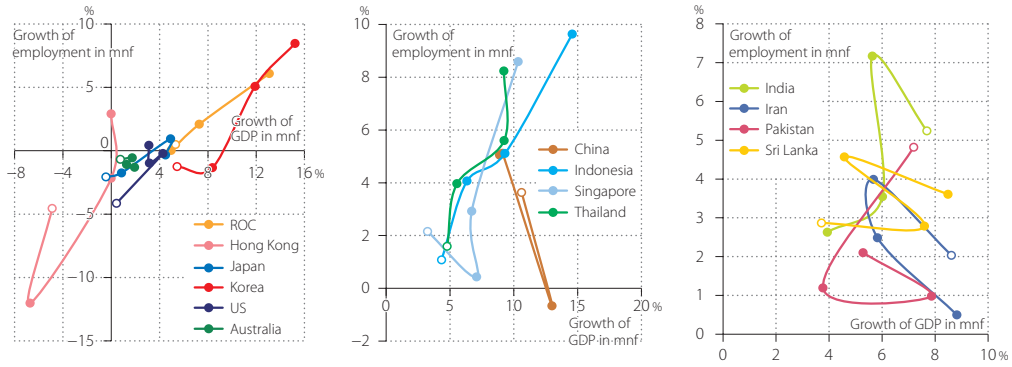

Figure 71 Job Creation in Manufacturing, 1970–2009
——Average annual growth rates of GDP at constant prices and number of employment

Sources: Official national accounts in each country, including author adjustments.
Note: Each dot represents the average annual growth rate in manufacturing (mnf) in the 1970s, 1980s, 1990s, and 2000s (2000–2009). The white dot indicates the rate in the latest decade.

6.2 Industry Growth

In Section 3.2, we see that, as a region, growth in Asia29 accelerated in the latest period 2005–2010, averaging 5.8 per cent per annum, up from 5.3 per cent in 2000–2005. China and India have been the two main drivers among the Asian economies, accounting for 70 per cent and 18 per cent of the region's growth during 2000–2010, respectively. However, looking at the industry composition, the origins of economic growth in China and India are quite different. For the period 1978–2004, Bosworth and Collins (2008) indicate that China's economic growth has been fueled by industry sector expansion,[77] whereas for India economic growth has been led by service sector expansion. Although our findings broadly support their conclusion, we also discern that the nature of growth in China may have started shifting more toward services in recent years.

The effect of extending our latest period to include 2009 has noticeably pulled down the averages for this period. The adverse impact of the global financial crisis has been significant for most countries and deep in some, turning the period atypical for comparisons. Our results show that manufacturing had been the biggest contributor to economic growth in China until the 2000s when the service sector overtook manufacturing in this respect (Figure 72).[78] The gap between contributions of manufacturing and services was the widest in the early 1990s; it narrowed in the late 1990s until they switched over in relative importance in the 2000s, with manufacturing and services accounting for 34 per cent and 44 per cent of economic growth, respectively. In contrast, economic growth in India has always been dominated by services and this character of its growth is getting more pronounced over time. The contributions of manufacturing and services to economic growth were 16 per cent versus 64 per cent in 2000–2009, compared with 18 per cent and 51 per cent in 1985–1990. The increased prominence of the service sector was eroding not so much the weight of manufacturing but agriculture, the contribution of which shrank from 18 per cent in the late 1980s to 7 per cent in the latest period of comparisons. In the US and Australia, the main driver of growth has been services, contributing over

77: The industry sector in Bosworth and Collins (2008) is equivalent to the industry groups 2–5 in this report.
78: The Törnqvist quantity index is adopted for calculating the growth of real GDP. Using this index, we can decompose the growth of real GDP into the products of contributions by industries:
$\underbrace{\ln\left(GDP^{t} / GDP^{t-1}\right)}_{\text{Real GDP growth}} = \sum_{j} \underbrace{(1/2)\left(s_j^{t} + s_j^{t-1}\right) \ln\left(Q_j^{t} / Q_j^{t-1}\right)}_{\text{Contribution of an industry } j}$ where Q_j^t is real GDP of an industry j in period t and s_j^t is the nominal GDP share of an industry j in period t.

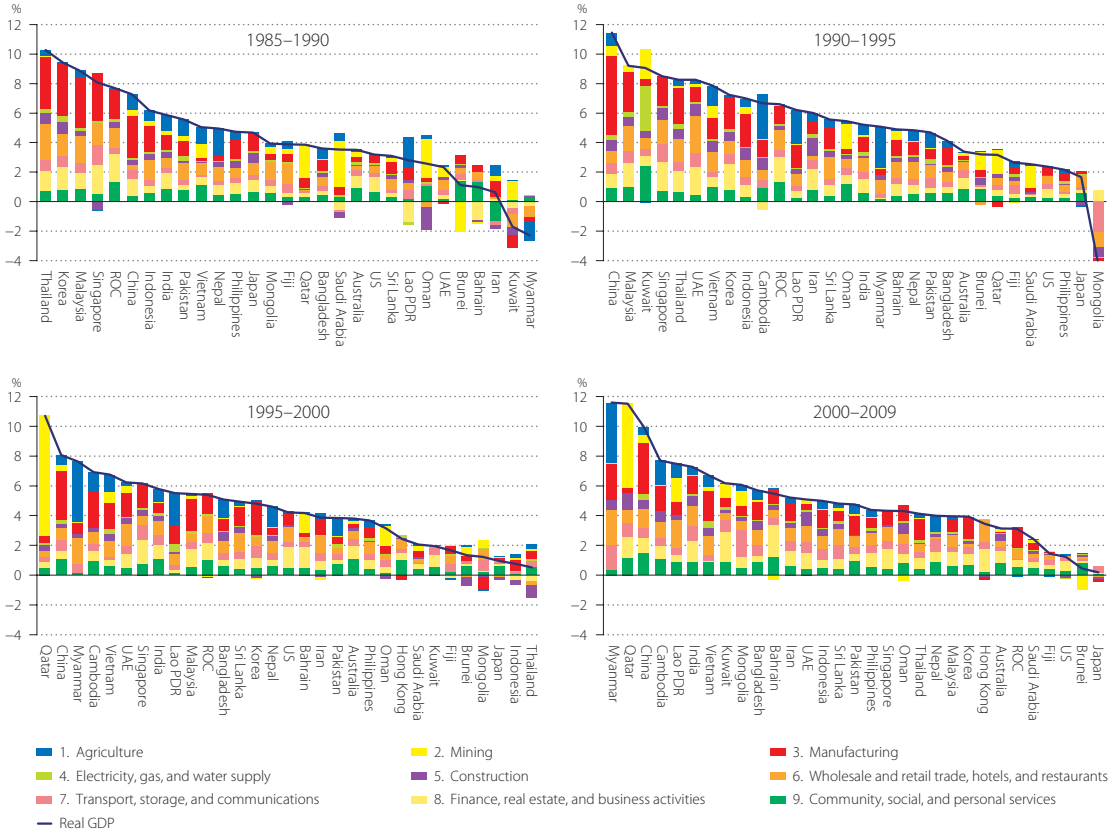

Figure 72 Industry Origins of Economic Growth, 1985–1990, 1990–1995, 1995–2000, and 2000–2009
——Industry decomposition: Average annual growth rate of GDP at constant prices

Sources: Official national accounts in each country, including author adjustments.

70 per cent during all the periods compared. The contribution of manufacturing to economic growth in Australia has been under 10 per cent while in the US, the share was between 15–22 per cent before falling to 5.5 per cent in the latest period.

In the second half of the 1980s, manufacturing was a clear driver behind the fastest-growing countries in Asia (i.e., Thailand, Korea, Malaysia, Singapore, the ROC, and China), contributing between 2 and 3.5 percentage points to economic growth. Such a pattern was not repeated in the subsequent periods of comparisons. Only China with a significant manufacturing contribution manages to be among the fastest-growing countries in the later periods of comparisons, whereas the main growth driver has been mining in Qatar and agriculture in Myanmar. Manufacturing has sustained its prominence in Thailand, Korea, and the ROC, contributing 34 per cent, 36 per cent, and 45 per cent to economic growth in 2000–2009, respectively, while its importance waned in Singapore from 27 per cent in 1990–2000 to 21 per cent in 2000–2009 (Figure 74). In Hong Kong, it has been a drag on economic growth in the past decade or so. During the Asian crisis, the most impaired economies were Thailand and Indonesia, and the sectors which bore the brunt were (1) construction, (2) wholesale and retail trade, hotels, and restaurants, and (3) finance, real estate, and business activities. In contrast, manufacturing played a significant role in bolstering the economy at the time (Figure 73).

The service sector plays an equally, if not more, important role in Asian economic growth. Services made the biggest contribution to economic growth in all Asian countries except Qatar (Figure 76).

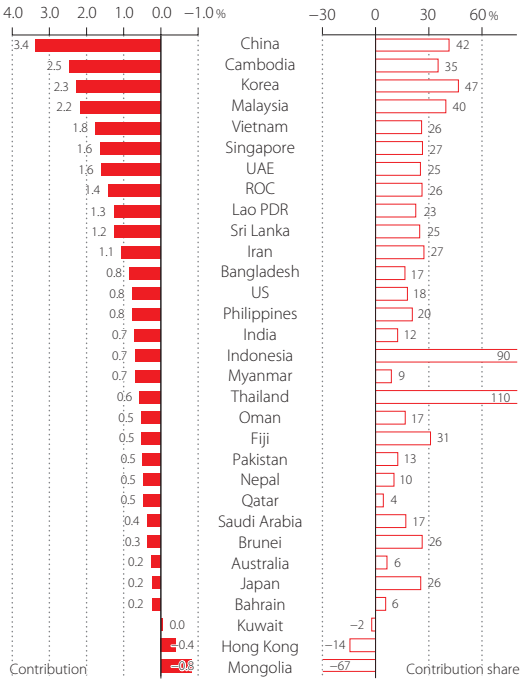

Figure 73 Contribution of Manufacturing to Economic Growth, 1995–2000

Sources: Official national accounts in each country, including author adjustments.

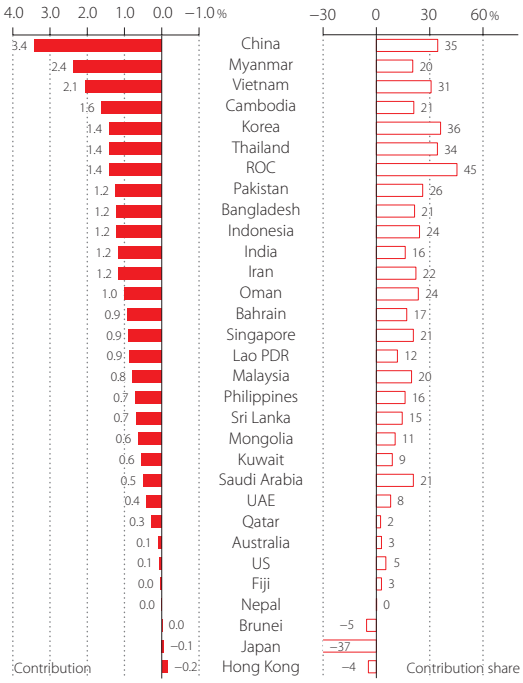

Figure 74 Contribution of Manufacturing to Economic Growth, 2000–2009

Sources: Official national accounts in each country, including author adjustments.

The story behind India's recent growth has been about services. Modern information and communication technology has allowed India to take an unusual path in its economic development, bypassing a stage when manufacturing steers growth.[79] Within the service sector, contribution is quite evenly spread among the sub-sectors. More recently, the iron/steel and motor vehicle sectors have been rapidly developing in India.[80] For further improvement in per capita GDP and to capitalize on the demographic dividend (see Box 2), expansion of labor-intensive manufacturing may be required for more job creation.

Economic growth in the Asian Tigers was also dominated by the service sector, albeit more so in Singapore and Hong Kong than in the ROC and Korea, where manufacturing remained a significant force. The service sector accounted for 56 per cent of growth in the ROC for the period 2000–2009, 54 per cent in Korea, 76 per cent in Singapore, and 107 per cent in Hong Kong (to counterbalance the negative contribution of 5 per cent by manufacturing and 4 per cent by construction) (Figure 76). These compare with 106 per cent in the US (to counterbalance the negative contribution of 13 per cent by construction). In the 2000s, growth in Hong Kong was highly skewed toward wholesale and retail trade, hotels, and restaurants, accounting for 42 per cent of growth. This compares with 23 per cent in Singapore and 19 per cent in the ROC. In contrast, the sector contributed only 6 per cent to Korea's

79: The computer software industry in India depends considerably on export demands. According to India's *Input–Output Table 2006–2007*, 82.0 per cent of the output in computer and related activities is exported. This export is equivalent to 14.8 per cent of total exports in India and is the second-largest export product (among 130 products in this table).

80: In 2011, India was the 6th largest producer (3.9 million) of motor vehicles (80.1), following Korea (4.7), Germany (6.3), Japan (8.4), the US (8.7), and China (18.4), based on a survey by OICA (International Organization of Motor Vehicle Manufacturers). India moved up in the rankings from 15th (0.8) in 2000 to 12th (1.6) in 2005.

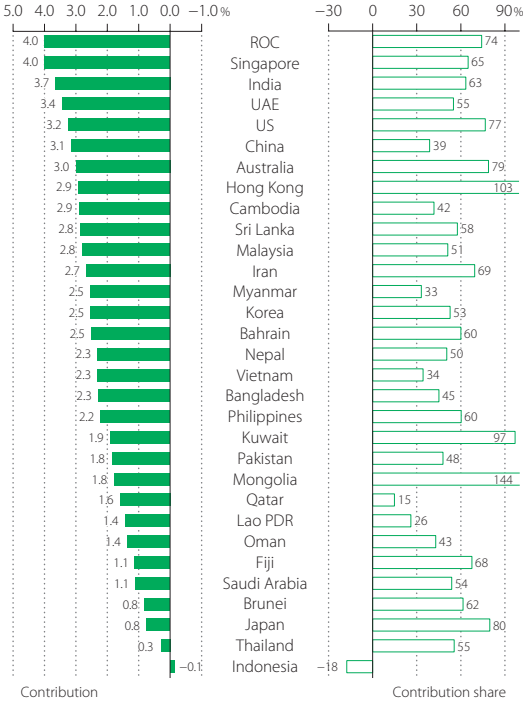

Figure 75 Contribution of Service Sector to Economic Growth, 1995–2000

Sources: Official national accounts in each country, including author adjustments.

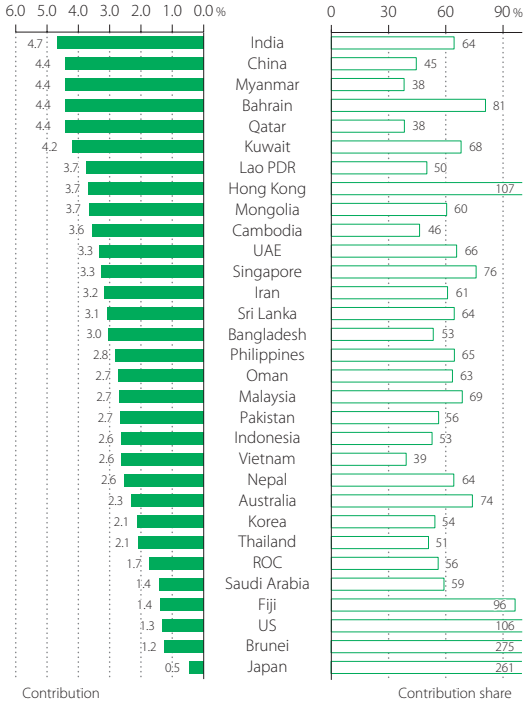

Figure 76 Contribution of Service Sector to Economic Growth, 2000–2009

Sources: Official national accounts in each country, including author adjustments.

growth over the same period (Figure 78). Finance, real estate, and business activities also played an important part, contributing 44 per cent to growth in Hong Kong, 31 per cent in Singapore, and 15 per cent in the ROC.

The oil-exporting countries have different industry structures from other countries, with their reliance on mining for growth. The sector is volatile in nature and could in turn give rise to big swings in these economies from one period to another. In 2000–2009, mining accounted for half of economic growth in Qatar, but less than 10 per cent in the UAE, Kuwait, and Saudi Arabia, and only 1.0 per cent in Iran, reflecting a drop in the demand toward the end of 2008 and 2009. (Excluding 2009, the figures are one-third in the UAE, Kuwait, and Saudi Arabia, and 14 per cent in Iran in 2000–2008.) Still, it has been a drag, and a significant one in some cases, on growth: its contribution was –6 per cent in Bahrain, –13 per cent in Oman, and –219 per cent in Brunei, reflecting a reduction in oil or gas production. These countries have to learn to diversify. Bahrain has been successful in branching into finance, real estate, and business activities, which accounted for 39 per cent of the 5.4 per cent overall growth over the same period. Oman also sustained growth of 3.9 per cent on average a year, 68 per cent of which originated from the service sector. Brunei has not managed as well, with dismal growth of 0.5 per cent on average a year between 2000 and 2009. Oil and gas production activities are also reflected in Mongolia and the Lao PDR, where mining accounted for 17 per cent and 21 per cent of overall economic growth, respectively, in the 2000s.

Japan's growth rate in the 2000s (at 0.7 per cent in Table 3) was one of the slowest in the region. As Japan was among those most affected by the global financial crisis, the industry contribution for this period is atypical for Japan. Figure 78 shows that Japan is the only country where the contribution of

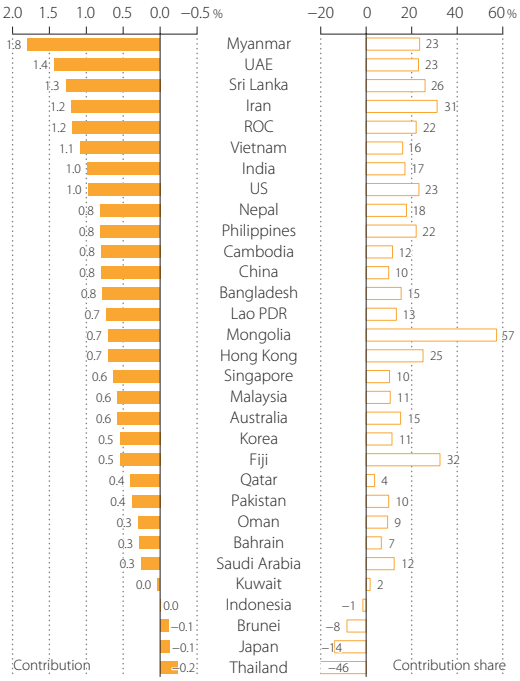

Figure 77 Contribution of Wholesale and Retail to Economic Growth, 1995–2000

Sources: Official national accounts in each country, including author adjustments.

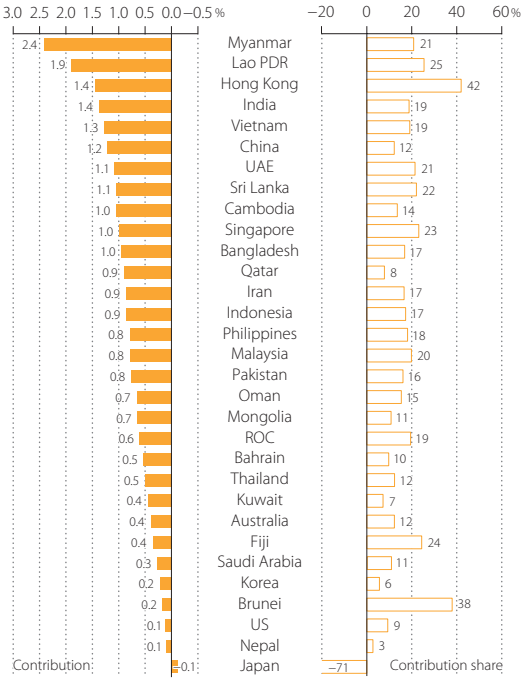

Figure 78 Contribution of Wholesale and Retail to Economic Growth, 2000–2009

Sources: Official national accounts in each country, including author adjustments.

wholesale and retail trade, hotels, and restaurants was negative (–71 per cent). In contrast, the contribution to growth is more evenly spread among the service sub-sectors in the US, with finance, real estate, and business activities leading with a 53 per cent contribution (Figure 72).

For some Asian countries, agriculture is still the biggest sector. The four countries where the agriculture sector has the largest share in total value added are Myanmar, Cambodia, Nepal, and the Lao PDR (Figure 65). For the period 2000–2009, agriculture in Myanmar, Nepal, and Cambodia had the highest contribution to economic growth among all Asian countries, accounting for 35 per cent, 26 per cent, and 22 per cent of growth, respectively.[81] In the latest period, agricultural output is still expanding in the majority of Asian countries, suggesting that the shrinkage in its value added share (Figure 68) over the recent period is more a result of rapid growth in other sectors than any actual contraction of the sector. The agriculture sector is contracting in the ROC, Fiji, Hong Kong, Japan, Qatar, and the UAE, with the deepest retrenchment (of –4.3 per cent) in Hong Kong (Table 15).

Comparing across the country groups in Table 15, Asia enjoyed more vibrant growth than the US in all sectors, noting that the US was more directly affected by the global financial crisis of 2008–2009. Overall construction retrenched in the US in the 2000s, while their growth has been the strongest in South Asia and GCC countries, at 8.6 per cent and 8.8 per cent a year on average respectively. Apart from construction, the other fast-growing sector in GCC countries and South Asia was transport,

81: In Myanmar, agriculture accounted for over 38 per cent of GDP in 2009. Since 1988, the government has continued its modest steps to liberalize the sector and marketing controls have been made less onerous. As a result, farm production has increased. According to official statistics, the quality of which has been questionable, this sector accounted for 34.7 per cent of GDP growth in 2000–2009.

storage, and communications (at over 10 per cent a year on average), probably reflecting their effort in building and upgrading infrastructure for their development needs. Finance, real estate, and business activities also enjoyed robust expansion at 9.0 per cent and 6.9 per cent a year on average in South Asia and GCC countries, respectively, compared with 2.0 per cent in the US and 4.0 per cent in Australia. For East Asia, mining is the sector that has enjoyed the most rapid growth at 10.1 per cent a year on average. Manufacturing has been growing at 6.7 per cent a year on average in Asia23 and 5.3 per cent in GCC countries, compared with under 1 per cent in both the US and Australia.

Table 15 Output Growth by Industry, 2000–2009
——Average annual growth rate of industry GDP at constant prices

	1. Agriculture	2. Mining	3. Manufacturing	4. Electricity, gas, and water supply	5. Construction	6. Wholesale and retail trade, hotels, and restaurants	7. Transport, storage, and communications	8. Finance, real estate, and business activities	9. Community, social, and personal services
Bahrain	1.4	−1.5	8.2	7.3	8.5	5.1	8.4	7.7	7.8
Bangladesh	3.2	7.9	7.3	6.8	7.3	6.5	7.3	4.3	5.4
Brunei	3.1	−1.6	−0.4	2.9	4.9	5.1	3.8	4.7	3.9
Cambodia	5.1	16.7	8.4	12.4	11.1	7.2	7.4	10.3	10.5
China	4.1	10.6	10.6	10.6	11.8	12.0	8.6	11.4	10.8
ROC	−0.1	−6.1	5.1	2.4	−1.8	3.0	2.4	2.4	2.5
Fiji	−1.0	0.8	0.3	0.3	1.4	2.1	2.2	1.6	2.3
Hong Kong	−4.3	−4.1	−4.7	1.8	−4.1	5.3	4.0	4.5	1.4
India	2.6	4.6	7.7	5.9	9.1	8.5	12.2	9.5	6.6
Indonesia	3.5	0.8	4.3	7.9	6.7	5.5	12.0	6.6	5.1
Iran	3.3	0.1	8.6	8.0	5.3	5.7	9.6	7.1	4.3
Japan	−1.5	−10.9	−0.4	−0.2	−3.1	−0.9	5.2	0.6	0.2
Korea	2.0	−0.3	5.3	5.5	2.5	2.0	4.8	3.8	3.7
Kuwait	3.0	2.4	8.3	15.3	8.2	8.2	14.1	12.6	5.7
Lao PDR	2.8	46.4	8.7	−0.8	5.6	10.7	9.0	8.6	11.3
Malaysia	3.0	0.5	2.6	4.3	2.4	6.2	5.7	6.9	5.4
Mongolia	2.8	5.5	8.0	4.1	4.1	6.1	14.3	7.1	4.0
Myanmar	8.3	13.2	20.0	10.8	19.3	10.9	17.1	23.5	12.1
Nepal	3.0	4.0	0.1	6.1	3.5	0.9	9.8	5.0	7.9
Oman	1.8	−1.0	11.5	11.3	21.2	7.6	12.0	6.5	5.4
Pakistan	2.9	5.9	7.2	−0.2	2.8	4.4	3.7	7.2	6.3
Philippines	3.1	10.7	2.9	3.8	3.7	4.9	7.3	5.9	4.1
Qatar	−1.7	10.6	4.2	5.4	21.6	14.6	28.3	13.2	12.0
Saudi Arabia	1.1	0.7	5.2	6.2	3.6	4.6	8.1	3.8	2.9
Singapore	0.1	0.0	3.2	3.7	2.4	5.5	3.6	5.1	4.0
Sri Lanka	2.4	11.8	3.7	6.1	5.9	4.4	7.9	5.6	4.1
Thailand	2.3	5.0	4.8	5.6	3.3	2.7	5.7	5.7	3.3
UAE	−2.6	0.8	3.9	9.5	10.2	5.8	9.7	6.6	7.1
Vietnam (regrouped)	3.6	2.3	10.1	12.5	8.8	7.4	8.8	1.3	7.9
APO20	2.5	1.5	3.7	3.2	2.8	3.7	7.1	4.2	2.5
Asia23	3.3	5.3	6.7	6.3	5.7	5.8	7.6	5.7	4.5
Asia29	3.2	3.9	6.7	6.4	5.8	5.8	7.7	5.8	4.5
East Asia	3.6	10.1	6.9	6.5	4.8	5.3	6.7	4.8	4.1
South Asia	2.6	4.9	7.5	5.0	8.6	7.7	10.3	9.0	6.4
ASEAN	3.6	1.4	4.5	6.1	5.6	5.2	7.9	5.9	4.8
GCC (reference)	0.5	1.7	5.3	8.7	8.8	6.0	10.6	6.9	4.5
US	3.5	0.8	0.4	−1.3	−4.0	0.8	3.4	2.0	1.1
Australia	1.5	2.6	0.7	1.4	6.8	3.0	3.7	4.0	2.9

Unit: Percentage.
Sources: Official national accounts in each country, including author adjustments.

Looking at countries individually, it is interesting to note that all sectors in China grew faster than those in India, except transport, storage, and communications, showing India's special strength. Industrial specialization in services has intensified in Hong Kong, with manufacturing hollowing out and agriculture, construction, and mining, all contracting at over 4 per cent a year on average. This process is probably a reflection of its economic integration with the Chinese economy following the handover in 1997: the two economies are evolving to complement each other. Manufacturing maintains its prowess as a fast-growing sector in Korea (5.3 per cent) and the ROC (5.1 per cent), while Singapore's relative strength is more evenly distributed across sectors. Growth has been weak in Japan all-round, partly reflecting the impact of the global financial crisis in 2009. Mining has been suffering badly, contracting by 10.9 per cent a year on average. Construction is also declining by 3.1 per cent on average a year. The strongest growth of 5.2 per cent in Japan has been experienced in transport, storage, and communications.

Figure 79 presents the sub-industry origins of average annual growth of manufacturing GDP for selected Asian countries for the periods 1995–2000 and 2000–2009.[82] Manufacturing in Asia has been

dominated by machinery and equipment, accounting for 40 per cent or more of overall manufacturing growth in half of the Asian countries compared. In Korea and the ROC, it was over 80 per cent. The food products, beverages, and tobacco products sub-sector is the largest contributor in the Philippines for both periods, accounting for 57 per cent of manufacturing output growth in 1995–2000 and rising to 80 per cent in 2000–2009. In Bangladesh and Cambodia, manufacturing growth has been dominated by the sub-sector of textiles, wearing apparel, and leather products, whereas in Kuwait, and to a lesser extent in Singapore and Malaysia, it is coke, petroleum, chemicals, rubber, and plastic products.

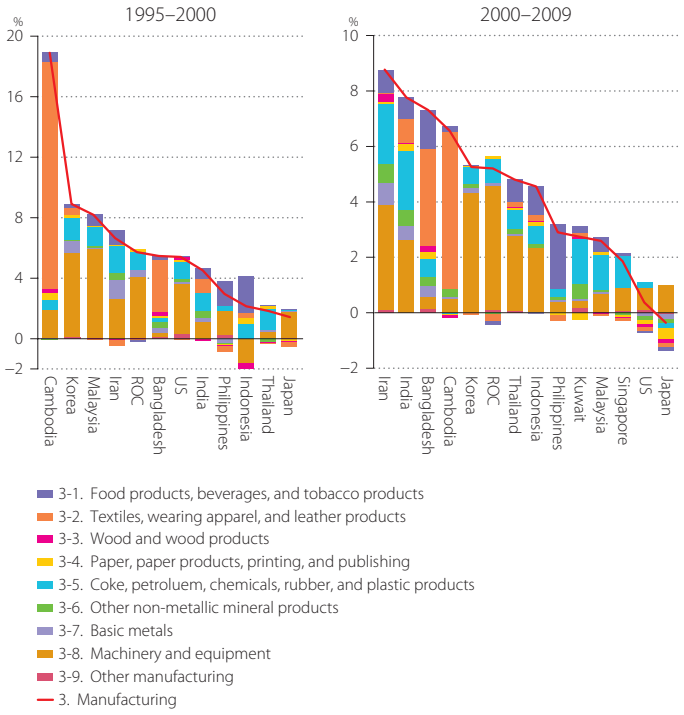

Figure 79 Industry Origins of Output Growth in Manufacturing, 1995–2000 and 2000–2009
——Sub-industry decomposition: Average annual growth rate of GDP at constant prices of manufacturing

Sources: Official national accounts in each country, including author adjustments.

Figure 80 contrasts industry contributions to economic growth for the periods 1995–2000 and 2000–2009, as well as between the US and Asian averages.[83] Even within such a short period, we can see that the industry structure of growth is changing. The first striking feature is the dominance of manufacturing in the Asian countries. Between 1995 and 2000, its contribution to economic growth in Asia23 was 32 per cent compared with 18 per cent in the US. Although its significance has fallen in recent years, it still accounted for 29 per cent of economic growth in Asia23 between 2000 and 2009, compared with 5 per cent in the US. This, however, masks the divergence within Asia. In the earlier period, manufacturing accounted for 37 per cent of growth in East Asia but only 13 per cent in South Asia. The corresponding figures were 33 per cent and 17 per cent in the 2000s, so the differential is narrowing. Another big difference between East Asia and South Asia was the contribution made by agriculture, at 5 per cent and 16 per cent, respectively, in the late 1990s. In the 2000s, its contribution was halved to 8 per cent in South Asia, although it was still twice as big as in East Asia. Over the same period, the contribution from construction increased by 50 per cent, from 6 per cent to 9 per cent in South Asia. The country group most dominated by manufacturing in the late 1990s was ASEAN, with a contribution of 39 per cent. Yet, in recent years manufacturing's

82: The Törnqvist quantity index is adopted for calculating the growth of real GDP of manufacturing. Using this index, we can decompose the growth of real GDP of manufacturing into the products of contributions by sub-industries of manufacturing:
$\underbrace{\ln\left(GDP^{t} / GDP^{t-1}\right)}_{\text{Real GDP growth of manufacturing}} = \sum_{j} \underbrace{(1/2)\left(s_j^{t} + s_j^{t-1}\right) \ln\left(Q_j^{t} / Q_j^{t-1}\right)}_{\text{Contribution of a sub-industry } j}$, where Q_i^t is real GDP of a sub-industry j in period t and s_i^t is the nominal GDP share of a sub-industry j in period t.

83: Asian averages are calculated using the Törnqvist index to aggregate the growth rates of industry GDP of each country based on the two-period average of each country's shares of industry GDP to the gross regional products as weights.

contribution was reduced to 25 per cent, while wholesale and retail trade, hotels, and restaurants increased from 10 per cent to 18 per cent. The latter also increased its weight in APO20, from 12 per cent to 16 per cent between the two periods compared. In the US, the finance, real estate, and business activities sub-sector made the biggest contribution in both periods, accounting for 33 per cent of economic growth in 1995–2000 and rising to 53 per cent in 2000–2009. In contrast, its contribution in Asia was 14 per cent in the period 2000–2009. Mining in GCC countries took a hit in 2008–2009 due to the downturn in the world economy. Consequently, the contributions of mining fell from 18 per cent to 16 per cent between the two periods while construction's share increased from 4 per cent to 11 per cent. Finance, real estate, and business activities became the biggest contributor to economic growth in GCC countries, with its share rising from 17 per cent to 19 per cent between the two periods.

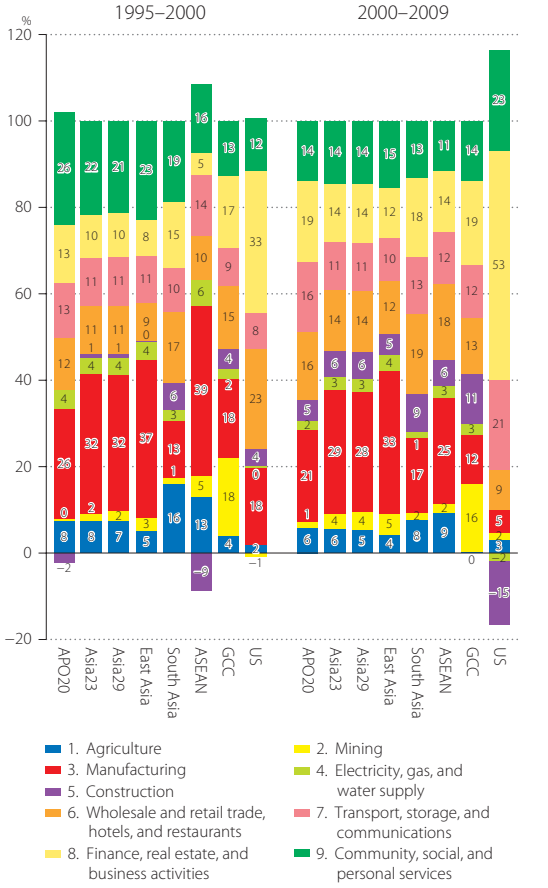

Figure 80 Industry Origins of Regional Economic Growth, 1995–2000 and 2000–2009
——Contribution share

Sources: Official national accounts in each country, including author adjustments.

The agriculture sector is much more significant in Asia23 than in the US, with a contribution of 8 per cent compared with 2 per cent for the period 1995–2000. In the 2000s, however, the relative significance of the agriculture sector in Asia23 fell to 6 per cent. Construction was hit hard in the ASEAN countries during the Asian financial crisis, pulling down economic growth by 9 per cent in the latter half of the 1990s. It bounced back subsequently and contributed 6 per cent to growth in the 2000s. The corresponding figures for Asia23 were 1 per cent and 6 per cent. The reverse was true in the US, where the contribution of construction was 4 per cent in the earlier period but fell to –15 per cent in the later period in the 2000s. The contribution of wholesale and retail trade, hotels, and restaurants was also high in the US. In 1995–2000, it accounted for 23 per cent of US economic growth compared with 11 per cent in Asia23. Though in 2000–2009 its contribution was reduced to 9 per cent in the US, its significance to economic growth rose to 14 per cent in Asia23.

Figure 81 presents industry contributions to regional economic growth in Asia29 during 2000–2009, decomposing Figure 7 in Section 3.1 into countries' industry origins.[84] In each industry contribution,

84: The average growth rate of the Asian economy for 2000–2009 is set at 100 per cent. Asian economic growth is calculated as the sum of the contributions over countries and industries:

$$\underbrace{\sum_x (1/2)\left(s_x^t + s_x^{t-1}\right)\sum_i (1/2)\left(s_{x,j}^t + s_{x,j}^{t-1}\right)\ln\left(Q_{x,j}^t / Q_{x,j}^{t-1}\right)}_{\text{Contribution of an industry } j \text{ in a country } x}$$

where $Q_{x,j}^t$ is real GDP of an industry j in a country x in period t, $s_{x,j}^t$ is GDP share of an industry j in a country x with respect to GDP of a country i in period t and s_x^t is GDP share of a country x with respect to the regional GDP in period t. All the industries whose contribution is more than 0.25 per cent are shown in Figure 81.

we present the top eight countries. The top four industries in terms of contributions to regional growth were manufacturing (28 per cent), wholesale and retail trade (14 per cent), finance, real estate, and business activities (14 per cent), and community, social, and personal services (14 per cent). A total of 28 per cent of Asian economic growth originated from the expansion of its manufacturing sector, two-thirds of which was accounted for by China. In other words, China's manufacturing sector alone accounted for nearly 19 per cent of the region's economic growth. This was followed by China's community, social, and personal services (7.9 per cent) and wholesale and retail trade, hotels, and restaurants (6.9 per cent).

Over a long period of four decades, we can see the shift of the industry origins of economic growth in countries (Figure 82). For the ROC and Korea, manufacturing has been a clear driving force behind economic growth on the whole. In the decade between the mid-1980s and the mid-1990s, however, the importance of manufacturing retreated in the ROC temporarily while the economy developed its service sector. Since the mid-1990s, the role of manufacturing in explaining growth in the ROC has increased again, though compared to its heydays of the 1970s and 1980s, the impact in terms of percentage points is much reduced.

Comparing the industry profiles of China and India over time, the differences in the nature of their growth can clearly be seen. In contrast to the dominance of

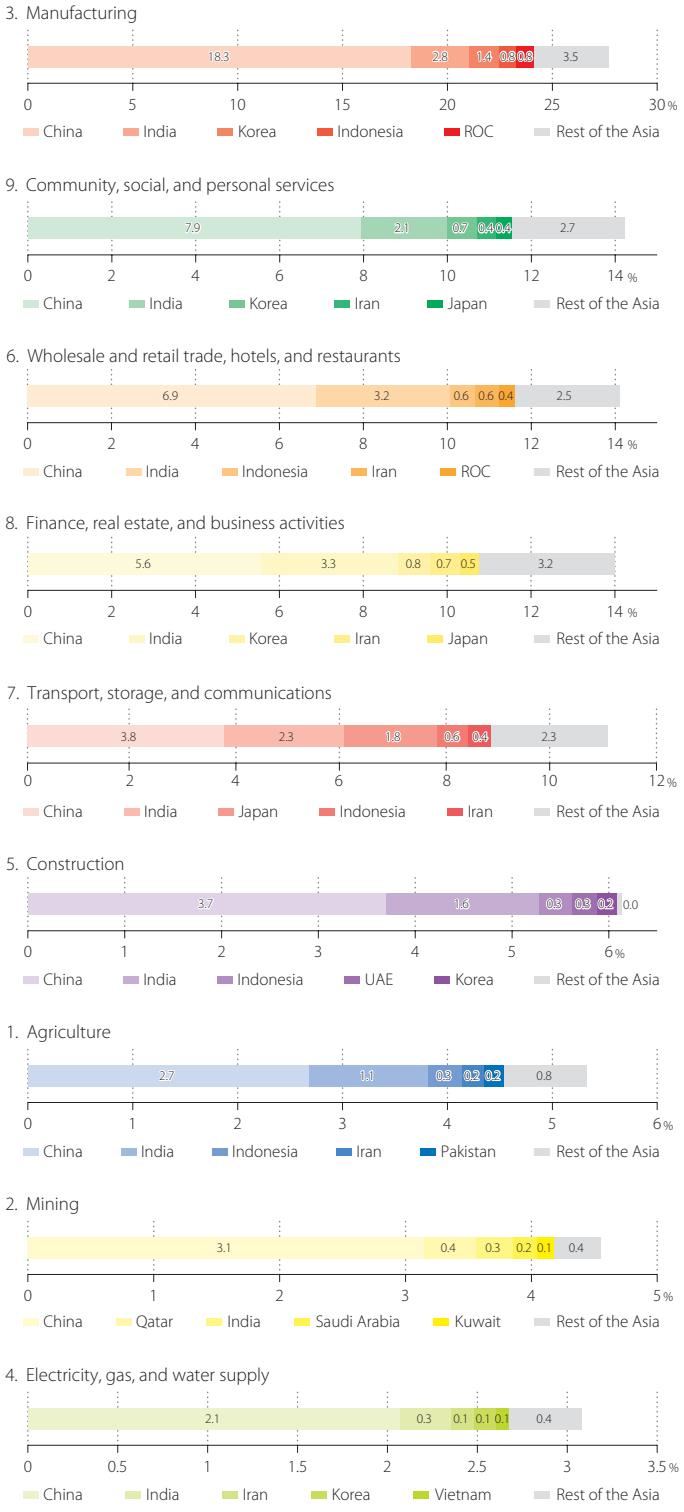

Figure 81 Industry Origins of Asian Economic Growth, 2000–2009

——Contribution to regional growth of GDP at constant prices, using 2005 PPPs

Sources: Official national accounts in each country, including author adjustments.


Bahrain
Bangladesh
Brunei
Cambodia
China
ROC
Hong Kong
India
Indonesia
Iran
Japan
Korea
Kuwait
Lao PDR
Malaysia
%
1971 1976 1981 1986 1991 1996 2001 2006
1. Agriculture
2. Mining
3. Manufacturing
4. Electricity, gas, and water supply
5. Construction
6. Wholesale and retail trade, hotels, and restaurants
7. Transport, storage, and communications
8. Finance
9. Community, social, and personal services
Real GDP

Figure 82 Industry Origins of Economic Growth, 1970–2009
——Industry decomposition: Average annual growth rate of GDP at constant prices

Sources: Official national accounts in each country, including author adjustments.

manufacturing in China (and in, for example, Korea, the ROC, and Japan in their similar development stages), manufacturing has never driven economic growth in India. Similarly, Australia has never been a country propelled by manufacturing. Over the years, agriculture has become less important in driving economic growth, while service industries gain significance in China. In Singapore, finance, real estate, and business activities, as well as wholesale and retail trade, hotels, and restaurants are important driving industries alongside the manufacturing sector. With the limited data we have, Hong Kong has been a clear service-driven economy in recent years. The lack of diversification of the oil-exporting countries cannot be missed. Historically, the preponderance of the mining sector underlay the volatility faced by these economies. Yet, in recent years the GCC countries have been making efforts in diversifying, especially into the service sector, with different degrees of success. Bahrain and Oman are leading the way and have yielded results. The largely agricultural countries are Myanmar, the Lao PDR, Cambodia, Nepal, and Pakistan, and, to a lesser extent, Vietnam and Bangladesh. In the Philippines, construction was driving economic growth in the first half of the period compared, but it has never recovered its dominance after its crash in the mid-1980s. In the second half, economic growth was better balanced, with the development of finance, real estate, and business activities in particular.

6.3 Labor Productivity by Industry

Section 5.1 discusses per worker measures of labor productivity performance in level terms, and identifies a large gap between Asia as a whole and the US. In 2010, Hong Kong and Singapore were the countries that had labor productivity levels comparable to that of the US. Besides these two, the best performers in Asia achieved productivity levels that were at least 40 per cent that of the US; yet, Asia collectively was dragged down by a long tail of countries with labor productivity less than 20 per cent of the US level, pulling down the average performance to 17 per cent that of the US for APO20 and 15 per cent for Asia23. In growth terms, however, Asia's performance far exceeded that of the US, allowing the countries to close the gap with the US gradually over time. Labor productivity growth in Asia23 was 5.5 per cent per annum on average between 2005 and 2010, compared to 1.3 per cent in the US (Table 9).

Table 16 presents cross-country comparisons in labor productivity growth by industry[85] for the period 2000–2009.[86] Positive labor productivity growth was achieved across all sectors for Asia23. Our findings highlight the fact that service industries are no longer a drag on an economy's productivity performance but are as capable as manufacturing in achieving productivity growth. In fact, the sector that managed the fastest labor productivity growth was transport, storage, and communications (at 4.7 per cent on average a year). Agriculture, utilities, and manufacturing came next at 4.1 per cent, 3.3 per cent, and 3.1 per cent, respectively. Construction was the sector with the slowest productivity growth at 1.4 per cent. Labor productivity achieved by the other sectors ranged from 1.9 per cent (in community, social, and personal services) to 2.7 per cent (in wholesale and retail trade, hotels, and

85: Labor productivity in Table 16 is defined simply as per-worker GDP at constant prices by industry (v_j). The industry decomposition of labor productivity growth for the whole economy (v) in Figure 83 is based on the equation $v = \sum_j \overline{w}_j v_j^*$ where the weight is the two-period average of value-added shares. In this decomposition, the number of workers as a denominator of labor productivity (v_j^*) is adjusted, weighting the reciprocal of the ratio of the real per-worker GDP by industry to its industry average. Thus, the industry contribution ($\overline{w}_j v_j^*$) is emphasized more in industries in which the per-worker GDP is higher than the industry average, in comparison with the impact ($\overline{w}_j v_j$) of using the non-adjusted measure of labor productivity.

86: Data presented in this chapter are subject to bigger uncertainty than those in the previous chapters and the quality across countries is also more varied. Employment data of the less developed countries often lack frequency as well as industry details. Neither does the industry classification of employment data necessarily correspond to those of industry output data. Consequently, the quality of labor productivity estimates at the industry level is adversely affected. Furthermore, estimates on the manufacturing sector should be of better quality than those on the service sector because many countries do not have a census covering the service sector but have occasional manufacturing censuses.

restaurants). Within Asia, the divergence between South Asia and East Asia is stark. While South Asia had a much higher labor productivity in services and construction, and less so in utilities, East Asia led by quite a distance in the other three sectors of agriculture, mining, and manufacturing. Including the GCC countries does not make a significant difference to the Asian averages except for the mining sector, labor productivity growth in which was pulled down from 2.2 per cent for Asia23 to 0.8 per cent for Asia29.

Table 16 Labor Productivity Growth by Industry, 2000–2009
——Average annual growth rate of industry labor productivity

	1. Agriculture	2. Mining	3. Manufacturing	4. Electricity, gas, and water supply	5. Construction	6. Wholesale and retail trade, hotels, and restaurants	7. Transport, storage, and communications	8. Finance, real estate, and business activities	9. Community, social, and personal services
Bahrain	−6.7	−9.4	−0.7	−0.8	0.2	−3.6	0.2	−0.9	−0.8
Bangladesh	2.2	21.5	1.9	16.5	4.6	2.5	−1.0	−10.9	3.5
Brunei	0.5	−4.0	−4.4	−0.1	2.3	2.0	1.2	1.6	0.7
Cambodia	4.1	11.1	0.2	−5.6	−3.1	−1.3	0.6	1.8	0.7
China	6.9	8.1	7.0	7.1	6.6	8.3	7.0	8.6	7.9
ROC	3.3	2.7	4.6	2.7	−1.2	1.9	2.3	−0.5	0.1
Fiji	2.5	−0.7	2.0	−4.4	−9.7	−0.3	2.1	−3.5	1.8
Hong Kong	−0.7	3.8	−0.2	3.7	−2.8	4.4	3.6	1.9	−0.7
India	1.8	1.2	2.4	2.9	6.1	5.5	9.2	6.5	3.6
Indonesia	2.9	−9.7	3.3	−4.5	2.6	3.6	8.9	0.8	1.0
Iran	3.1	−1.7	6.6	4.4	−0.2	2.5	3.0	0.8	3.0
Japan	0.4	−4.5	1.6	−0.2	−1.1	−1.2	1.5	0.7	−0.2
Korea	5.4	−3.6	6.5	1.0	1.6	2.4	0.3	−0.3	−0.7
Kuwait	−5.0	3.3	2.2	9.1	2.2	1.5	7.2	2.1	0.0
Lao PDR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaysia	3.6	−8.6	4.6	2.4	−0.8	1.9	2.3	0.1	3.5
Mongolia	2.6	2.4	7.3	2.7	−3.7	1.8	5.4	6.1	0.2
Myanmar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nepal	−0.1	−6.4	−0.9	0.4	1.4	−1.3	6.1	−0.9	10.4
Oman	−5.5	−10.4	4.6	−0.7	12.3	1.8	5.4	−0.9	−0.9
Pakistan	0.2	−3.4	2.4	−3.5	−2.1	−1.3	−0.2	−3.4	5.5
Philippines	1.0	4.8	2.2	2.9	0.4	−0.9	4.3	−2.1	3.6
Qatar	−8.2	−3.7	−4.3	6.1	0.3	3.1	12.8	−3.7	9.0
Saudi Arabia	1.3	3.1	4.3	6.7	−0.7	0.9	3.8	−4.9	−0.5
Singapore	−6.2	0.0	1.1	1.4	−0.3	2.1	0.7	−0.8	−0.8
Sri Lanka	2.1	10.0	0.8	13.3	3.3	1.7	4.3	−1.0	5.2
Thailand	1.7	3.4	3.2	6.6	−1.5	−0.8	3.8	1.2	−0.1
UAE	−4.3	−3.6	0.1	2.4	−1.5	−1.5	3.1	−6.7	2.6
Vietnam (regrouped)	3.6	0.8	3.5	7.3	−1.3	3.2	5.0	−7.0	0.9
APO20	1.7	−2.6	0.1	1.2	−0.1	0.8	3.3	0.6	0.2
Asia23	4.1	2.2	3.1	3.3	1.4	2.7	4.7	2.2	1.9
Asia29	4.1	0.8	3.0	3.3	1.5	2.7	4.7	2.2	1.9
East Asia	6.4	7.7	4.1	3.4	0.6	2.6	4.6	2.4	1.6
South Asia	1.7	1.8	2.3	3.9	5.3	4.2	6.2	5.4	4.1
ASEAN	3.0	−6.1	2.4	1.6	0.5	1.9	4.8	−0.4	1.2
GCC (reference)	−1.2	−1.1	1.8	6.5	−0.1	0.7	4.8	−3.3	0.3
US	4.9	−1.6	4.6	−0.5	−3.1	1.4	4.7	2.1	−0.2
Australia	3.4	−5.5	1.4	−2.9	2.5	1.2	2.3	1.6	−0.1

Unit: Percentage.
Source: APO Productivity Database 2012.01.

Compared with Asia23, the US[87] was stronger in labor productivity growth in four sectors:, agriculture (4.1 per cent versus 4.9 per cent), wholesale and retail trade, hotels, and accommodations (2.7 per cent versus 1.4 per cent), transport, storage, and communications (4.7 per cent versus 4.7 per cent), and finance, real estate, and business activities (2.2 per cent versus 2.1 per cent). If we look at individual countries, however, there was stronger performance than the US in these sectors: for example, agriculture in China (6.9 per cent) and Korea (5.4 per cent); wholesale and retail trade, hotels, and restaurants in China (8.3 per cent), India (5.5 per cent), and Hong Kong (4.4 per cent); transport, storage, and communications in India (9.2 per cent), Indonesia (8.9 per cent), and China (7.0 per cent); and finance, real estate, and business activities in China (8.6 per cent) and India (6.5 per cent). Note that although different countries top the ranking in different industries, China was the only country with labor productivity persistently strong and close to the region's leaders across all sectors. In contrast, Japan experienced negative labor productivity growth in five out of the nine sectors.

87: The strengths and weaknesses of the US might have been distorted by the impact of the global financial crisis during the late 2000s.

Figure 83 shows the industry origins of average labor productivity growth per annum in four periods: 1985–1990, 1990–1995, 1995–2000, and 2000–2009.[88] Among these periods, labor productivity clearly slowed in the second half of the 1990s due to the general impact of the Asian financial crisis. Countries gradually recovered in the 2000s, but at different paces. Table 9 suggests that Asia23's labor productivity growth was more than fully restored to the pre-crisis rate in the first half of the 2000s. Thereafter, there was a strong pick-up to 5.5 per cent in 2005–2010. China has been leading labor productivity growth among the countries compared by a big margin since 1990, but in the past five years, India has been closing on China's productivity performance. In the past two-and-a-half decades, we can see that the role played by agriculture (both positive and negative) has been diminishing in Asian countries. While the importance of manufacturing has never waned in some countries (e.g., Korea, the ROC, China, and Thailand), it has not been a major contributor in India in its recent development process, or in Hong Kong and Sri Lanka in the 2000s.

The manufacturing sector has been a major driving force behind productivity growth in most Asian countries, as shown in Figures 84 and 85. In the late 1990s, manufacturing accounted for a significant part of labor productivity growth in Korea (68 per cent), Malaysia (78 per cent), and China (55 per

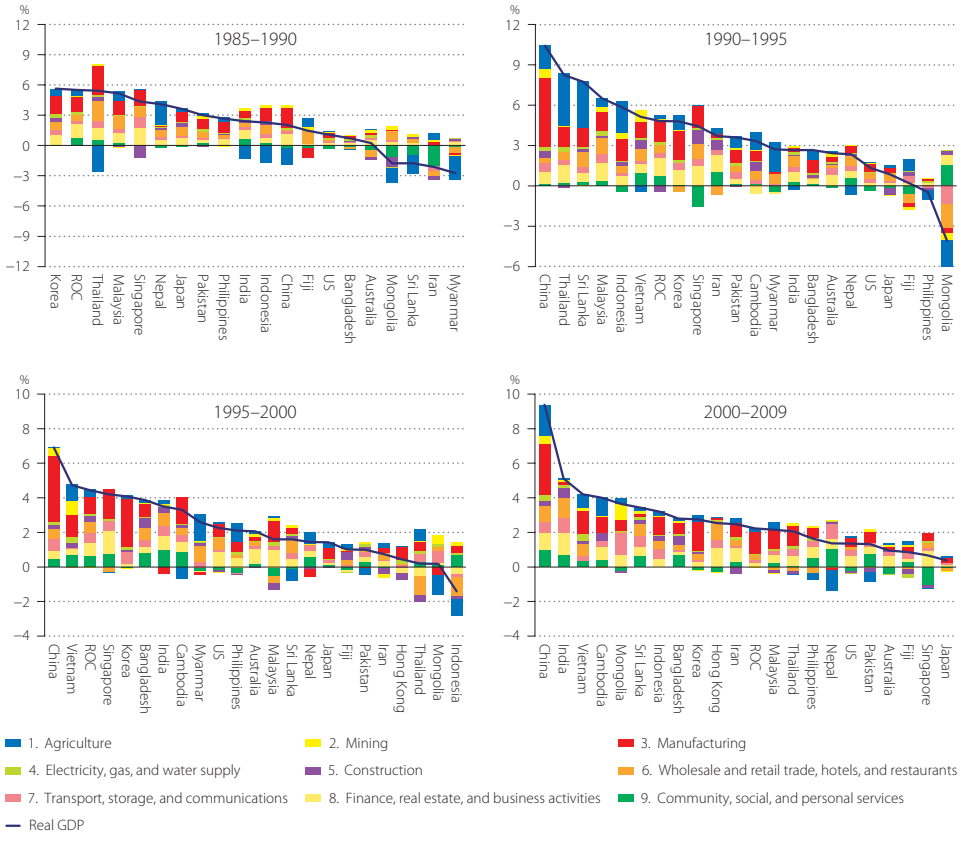

Figure 83 Industry Origins of Labor Productivity Growth, 1985–1990, 1990–1995, 1995–2000, and 2000–2009

——Industry decomposition: Average annual growth rate of GDP at constant prices

Source: APO Productivity Database 2012.01.

88: Not all Asian countries are included, because employment by industry sector is not available for some countries.

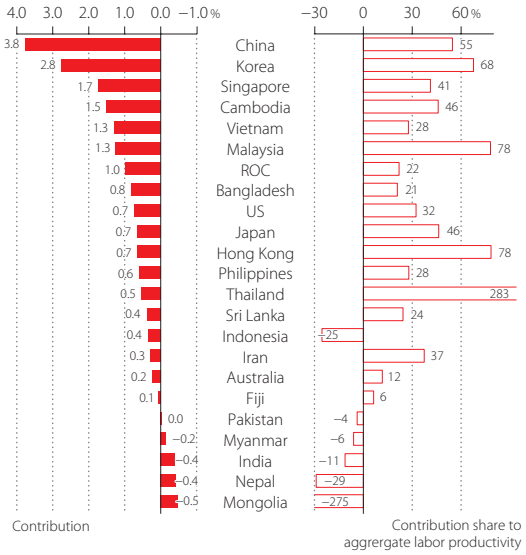

Figure 84 Contribution of Manufacturing to Labor Productivity Growth, 1995–2000

Sources: APO Productivity Database 2012.01.

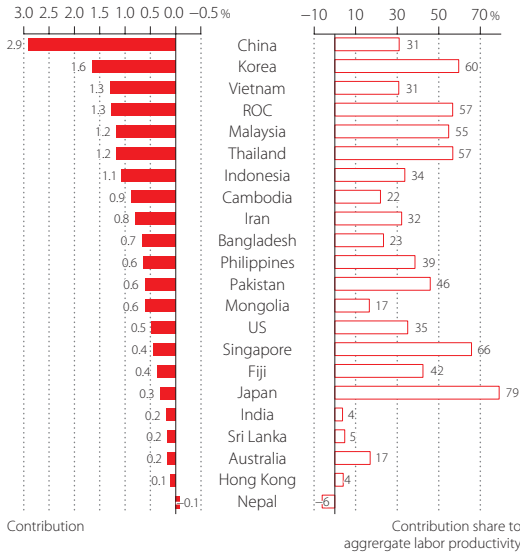

Figure 85 Contribution of Manufacturing to Labor Productivity Growth, 2000–2009

Sources: APO Productivity Database 2012.01.

cent). Nevertheless, its role has lessened in the 2000s to 60 per cent, 55 per cent, and 31 per cent, respectively. In contrast, the contribution by manufacturing strengthened from 22 per cent to 57 per cent in the ROC and from 46 to 79 per cent in Japan between the two periods. However, in some economies, like India, Hong Kong, Sri Lanka, and Nepal in the 2000s, manufacturing played a negligible role.

Traditionally, it has been difficult for the service sector to realize productivity growth, but modern advancements in information and communication technology have changed that. A lot of IT-intensive users are in this sector, which is capable of capturing the productivity benefits arising from IT utilization. We have observed the growing importance of services in explaining productivity growth in Western economies in recent decades. In Asia, the contribution from services matches that of manufacturing. Among the four industries in the service sector, three are potentially IT-using industries: wholesale and retail trade, hotels, and restaurants; transport, storage, and communications; and finance, real estate, and business activities. Figures 86 and 87 present the contribution of services in labor productivity growth by country. In the 2000s, services were contributing at least one-third or more to labor productivity growth in most Asian countries. The contribution was predominant in Hong Kong and India, accounting for 94 per cent and 78 per cent of labor productivity growth, respectively. It also accounted for around two-thirds or more of labor productivity growth in the US, Sri Lanka, and Singapore. Korea had the lowest share from the service sector, accounting for less than one-fifth of labor productivity growth. We see a slight expansion of the role played by services in China, from 32 per cent to 38 per cent between the two periods. The contribution of services was also highly significant in South Asian countries like Bangladesh, India, Nepal, and Pakistan over the same period. Finance, real estate, and business activities made the largest contribution of 1.4 percentage points in India and 1.5 percentage points in Hong Kong, respectively, while transport, storage, and communications made the largest contribution of 1.8 percentage points in Mongolia. It was particularly prominent that in India all four industries significantly contributed to the improvement of economy-wide labor productivity for the period 2000–2009, while the contribution of manufacturing was negative for the period 1995–2000 and 4 per cent in 2000–2009.

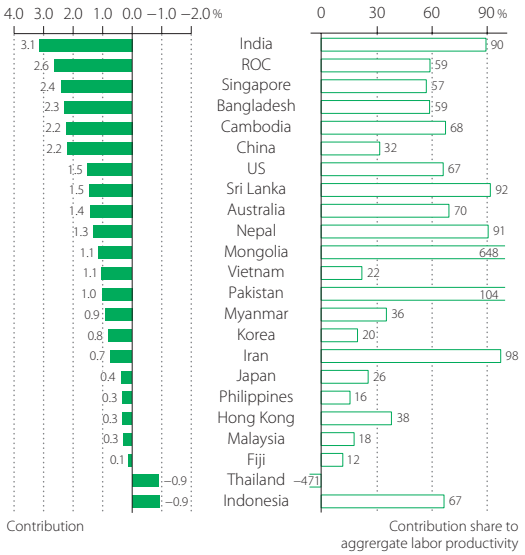

Figure 86 Contribution of Service Sector to Labor Productivity Growth, 1995–2000

Sources: APO Productivity Database 2012.01.

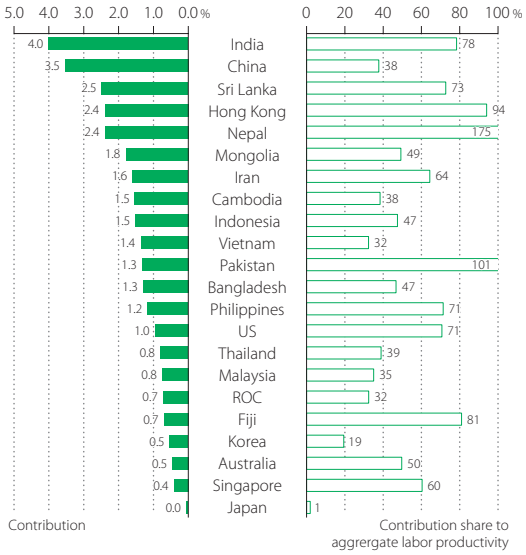

Figure 87 Contribution of Service Sector to Labor Productivity Growth, 2000–2009

Sources: APO Productivity Database 2012.01.

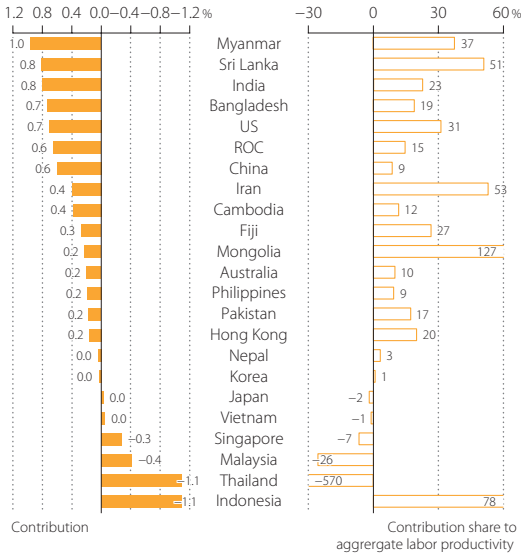

Figure 88 Contribution of Wholesale and Retail Sector to Labor Productivity Growth, 1995–2000

Sources: APO Productivity Database 2012.01.

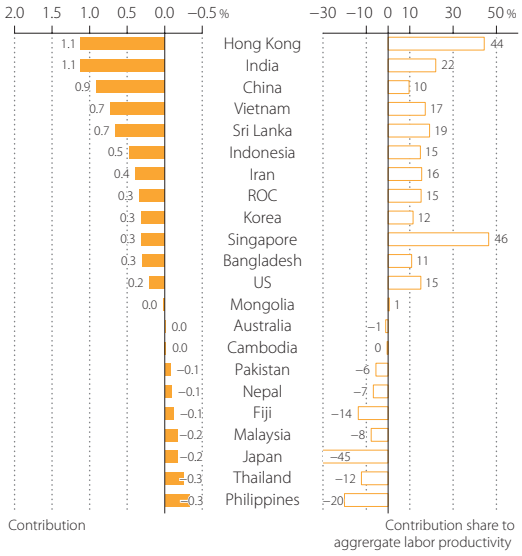

Figure 89 Contribution of Wholesale and Retail Sector to Labor Productivity Growth, 2000–2009

Sources: APO Productivity Database 2012.01.

7 Real Income

The standard GDP concept does not adequately measure welfare, as discussed in Section 3. Among the shortcomings is its neglect of the terms-of-trade effect. An improvement in the terms of trade (i.e., the relative prices of a country's exports to imports) unambiguously raises real income and in turn welfare.[89] In many ways, a favorable change in the terms of trade is synonymous with technological progress as it makes it possible to get more for less; that is, for a given trade balance position, a country can either import more for what it exports, or export less for what it imports.

7.1 Real Income and Terms of Trade

By focusing on production *per se*, the real GDP concept does not capture this beneficial effect of the improvement in the terms of trade.[90] In contrast, real income focuses on an economy's consumption possibilities, and in turn captures the impact of a change in the relative price of exports to imports. Real income growth attributed to changes in the terms of trade can be significant when there are large fluctuations in import and export prices and the economy under concern is highly exposed to international trade, like many Asian economies (see Figure 26). For example, real income growth for oil-exporting countries was more than double that of real GDP growth in recent years (as in Saudi Arabia and Brunei), while there has been no significant difference between real income growth and real GDP growth in Myanmar, which is a relatively closed economy (Figure 96). In the recent decade, the trading gain has also driven a significant wedge between real income and real GDP in Australia. That is partly because import prices have fallen, but more because prices of its commodity exports have risen.

The distinction between real income and real GDP lies in the differences between the corresponding deflators. Real GDP is calculated from a GDP deflator aggregating prices of household consumption, government consumption, investment, exports, and imports,[91] while real income is calculated from the prices of domestic expenditure, consisting of household consumption, government consumption, and investment. Therefore, real income can be considered as how much domestic expenditure can be purchased with the current income flow.[92] As such, real income captures the purchasing power of the income flow. Furthermore, in this report we adopt the concept of GNI (gross national income) instead of GDP in our estimation of real income, to take into account net income transfer from abroad.[93] Applying the method proposed by Diewert and Morrison (1986), the annual growth rate of real income can be fully attributed to three components: annual growth rate of real GDP, real income growth attributed to changes in prices of exports and imports (referred to as the trading gain),[94] and the effect of net income transfer.[95]

The general observation is that the trading gain effect is small on average over a long period of time, but over a shorter period it could be very significant.[96] Our findings presented in Table 17 confirm this observation. Excluding the oil-exporting countries, the trading gain effect in 17 out of 22 economies compared fell within the margin of ±10 per cent of real GDP growth on average for the long period of 1970–2010. Movements in terms of trade have been consistently unfavorable to Japan and the ROC.

89: See Diewert and Morrison (1986) and Kohli (2004).
90: Kohli (2004) explains this point: "if real GDP is measured by a Laspeyres quantity index, as it is still the case in most countries, an improvement in the terms of trade will actually lead to a fall in real GDP."
91: The weight for import price changes is negative. Thus, if import prices decrease, this tends to raise the GDP deflator.
92: This definition of real income is the same as in Kohli (2004, 2006). An alternative definition is nominal GDP deflated by the price of household consumption; this is adopted by Diewert, Mizobuchi, and Nomura (2005) and Diewert and Lawrence (2006).
93: Note that this is a departure from the *Databook 2011*, which defines income by domestic production as encapsulated in the concept of GDP.
94: The term "trading gain" is used by some authors (Kohli, 2006). This term is adopted in this report.

Table 17 Real Income and Terms of Trade, 1970–2010, 1995–2000, 2000–2005, and 2005–2010

——Average annual growth rate of real income, real GDP, trading gain, and net primary income transfer from abroad

1970–2010	Real income	Real GDP	Trading gain	Net primary income from abroad
China	8.58	8.57	0.01	0.00
Singapore	7.26	7.36	−0.03	−0.07
Korea	6.70	7.18	−0.44	−0.03
Malaysia	6.66	6.23	0.49	−0.05
Vietnam	6.66	6.71	0.13	−0.19
ROC	6.36	7.12	−0.84	0.08
Indonesia	6.03	5.36	0.70	−0.03
Hong Kong	5.77	5.78	−0.07	0.05
Iran	5.54	3.48	1.96	0.11
Thailand	5.38	5.85	−0.37	−0.11
India	5.23	5.21	0.02	0.00
Myanmar	5.09	5.20	0.01	−0.12
Sri Lanka	4.95	5.20	−0.18	−0.07
Pakistan	4.50	4.68	−0.28	0.09
Philippines	4.25	3.47	0.03	0.76
Fiji	4.07	3.27	0.66	0.14
Bangladesh	2.98	3.06	−0.30	0.22
Japan	2.52	2.74	−0.29	0.07
Lao PDR	−0.23	0.00	0.00	−0.23
Bahrain	5.17	4.77	0.67	−0.31
Kuwait	4.81	0.37	4.04	0.42
Oman	7.75	6.40	1.23	0.12
Qatar	7.77	6.67	1.02	0.07
Saudi Arabia	5.78	4.13	0.60	0.71
UAE	10.59	10.37	−0.16	0.38
(reference)				
US	2.76	2.81	−0.07	0.02
EU15	2.20	2.24	−0.03	−0.01
Australia	3.52	3.30	0.31	−0.09

1995–2000	Real income	Real GDP	Trading gain	Net primary income from abroad
China	6.96	7.73	−0.85	0.08
Vietnam	6.80	6.86	0.21	−0.27
Singapore	6.33	6.38	0.22	−0.27
Philippines	5.53	2.70	1.15	1.69
India	5.36	5.53	−0.17	0.01
ROC	5.34	5.47	−0.11	−0.03
Iran	5.19	2.72	2.32	0.15
Cambodia	5.18	5.46	0.03	−0.31
Sri Lanka	4.82	5.04	−0.07	−0.15
Malaysia	4.73	5.03	0.48	−0.79
Myanmar	4.34	4.94	0.00	−0.61
Bangladesh	4.07	4.15	−0.20	0.12
Fiji	3.58	3.65	−1.09	1.00
Korea	3.07	4.98	−1.89	−0.02
Pakistan	2.74	3.14	−0.02	−0.37
Hong Kong	2.71	2.40	0.35	−0.04
Japan	0.76	0.83	−0.16	0.09
Indonesia	−0.21	−0.08	0.68	−0.81
Lao PDR	−0.77	0.00	0.00	−0.77
Thailand	−0.87	0.31	−1.20	0.02
Bahrain	6.39	3.82	2.93	−0.35
Kuwait	6.04	1.68	4.42	−0.06
Oman	6.82	3.12	4.09	−0.38
Qatar	13.80	8.93	5.83	−0.97
Saudi Arabia	4.81	2.38	2.00	0.43
UAE	8.18	6.57	1.87	−0.27
Brunei	5.39	1.81	3.59	0.00
(reference)				
US	4.32	4.25	0.07	0.00
EU15	2.96	2.96	−0.08	0.07
EU27	2.66	2.70	−0.11	0.06
Australia	3.97	3.70	0.12	0.15

2000–2005	Real income	Real GDP	Trading gain	Net primary income from abroad
Myanmar	11.86	11.86	0.00	0.00
China	11.15	10.20	0.61	0.34
Cambodia	10.39	10.68	−0.03	−0.26
Mongolia	9.87	7.10	3.08	−0.32
Iran	8.80	7.14	1.97	−0.30
Vietnam	7.27	7.32	0.06	−0.11
India	6.96	7.20	−0.31	0.07
Malaysia	6.82	4.82	1.25	0.75
Sri Lanka	5.50	4.67	0.72	0.11
Philippines	5.41	4.25	−0.28	1.44
Bangladesh	5.23	5.41	−0.45	0.27
Pakistan	4.63	4.77	−0.80	0.65
Thailand	4.54	5.17	−0.01	−0.62
Indonesia	3.96	4.55	−0.96	0.37
Fiji	3.72	3.40	0.87	−0.55
Korea	3.71	4.47	−0.84	0.08
Singapore	3.55	4.69	0.12	−1.25
Hong Kong	2.89	4.01	−1.01	−0.11
Nepal	2.64	3.11	−0.55	0.07
ROC	2.36	3.60	−1.47	0.22
Japan	1.05	1.18	−0.34	0.21
Lao PDR	−0.22	0.00	0.00	−0.22
Bahrain	7.04	5.91	1.18	−0.05
Kuwait	11.01	7.56	4.63	−1.18
Oman	7.82	3.44	4.17	0.21
Qatar	13.38	9.14	4.19	0.05
Saudi Arabia	9.02	4.18	4.90	−0.07
UAE	6.48	4.69	1.74	0.05
Brunei	8.00	2.85	5.15	0.00
(reference)				
US	2.39	2.36	−0.04	0.08
EU15	2.00	1.79	0.06	0.15
EU27	1.98	1.80	0.06	0.12
Australia	4.32	3.38	1.17	−0.24

2005–2010	Real income	Real GDP	Trading gain	Net primary income from abroad
China	11.31	11.40	−0.10	0.01
Myanmar	10.15	10.14	0.01	0.00
India	8.34	7.97	0.35	0.01
Mongolia	7.54	6.61	2.41	−1.48
Vietnam	7.47	6.88	1.03	−0.44
Cambodia	7.43	6.41	1.11	−0.09
Sri Lanka	6.31	5.90	0.41	0.00
Bangladesh	6.28	6.13	−0.67	0.83
Singapore	6.18	6.41	−1.27	1.04
Philippines	5.88	4.82	−0.07	1.13
Malaysia	4.94	4.05	0.65	0.23
Indonesia	4.88	5.25	−0.78	0.42
Nepal	4.83	3.87	1.01	−0.05
Iran	4.61	2.98	1.50	0.13
Pakistan	3.91	4.56	−0.98	0.33
Thailand	3.88	3.78	0.00	0.10
Hong Kong	3.34	3.86	−0.82	0.30
Korea	3.12	3.97	−0.89	0.04
ROC	1.81	4.01	−2.33	0.13
Lao PDR	0.28	0.00	0.00	0.28
Japan	−0.13	0.28	−0.45	0.04
Fiji	−0.33	−0.14	0.67	−0.86
Bahrain	3.21	5.39	−0.58	−1.60
Kuwait	−0.93	−1.14	1.07	−0.85
Oman	8.55	5.14	3.81	−0.41
Qatar	19.93	17.94	1.99	0.00
Saudi Arabia	3.52	1.88	1.36	0.28
UAE	3.91	3.27	0.59	0.05
Brunei	4.85	−2.40	7.26	0.00
(reference)				
US	0.75	0.73	−0.08	0.11
EU15	0.55	0.69	−0.10	−0.03
EU27	0.78	0.81	−0.02	−0.02
Australia	3.90	2.53	1.42	−0.06

Unit: Percentage.
Sources: Official national accounts in each country, including author adjustments.
Note: See footnote 95 for the definition of real GDP growth, real income growth, and trading gain growth. The starting years for some countries are different due to data availability during 1970–2010: Brunei (1989–), Cambodia (1993–), Mongolia (2000–), and Nepal (2000–).

95: Real income growth can be decomposed into two components as follows:

$$\underbrace{\ln\left(\frac{GNI^t}{GNI^{t-1}}\right)-\ln\left(\frac{P_D^t}{P_D^{t-1}}\right)}_{\text{Real income growth}}=\underbrace{\ln\left(\frac{GNI^t/GDP^t}{GNI^{t-1}/GDP^{t-1}}\right)}_{\text{Income transfer effect}}+\underbrace{\ln\left(GDP^t/GDP^{t-1}\right)-(1/2)\sum_i\left(s_i^t+s_i^{t-1}\right)\ln\left(P_i^t/P_i^{t-1}\right)}_{\text{Real GDP growth}}+$$

$$\underbrace{(1/2)\left(s_X^t+s_X^{t-1}\right)\left(\ln\left(P_X^t/P_X^{t-1}\right)-\ln\left(P_D^t/P_D^{t-1}\right)\right)-(1/2)\left(s_M^t+s_M^{t-1}\right)\left(\ln\left(P_M^t/P_M^{t-1}\right)-\ln\left(P_D^t/P_D^{t-1}\right)\right)}_{\text{Real income growth attributed to changes in the terms of trade (=trading gain)}}$$

where P_i^t is price of final demand i in period t and s_i^t is expenditure share of final demand i in period t. D is domestic expenditure, X is export, and M is import. Note that the real GDP growth based on this formulation may differ from that used in other chapters, since the implicit Törnqvist quantity index is adopted for calculating it.

96: Short-term trends in export and import prices cannot continue indefinitely. Negative and positive trading gain effects in shorter periods cancel each other out. In the end, the accumulated effect over a long period of time often becomes negligible.

In the shorter terms, the spread of the trading gain effect is wider across countries. Australia has been benefiting from the continual surge in commodity prices in the past decade or so; as such, its terms of trade have been turning strongly in its favor. The trading gain effect therefore has been rising in Australia from 3 per cent on average a year in 1995–2000, to 35 per cent in 2000–2005, and 56 per cent in 2005–2010 of its real GDP growth. In terms of percentage points, the trading gain added 0.12, 1.17, and 1.42 points to real GDP growth in the three consecutive periods. For the oil-exporting countries, the trading gain effect is almost always positive and significant, and makes it possible to sustain a rise in purchasing power with little real GDP growth in some countries, such as in Kuwait or Saudi Arabia and Brunei in the second half of the 2000s.

Over the past four decades, net primary income from abroad does not move outside the margin of ±10 per cent of real GDP growth on average for all 29 countries compared, except the Philippines, Kuwait, and Saudi Arabia. Net primary income from abroad has been a long-term significant contribution to the purchasing power of the Philippines, with remittances from its large number of overseas workers. When real GDP growth slows (such as during the late 1990s), net primary income from abroad plays an even greater role in cushioning the real income of Filipinos. Over the past four decades, net primary income from abroad augmented real GDP growth by 2.5 per cent and 0.6 per cent on average a year in Japan and the US, respectively, but it has grown to be more significant (i.e., around 15 per cent) in both countries as real GDP growth has slowed in recent years.

Figure 90 plots the time series of net primary income from abroad as a percentage of GDP. The role of net primary income from abroad has been shifting from negative to positive in Hong Kong, with the transition taking place in the mid-1990s leading up to the handover of Hong Kong from British rule to China in 1997. Since then, net primary income from abroad has been positive. A shift in the role of net primary income from abroad has also taken place in Korea from negative to a more or less neutral position in the 2000s, whereas it has been positive in the ROC, oscillating around +2 per cent of GDP, since 1980. Singapore's net primary income from abroad displays the largest fluctuations, ranging from +1.9 per cent in 1997 to −7.1 per cent in 2004, but on the whole, it has been more negative than positive. In Japan and the Philippines, net primary income from abroad has been rising strongly, albeit at different magnitudes. In Japan, it rose from 0.6 per cent of GDP in 1990 to 3.3 per cent in 2008 before falling to 2.5 per cent in 2010, compared with 1.4 per cent in 1990 and 33.3 per cent in 2010 in the Philippines. In China and India, it has been fluctuating within ±1.6 per cent and with a range from −1.5 to 0.2 per cent, respectively. In the US, it has always been positive, fluctuating tightly within +1.5

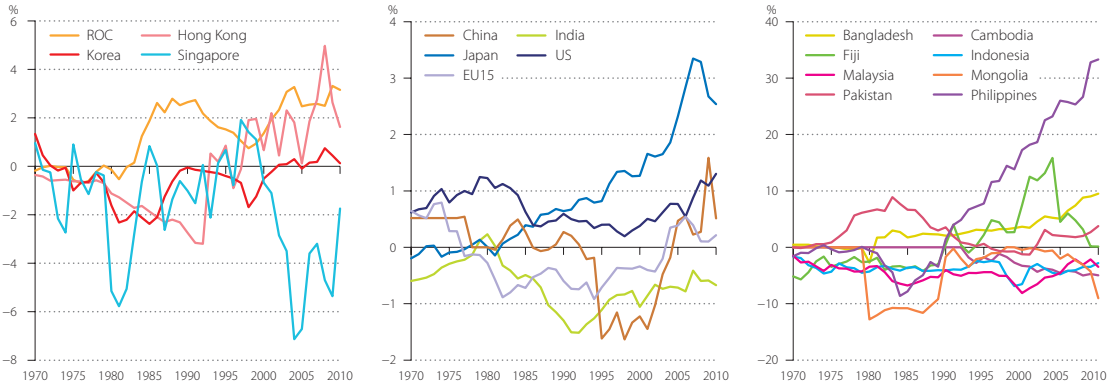

Figure 90 Effect of Net Income Transfer on GDP, 1970–2010

Sources: Official national accounts in each country, including author adjustments.

per cent of GDP, whereas it has been marginally negative for EU15 for three decades between 1975 and 2005 before turning mildly positive. For the smaller Asian economies, net primary income from abroad tends to fluctuate within a bigger range of ±10 per cent of GDP.

Combining both the trading gain effect and net primary income from abroad, real income growth for most countries compared fall within the margin of ±20 per cent of real GDP growth (Figure 91); Kuwait and Brunei appear to be the outliers, with real income growth being 13.1 times and 3.4 times their respective long-term dismal real GDP growth of 0.4 per cent and 1.3 per cent.[97]

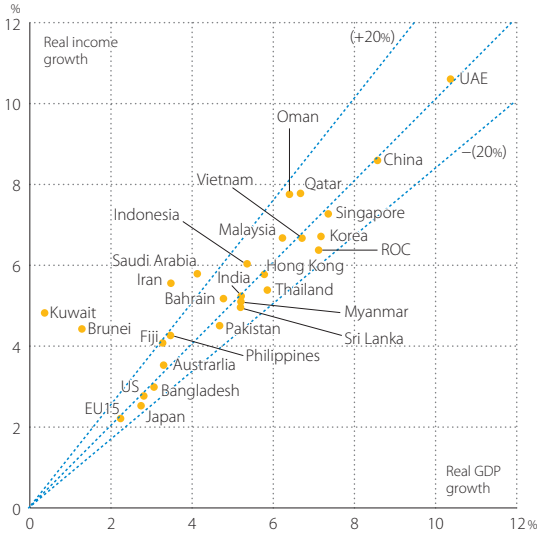

Figure 91 Real Income and Real GDP Growth, 1970–2010
——Average annual growth rate of GDP at constant prices and real income

Sources: Official national accounts in each country, including author adjustments.
Note: The starting years for some countries are different due to data availability during 1970–2010: Brunei (1989–), Cambodia (1993–), Mongolia (2000–), and Nepal (2000–).

Unlike the oil-exporting countries, at any one time, roughly half of the Asian countries compared sustain a negative trading gain effect, albeit at variable extents, whereas the impact from net primary income from abroad is relatively less pronounced. The period 1995–2000 reflects the impact of the Asian financial crisis. For Thailand, the trading gain effect more than outweighed the small positive average real GDP growth per year (of 0.3 per cent), giving rise to a marginal fall in real income of –0.9 per cent. In Korea, the negative trading gain also shaved 37 per cent off real GDP growth of 5.0 per cent, producing a real income growth of 3.1 per cent. At the start of the 2000s, the Asian economy recovered from the financial crisis, but the trading gain effect worked against welfare for some countries, and such a negative impact even intensified after 2005. For example, in the ROC, the trading gain effect caused real income growth to be 41 per cent lower than real GDP growth in the period 2000–2005, but in the period 2005–2010 it wiped out 58 per cent of the handsome 4.0 per cent real GDP growth on average a year, leaving real income to grow at 1.8 per cent. Similarly, in Korea the trading gain effect caused real GDP growth to overestimate real income growth by 19 per cent in the first half of the 2000s, which increased to 22 per cent in the years 2005–2010 (Table 17 and Figure 92). In Japan, the negative trading gain effect more than wiped out the 0.4 percentage points of real GDP growth, leaving real income actually falling by 0.1 per cent a year on average in the period 2005–2010.

In contrast, the trading gain has worked to counterbalance falling real GDP in Brunei, leaving it with a handsome real income growth of 4.8 per cent, despite its contracting real GDP of 2.4 per cent in the latest period. In Saudi Arabia, real income growth was more than 174 per cent faster than its real GDP growth. This takes place against the backdrop of strong oil prices, which spiked in mid-July 2008 to

97: According to Kohli's (2004) study on real income of 26 OECD countries during 1980–1996, the trading gain on average over the entire period varies across countries, from the smallest effect of –0.8 per cent (–30.9 per cent of real income growth) per year in Norway to the largest of 0.63 per cent (29.4 per cent of real income growth) per year in Switzerland.

USD147 a barrel; after dropping sharply to USD40 per barrel by the end of 2008 (reflecting the fall in demand after the collapse of Lehman Brothers), it has steadily risen to, and held at, over USD100 a barrel since 2010 (Figure 93). Relatively, the trading gain effect has been small in EU15, making a difference of ±15 per cent between real GDP and real income growth. In the US, the trading gain effect has been unfavorable more often than not, but its positive net primary income from abroad has worked to counterbalance it and the difference between real GDP and real income growth is reduced. For example, in the latest period 2005–2010, the trading gain effect shaved 10.8 per cent off real GDP growth but it was counterbalanced by the positive effect from net primary income from abroad, which added 14.6 per cent to real GDP growth, leaving real income growth slightly faster than real GDP.

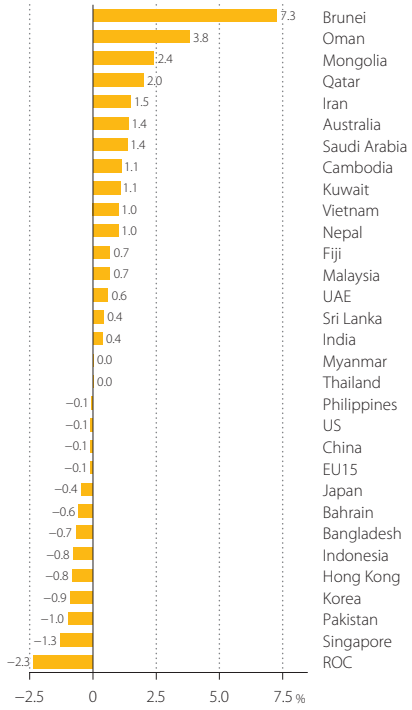

Figure 92 Trading Gain Effect, 2005–2010
——Average percentage points

Sources: Official national accounts in each country, including author adjustments.

Figure 94 provides the results of further decomposition of the trading gain into the *terms-of-trade effect* and the *real exchange rate effect* in Asian countries for the period 1970–2010.[98] The terms-of-trade effect is the part of real income growth attributed to the change in the relative price between exports and imports, while the real exchange rate effect refers to the part of real income growth attributed to changes in the relative prices of traded goods and domestically consumed goods. By applying this result, real income growth can be decomposed into real GDP growth, terms-of-trade effect, real exchange rate effect, and net primary income from abroad. The left-hand chart in Figure 94 applies this decomposition to Asian countries for the period 1970–2010. It shows that the real exchange rate effect is generally much smaller than the terms-of-trade effect, implying that the relative prices of traded versus domestically consumed goods have been largely stable in most countries. The exceptions are Kuwait and Brunei where the real exchange rate effect accounted for 37 per cent and 23 per cent of real income growth. This might have reflected the weight of oil in the composition of their traded goods. The right-hand chart shows the decomposition for the most recent period 2000–2010. It shows that the trading gain, particularly the terms-of-trade effect, is highly significant and favorable for the oil-exporting countries, but is significant and negative in a handful of Asian economies such as Hong Kong, the ROC, Korea, and Pakistan.

98: Following Kohli (2006), trading gain can be decomposed into two components as follows:

$$\underbrace{(1/2)\left(s_X^t + s_X^{t-1}\right)\left(\ln\left(P_X^t/P_X^{t-1}\right) - \ln\left(P_D^t/P_D^{t-1}\right)\right) - (1/2)\left(s_M^t + s_M^{t-1}\right)\left(\ln\left(P_M^t/P_M^{t-1}\right) - \ln\left(P_D^t/P_D^{t-1}\right)\right)}_{\text{Real income growth attributed to changes in the terms of trade (=trading gain)}} =$$

$$\underbrace{(1/4)\left(s_X^t + s_X^{t-1} + s_M^t + s_M^{t-1}\right)\left(\ln\left(P_X^t/P_X^{t-1}\right) - \ln\left(P_M^t/P_M^{t-1}\right)\right)}_{\text{Terms-of-trade effect}} +$$

$$\underbrace{(1/2)\left(s_X^t + s_X^{t-1} - s_M^t - s_M^{t-1}\right)\left((1/2)\ln\left(P_X^t/P_X^{t-1}\right) + (1/2)\ln\left(P_M^t/P_M^{t-1}\right) - \ln\left(P_D^t/P_D^{t-1}\right)\right)}_{\text{Real exchange rate effect}}.$$

Figure 93 Price of Crude Oil, 1986–2012

Source: US Energy Information Administration, WTI spot prices FOB (Cushing, Oklahoma).

Figure 95 shows the decomposition of average annual real income growth covering two periods of major economic shocks faced by the Asian economies: during 1973–1979, which includes the two oil price hikes in 1974 and 1979, and 1996–1998 to capture the impact of the Asian financial crisis. High oil prices improved the terms for oil-exporting countries, such as Iran and Indonesia, and worsened the terms of trade for oil-importing countries. During the Asian financial crisis, the terms-of-trade effect was still the predominant factor in deciding the difference between real income growth and real GDP growth. In Brunei, the terms-of-trade effect further reinforced the negative real GDP growth of –6.3 per cent, reducing its real income growth a further 8.1 percentage points. In Iran, the negative terms-of-trade effect counteracted the 0.9 per cent real GDP growth, giving real income growth of –1.5 per cent. In Indonesia, the trading gain effect worked to counterbalance the contraction in real GDP, whereas in Thailand, it reinforced the negative real GDP growth. In the Philippines, although the strong favorable terms-of-trade effect was moderated by the negative real exchange rate effect, the resulting real income growth more than quadrupled the real GDP growth.[99]

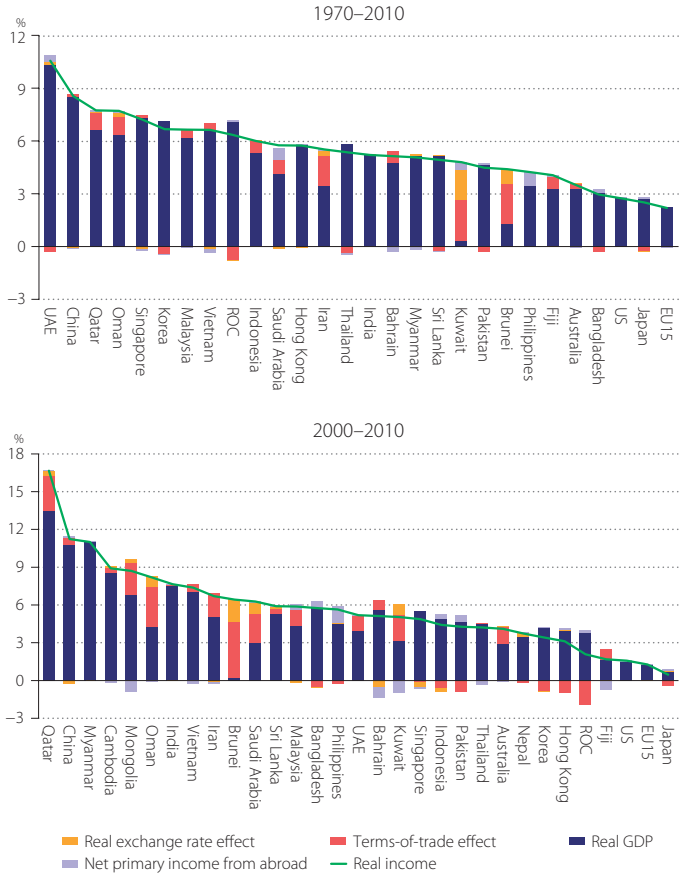

Figure 94 Decomposition of Real Income Growth, 1970–2010 and 2000–2010

Sources: Official national accounts in each country, including author adjustments.

Figure 96 shows this decomposition of real income in each Asian country, along with the US, EU15, and Australia[100] from 1970, or whichever year a country's time series starts. The trading gain can be positive or negative, depending on the direction of change in the terms of trade. Its impact is modest for most countries, adding less than ±1 percentage point to annual real GDP growth, except for some oil-rich countries. However, historically the trading gain has been significant in some oil-rich countries (e.g., annual real income growth being 4.0 percentage points, 3.1 percentage points, and 2.0 percentage points higher than annual real GDP growth on average in Kuwait, Brunei, and Iran between 1970 and 2010, respectively). In the short term, we can see extreme spikes in trading gain. For instance, as a consequence of the first oil price shock, the improvement in the terms of trade was responsible for over 80 per cent of the 41.9 per cent increase in real income in Iran in 1974. The opposite was true in EU15, where the negative trading gain effect counterbalanced real GDP growth, leaving virtually no growth in real income in the period 1974–1975. The effect of the second oil spike can be seen in the early 1980s. Sri Lanka, Malaysia, and Indonesia also experienced volatile variations in trading gains in the 1970s. The trading gain has been working against Singapore's and the ROC's welfare for most of the period covered. For Australia, the trading gain effect has clearly switched from being negative in the early half of the period covered to positive in the past decade or so.

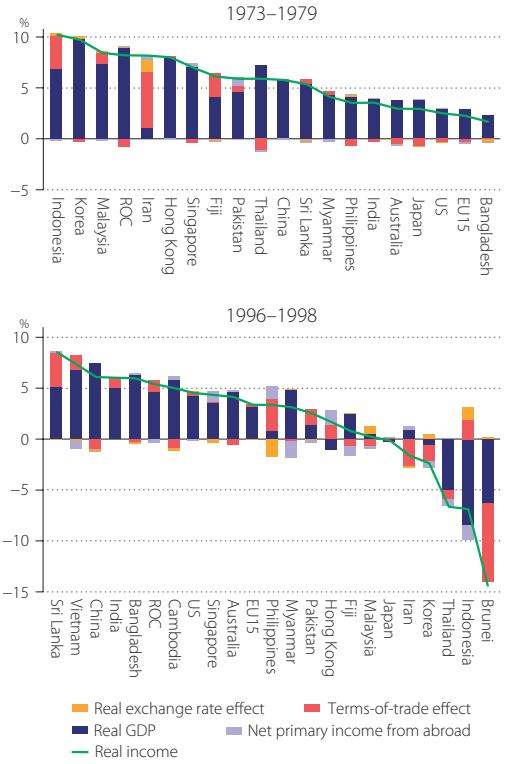

Figure 95 Decomposition of Real Income Growth, 1973–1979 and 1996–1998

——Decomposition: Average annual growth rate of real income

Sources: Official national accounts in each country, including author adjustments.

99: Kohli (2006) calculated the trading gain, the terms-of-trade effect, and the real exchange rate effect of Canada during 1982–2005. The average annual trading gain over the entire period is very low, at 0.1 per cent. This is small by the standard of Asian economies. However, the trading gain became significant, especially for the three years 2002–2005. Over these years, the average trading gain is 1.6 per cent per year. This effect is decomposed into a terms-of-trade effect of 1.4 per cent and a real exchange rate effect of –0.1 per cent.

100: There are several studies on the decomposition of real income growth for other countries: Kohli (2004) for 26 OECD countries during 1980–1996, Kohli (2006) for Canada during 1981–2005, and Diewert and Lawrence (2006) for Australia during 1960–2004.


Bahrain
Bangladesh
Brunei
Cambodia
China
ROC
Hong Kong
India
Indonesia
Iran
Japan
Korea
Kuwait
Malaysia
Mongolia
%
1971 1976 1981 1986 1991 1996 2001 2006
Real GDP
Trading gain
Net primary income from abroad
Real income

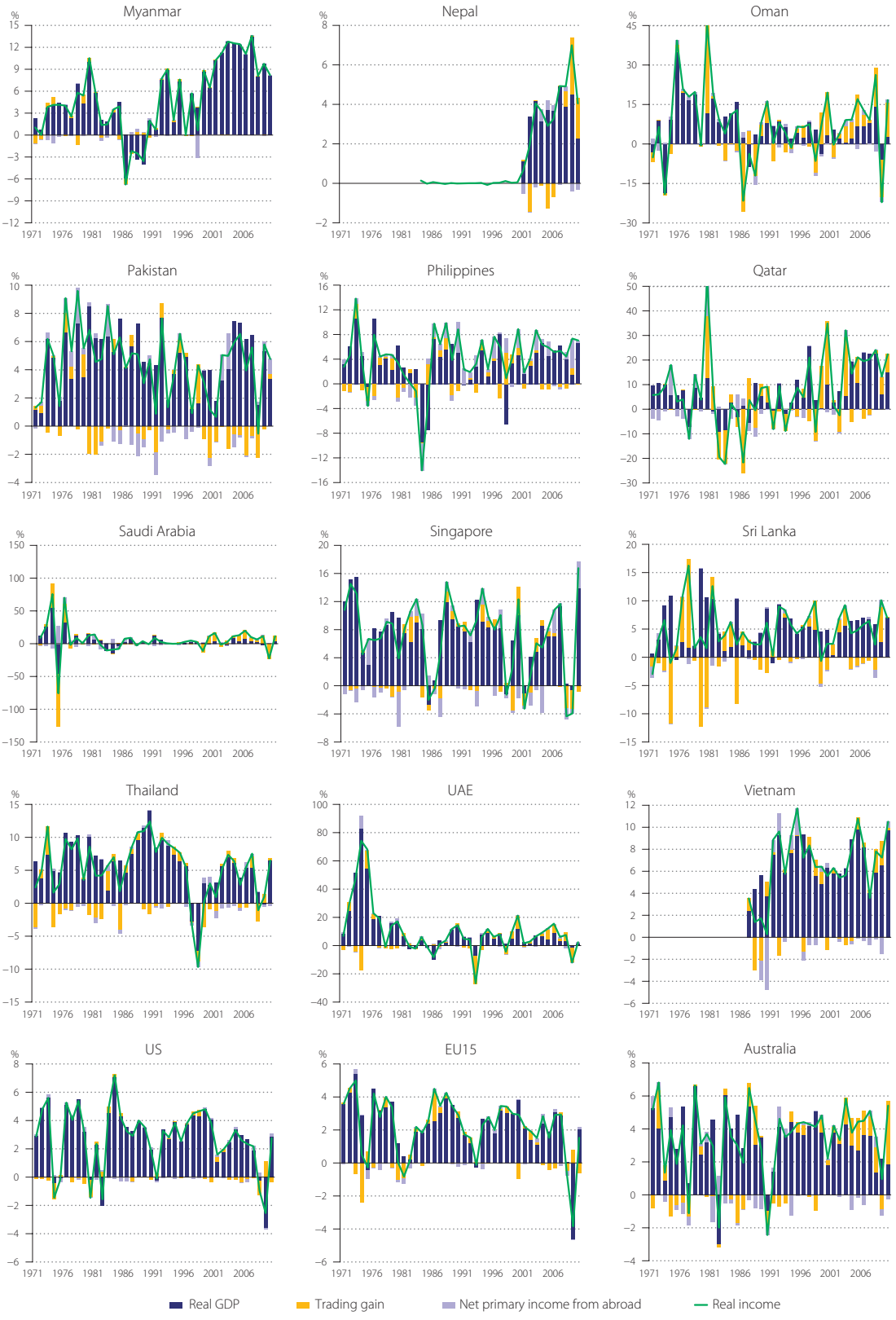

Figure 96 Sources of Real Income Growth, 1970–2010

Sources: Official national accounts in each country, including author adjustments.

7.2 Terms of Trade and Productivity Growth

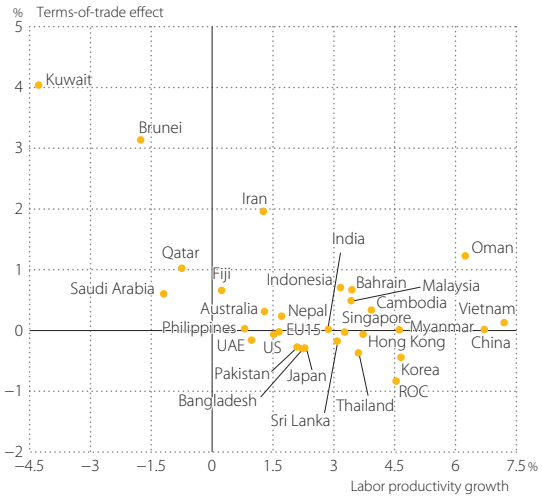

Figure 97 Terms-of-Trade Effect and Labor Productivity Growth, 1970–2010

Sources: Official national accounts in each country, including author adjustments.
Note: The starting years for some countries are different due to data availability during 1970–2010: Brunei (1989–), Cambodia (1993–), Mongolia (2000–), Nepal (2000–), and Vietnam (1986–).

When the trading gain is highly favorable, it can breed a sense of complacency, and productivity performance can suffer as a result. Resource-rich economies are susceptible to this pitfall because they are poised to reap some extremely positive trading gains when commodity prices turn in their favor over a sustained period of time. While commodity prices can rise, they can also fall. This is when countries' real income growth could suffer if fundamentals for real GDP growth are weak. Over the past four decades, only four countries have enjoyed a favorable trading gain effect over 1.0 per cent per annum. They are Kuwait, Brunei, Iran, and Qatar (all oil-exporting countries), and only Iran could achieve a positive growth in labor productivity (Figure 97). Australia is a rising economy that has benefited from the recent hikes in commodity prices, which are likely to stay for a period of time, as a response to the vibrant growth in the emerging economies especially China. The surge in its multifactor productivity growth in the 1990s stopped around the end of the century and then turned negative about five years ago,[101] just when they enjoyed an all-time-high positive trading gain effect, with real income growth faster than real GDP growth by 53 per cent (Table 17). A resource-rich country can suffer from "Dutch disease," which describes the phenomenon in which a country's currency is pushed up by the commodity boom, making other parts of its economy less competitive and potentially increasing the country's dependence on its natural resources. This is how resource abundance can easily lead to resource dependence. A way to counteract Dutch disease is broad-based robust productivity growth and industry diversification, in which Bahrain and Oman have shown some success (see Section 6.2 and Figure 72).

Figure 97 also shows that many Asian countries have succeeded in achieving high growth of labor productivity while having to accept a deteriorating trading gain over the long run. They are typically resource importers. Their voracious demand for commodities has pushed up their import prices, whereas export prices tend to fall as a result of their achievement in productivity improvement, resulting in unfavorable movements in their terms of trade. This is especially the case in countries where economic growth is highly dependent on export promotion. In this sense, a negative trading gain is partly a side effect of their own productivity success. Although the trading gain effect partly negates their real GDP growth, they are still much better off than before their development took off and without productivity improvements.

101: *The Economist*, 28 May 2011, "Special Report on Australia: No worries?"

Appendix

A.1 GDP Adjustments

The database used in the *Databook* series includes author adjustments made to harmonize GDP coverage better across countries. Although this edition mainly follows the 1993 SNA, it excludes investment of valuables and includes software investment and final consumption of financial intermediation services indirectly measured (FISIM). In addition to these adjustments, an extra adjustment is necessary to harmonize the price concept of GDP. Procedures for all these adjustments are explained below.

1) FISIM

Among the 20 APO member economies, eight countries – Bangladesh, Cambodia, Indonesia, the Lao PDR, Nepal, Pakistan, Sri Lanka, and Vietnam – do not allocate FISIM to final demands in their official national accounts, as a result of them still not following the 1993 SNA recommendation. Thus, the GDP values in those countries are smaller than others by definition. In addition, even in the countries whose national accounts follow the 1993 SNA's recommendation on FISIM, the available data sometimes do not cover the whole periods of our observation. To harmonize the GDP concept among countries and over periods, final demands of FISIM are estimated for those countries in the APO Productivity Database, using available estimates of value added in Imputed Bank Service Charge (IBSC) or financial intermediation (in case data of IBSC is not available). The ratios of value added of IBSC or financial intermediation on FISIM allocated to final demand are assumed to be identical with the average ratios observed in the countries in which the data is available. Figure A1 describes the countries and methods to adjust FISIM. As described there, for the case that both value added data are not available, the trend of the FISM share on GDP is applied simply to extrapolate the estimates in the past (although the impacts on GDP are minor).

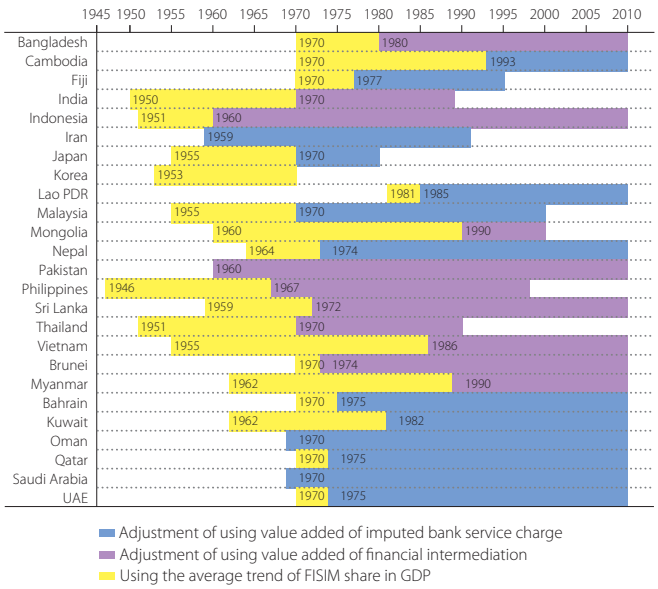

Figure A1 Adjustment of FISIM

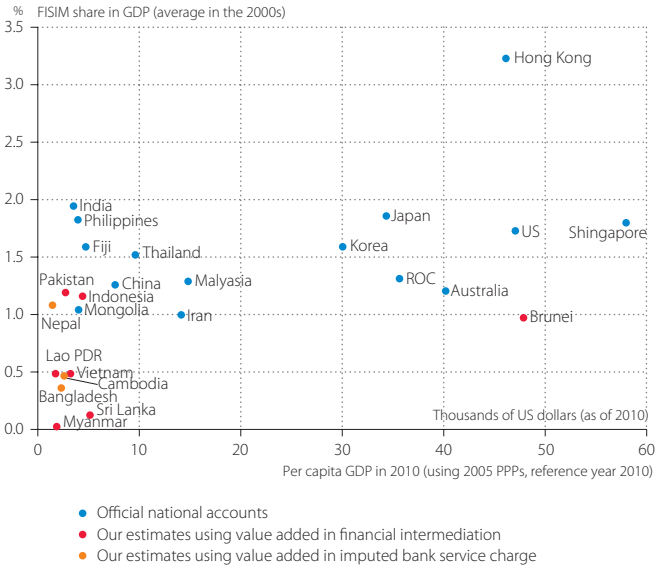

Figure A2 FISIM Share in GDP in the 2000s

Sources: Official national accounts in each country and author estimates.

Figure A2 presents a plot of the per capita GDP level in 2010 and the FISIM share in GDP in the 2000s (including both of the original estimates in the official national accounts and our estimates). In the countries where their GDP are adjusted, the proportions by which author adjustments for FISIM increase GDP are 0.9–1.4 per cent for Brunei, Indonesia, Nepal, and Pakistan and the impact on GDP is less than 0.5 per cent in others.

2) Software

The treatment of software also varies across countries. Among the countries studied, software investment is available for the ROC, Japan, Korea, Mongolia, Philippines, Singapore, Thailand, and China. To harmonize data, a country's GDP is adjusted to include software investment (through its software industry) by using the ratio between software investment and GDP (hereafter software ratio) and the tangible GFCF to GDP ratio (hereafter GFCF ratio). Data from the OECD Productivity Database (Schreyer, Bignon, and Dupont 2003) and the APO Productivity Database suggest an inverse relationship between these two ratios (Figure A3). Countries with a low GFCF ratio tend to be those with high per capita GDP, and the observed data suggest that information technology tends to play a more important role in these countries than in less developed countries. Furthermore, it is observed from the OECD and APO software data that the software ratio has been gradually increasing over the past 25 years.

We apply this inverse relationship between these two ratios observed from the OECD countries and national accounts in Asian non-OECD countries to estimate the software ratio in 2006 for those APO member economies that do not capitalize software investment. The estimated ratios for individual countries in 2006 are gradually tapered off as we move back in time. However, there is an exception. Countries at the very early stage of economic growth are found to have a GFCF ratio as low as countries with high per capita GDP, but for a different reason. The low GFCF ratio is explained by the fact that these countries have not experienced economic development yet, and in turn this does not imply an important role for software investment. In this report, we regard Cambodia, the Lao PDR, and Nepal as countries at the very early stage of economic development, and assign Vietnam's software ratio, which is the lowest of all APO member economies, to these countries.

Another problem arises from partial software capitalization. There are three types of software: prepackaged software, custom software, and own-account software. Countries may have capitalized one or two types of software, but software investment data are often not available separately. We attempt to adjust for the varied level of capitalization across countries by adding the type of software not capitalized to countries' GDP. In the case of Japan's

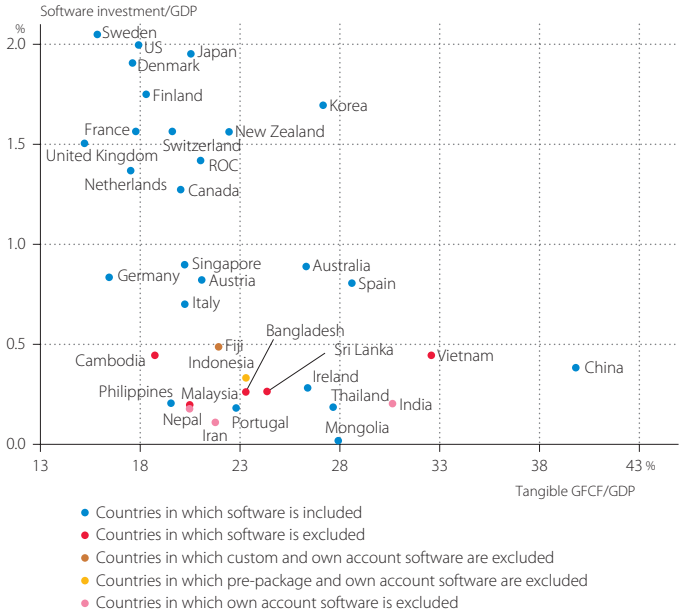

Figure A3 Software Investment Ratio and GFCF Ratio to GDP, 2005

Source: OECD Productivity Database (30 March 2012) and author estimates.

own-account software and ownership transfer cost, we used estimates by Nomura (2004) and added these to the GDP of Japan's software industry and GFCF.

3) Valuables

Valuables are defined as "goods of considerable value that are not used primarily for purposes of production or consumption but are held as stores of value over time" (United Nations 1993: para. 10.7). They are held under the expectation that their prices will not deteriorate and will rise in the long run. Valuables consist of precious stones and metals such as diamonds; art-works such as paintings and sculptures; and other valuables such as jewelry made from stones and metals. In some countries, such as Fiji, India, Iran, Mongolia, Pakistan, and Vietnam, net acquisitions of valuables are recorded as a part of capital formation. Our current decision is to harmonize the data by excluding net acquisition of valuables from GDP in the APO Productivity Database. According to our calculation, the figures were 1.1 per cent of GDP for India.

4) GDP at basic prices

GDP can be valued using different price concepts: factor cost, basic prices, and market prices. If the price concept is not standardized across countries, it will interfere with the international comparisons. All the countries we have covered in this *Databook* officially report GDP at market prices (or at purchasers' prices), but this is not true for GDP at factor cost and GDP at basic prices. International comparisons in Chapter 3 (on economic scale and growth) and Chapter 4 (on final demand) are based on GDP at market prices. However, by valuing output and input at the prices that producers actually pay and receive, GDP at basic prices is a more appropriate measure of countries' output than GDP at market prices for international comparisons of total factor productivity and industry performance as it is a measure from the producers' perspective. Hence, Chapter 5 on whole-economy productivity performance is based on GDP at basic prices, including our estimates.

These concepts of GDP differ in the treatment of indirect tax and subsidies (and import duties). The difference between GDP at basic prices and GDP at market prices is "taxes on products" minus "subsidies on products." "Taxes on products" are the indirect taxes payable on goods and services mainly when they are produced, sold, and imported, and "subsidies on products" are subsidies payable on goods and services mainly when they are produced, sold, and imported. Since GDP at basic prices is available for some economies, such as Hong Kong, India, Korea, Nepal, Singapore, and Sri Lanka, we need to construct GDP at basic prices for all other countries. To obtain GDP at basic prices, we subtract "taxes on products" and "duties on imports" from and add "subsidies on products" to GDP at market prices, which is available for all the countries studied. The main data sources for estimating "taxes on products" and "subsidies on products" are tax data in national accounts, the IMF's GFS, and the Input–Output Tables in each country.

Readers should bear these caveats in mind in interpreting the results in Chapter 6, since the definition of GDP by industry differs among countries due to data availability. GDP is valued at factor cost for Fiji, India, and Pakistan, at basic prices for Cambodia, Hong Kong, Korea, the Lao PDR, Mongolia, Nepal, and Singapore, at producers' prices for Bangladesh, the ROC, Iran, and the Philippines, and at market prices for Indonesia, Japan, Malaysia, Sri Lanka, Thailand, and Vietnam. In this sense, APO industry data should be treated as a work in progress and it is difficult to advise on data uncertainty. We will further develop and examine these data issues in the future.

A.2 Capital Stock

At present, half the APO member economies publish estimates of capital stocks in their systems of national accounts. Even if the estimates are available, users must be careful about a difference in methodologies and assumptions used to estimate capital stock and a large diversity in the treatment of quality adjustment in price statistics among countries. In the APO Productivity Database 2012.01, a harmonized methodology is applied in estimating capital stock and capital services, covering 15 Asian economies: China, the ROC, Fiji, Hong Kong, India, Indonesia, Iran, Japan, Korea, Malaysia, Mongolia, the Philippines, Singapore, Thailand, and Vietnam, and the US as a reference country.

Quality changes in the aggregate measure of capital input can originate from two kinds of sources, namely the composition change by type of assets and the quality change in each type of asset. To take the composition change of assets into account, our current database classifies ten types of assets (shown in Table A1). For countries in which detailed investment data are not available in their national accounts, the ten types of investment data are estimated based on the benchmark input–output tables and our estimates of the commodity flow data of domestic production and export/import of assets. The starting years for estimating capital stock based on the perpetual inventory method are 1901 for the US, 1951 for the ROC, 1952 for China, 1953 for Korea, 1955 for Japan, 1960 for Singapore, 1961 for Hong Kong, and 1970 for other countries.

Table A1 Parameters in Hyperbolic Function

	T	β
1. IT hardware	7	0.50
2. communications equipment	15	0.50
3. transportation equipment	15	0.50
4. other machinery and equipment	15	0.50
5. residential buildings	30	0.75
6. non-residential buildings	30	0.75
7. other construction	40	0.75
8. cultivated assets	10	0.50
9. computer software	3	0.50
10. other intangible assets	7	0.50

Source: APO Productivity Database 2012.01.

It is well known that prices of constant-quality IT capital have been falling rapidly. For cross-country comparisons, it has been noted that there is great diversity in the treatment of quality adjustment in price statistics among countries. Cross-country comparisons will be significantly biased if some countries adjust their deflators for quality change while others do not. Price harmonization is sometimes used in an attempt to control for methodological differences in the compilation of price indexes, under the assumption that individual countries' price data fail to capture quality improvements. Assuming that the relative price of IT to non-IT capital in the countries compared is set equal to the IT to non-IT prices relative in the reference country, the harmonized price is formulated as: $\Delta \ln \tilde{P}_{IT}^{X} = \Delta \ln P_{nIT}^{X} + (\Delta \ln P_{IT}^{ref} - \Delta \ln P_{nIT}^{ref})$, where the superscript X denotes the country included in the comparisons, P_{IT} is the price of IT capital, and P_{nIT} is the price of non-IT capital. The price of IT capital in country X, $\tilde{P}_{IT}^{X}$, is computed by the observed prices P_{IT}^{ref} and P_{nIT}^{ref} in the reference country and P_{nIT}^{X} in X. Schreyer (2002) and Schreyer, Bignon, and Dupont (2003) applied price harmonization to OECD capital services, with the US as a reference country, since the possible error due to using a harmonized price index would be smaller than the bias arising from comparing capital services based on national deflators.

In this *Databook*, the same price harmonization method is applied to adjust the quality improvement for IT hardware and communications equipment in countries where the appropriate quality-adjusted price data are not available, with Japan's prices as a reference country. A similar procedure was applied in cases where the prices for some assets were not available, to estimate missing data based on the relative price of these assets to total GFCF. In measuring capital services, this *Databook* basically follows the framework of the OECD Productivity Database (see Schreyer, Bignon, and Dupont, ibid.). The OECD assumes the truncated normal distribution as profiles for asset discarding (retirement) and the hyperbolic distribution as profiles for asset decaying. The age-efficiency profile (AEP) is defined as a

combined distribution of discard and decay of assets. The AEP in each asset is based on the two parameters in the hyperbolic function: T (average service life) and β ($-\infty<\beta\leq 1$). The hyperbolic function becomes one-hoss shay (no decay until T) when $\beta=1$ and linear when $\beta=0$. We set these two parameters as shown in Table A1. The estimates of productive capital stock by type of asset are used in measuring capital services (see Appendix A.3).

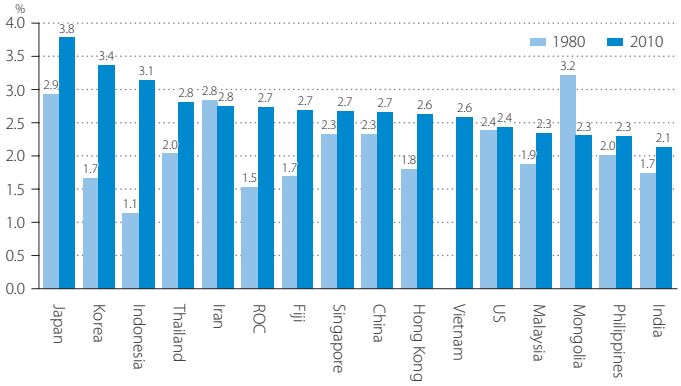

Figure A4 Capital-Output Ratio, 1980 and 2010
——Ratio of the beginning-of-period net capital stock to GDP at current prices

Source: APO Productivity Database 2012.01.

Figure A4 presents the estimated capital-output ratio (stock coefficient) that is defined by the ratio of the beginning-of-period net capital stock (all types of produced fixed assets owned by private and public institutions) to the basic-price GDP at current prices. Japan has the highest capital-output ratio among Asian countries, at 3.8. However, the ratio may not work well for cross-country comparison since the price differential between that for GDP and fixed assets in each country is not accounted for. Compared to the 1980 level in each country, all Asian countries except Mongolia have an increasing trend of capital-output ratio, unlike the ratio in the US, which is stable.

A.3 Rate of Return and Capital Services

In the analysis of production and productivity, capital service provides an appropriate concept of capital as a factor of production. The fundamental assumption in measuring capital services is proportionality between the (productive) capital stock and capital services in each type of asset. Thus, the growth rates of capital services can differ from that of capital stock only at the aggregate level. For aggregating different types of capital, the user costs of capital by type of asset should be estimated. This box outlines the methodology of the user cost of capital estimation and presents the estimated results of endogenous rate of return for Asian countries in the APO Productivity Database 2012.01.

The user cost of capital of a new asset (with type of asset denoted as k of the period t), $u^k_{t,0}$, is defined as $q^k_{t-1,0}\{r_t + (1 + \zeta^k_t)\,\delta^k_{P,t,0} - \zeta^k_t\}$, where r_t, $\delta^k_{P,t,0}$, and $q^k_{t,0}$ are the expected nominal rate of return, cross-section depreciation rate, and asset price, respectively. The asset-specific inflation rate ζ^k_t is defined as $(q^k_{t,0} / q^k_{t-1,0} - 1)$. The OECD assumes the country-specific *ex ante* real rate of return r^* that is constant for the whole period, and defines the nominal rate of return as $r_t = (1 + r^*)(1 + \rho_t) - 1$, where ρ_t represents the expected overall inflation rate, defined by a five-year centered moving average of the rate of change of the consumer price index (see Schreyer, Bignon, and Dupont, 2003).

One of the main difficulties in applying the *ex ante* approach for measuring user cost of capital is obtaining proper estimates for real rates of return, which can differ considerably among countries and over time. On the other hand, the *ex post* approach originated by Jorgenson and Griliches (1967) enables us to estimate it based on observed data. Assuming constant returns to scale and competitive markets, capital compensation can be derived from the summation of the capital service cost V^k_t for

each asset, which is defined as the product of the user cost of capital and the productive capital stock, (i.e., $V_t = \Sigma_k V_t^k = \Sigma_k u_{t,0}^k S_t^k$) . Based on this identity and the n-equations of user cost of capital, the n+1 variables of $u_{t,0}^k$ and r_t are simultaneously determined, using the observed capital compensation V_t as the total sum of V_t^k that is not observable in each asset. Note that the depreciation rate $\delta_{P,t,0}^k$ is not independent of the estimated r_t.

The estimated results of the *ex post* real rate of return based on $r_t^* = (1 + r_t) / (1 + \rho_t) - 1$ for 15 Asian countries and the US are shown in Figure A5. Although there are large fluctuations in countries like Thailand, Mongolia, and Vietnam, we may find a decreasing trend in the (endogenous) real rate of return for many Asian countries, compared to the US, which has a stable rate of around 10 per cent. In 2010, the real rate of return ranged from 6 per cent (Japan) to 25 per cent (Indonesia). Using these *ex post* estimates, the aggregate capital services are measured in this report. The difference caused by the *ex ante* and *ex post* approaches may provide a modest difference in the growth measure of capital services, regardless of the substantial differences in the rates of return and capital compensations (Nomura 2004).

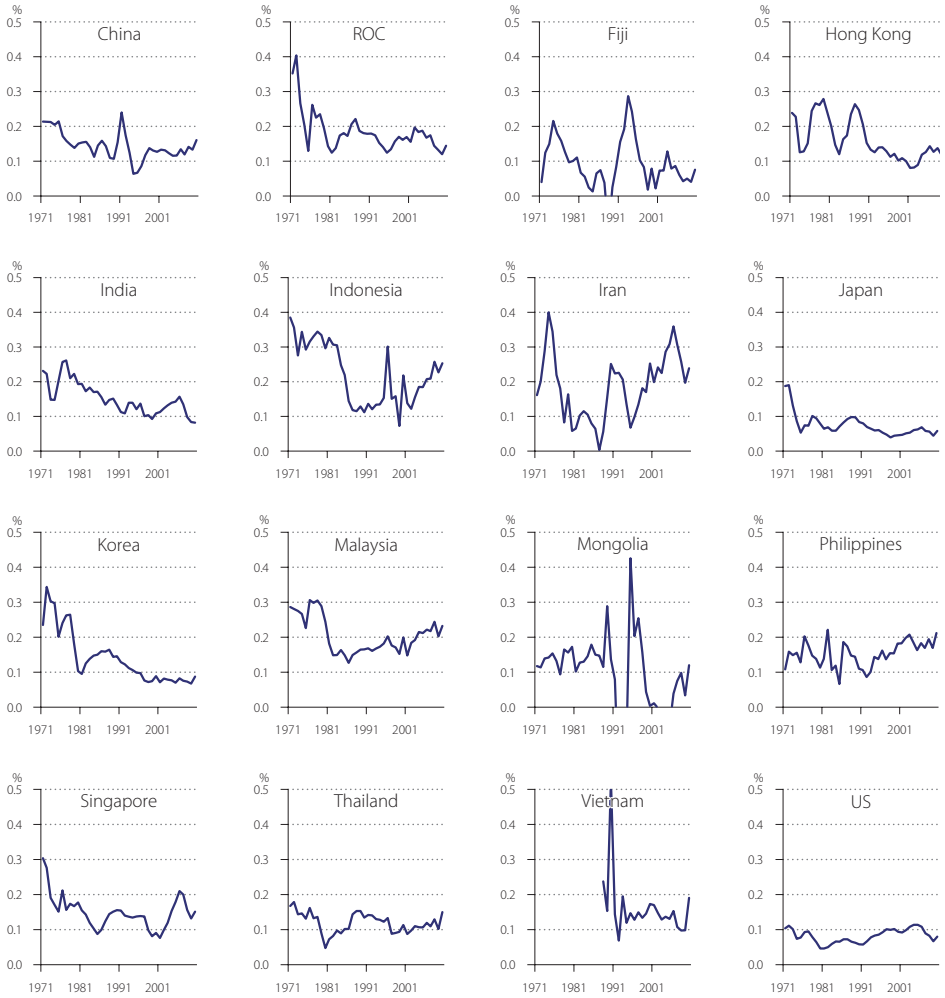

Figure A5 Ex Post Real Rate of Return in Asia, 1970–2010

Source: APO Productivity Database 2012.01.
Note: The starting period for Vietnam is 1986.

A.4 Data Sources

Most of the data for APO member economies have been prepared by national experts of each country and the research effort of KEO, Keio University. A list of the national experts is given in Section 1.2. Employment data have been constructed using statistics listed in the table at the end of each section. These data provided by the national experts are supplemented by the use of external data sources such as the *ILO Yearbook of Labor Statistics* (http://laborsta.ilo.org), the World Bank's *World Development Indicators*, UN data (National Accounts Official Country Data – http://data.un.org), and the Asian Development Bank's *Key Indicators for Asia and the Pacific* (www.adb.org/documents/books/key_indicators).

The exchange rates used in this edition are the adjusted rates, which are called the AMA (Analysis of Main Aggregate) rates, in the UNSD National Accounts Main Aggregate Database. The AMA rates coincide with IMF rates except for certain periods in countries with official fixed exchange rates and high inflation, when there could be a serious disparity between real GDP growth and growth converted to US dollars based on IMF rates. In such cases, the AMA adjusts the IMF-based rates by multiplying the growth rate of the GDP deflator relative to the US.

There are three reference countries, for which the authors collected and constructed data. For China, we use multiple data sources. GDP for the whole economy, industry GDP, final demand, and employment are taken from CEIC Data Company. Income data are taken from *China National Income 1952–1995 and China Statistical Yearbook*. Time-series data of GFCF during 1952–2010 are constructed by the authors. Main references for GFCF construction are *Statistics on Investment in Fixed Assets of China 1950–2000, China Statistical Yearbook*, and *1987, 1992, 1997, 2002, and 2007 Input–Output Tables of China*. Multiple data sources for manufacturing, electrics, and trade data from China's Customs Statistics are also utilized.[102]

The data source for EU15 and EU27 is OECD.Stat (http://stats.oecd.org/). The data for the US and Australia are taken from the website of the US Bureau of Economic Analysis (http://www.bea.gov) and the Australian Bureau of Statistics (http://www.abs.gov.au/), respectively.

Tax data of member economies are supplemented by the IMF's Government Finance Statistics (GFS). From its tax revenue data, "taxes on goods and services" and "taxes on imports" are used for calculating taxes on products. From its expenditure data, "subsidies" are taken. Data taken from GFS play a key role in adjusting GDP at market prices to GDP at basic prices.

Sources for Employment Data

Bangladesh	Labor Force Survey, Populations Census
Cambodia	Socio-Economic Survey, Labor Force Survey
ROC	Yearbook of Manpower Survey Statistics in Taiwan Area, Taiwan Statistical Data Book
Fiji	Annual Employment Survey, Population Census, Estimates by FIBOS (Fiji Islands Bureau of Statistics)
Hong Kong	Data download from Census and Statistics Department of Hong Kong Statistics
India	Census of India
Indonesia	Labor Situation in Indonesia
Iran	Population Census
Japan	Labor Force Survey, National Accounts
Korea	Census on Basic Characteristics of Establishment, Economically Active Population Survey, Monthly Labor Survey
Lao PDR	ADB Key Indicators for Asia and the Pacific
Malaysia	Economic Report Various Issues, Malaysia Economic Statistics-Time Series, Labor Force Survey Report
Mongolia	Mongolian Statistical Yearbook
Nepal	Population Census
Pakistan	Pakistan Economic Survey
Philippines	Labor Force Survey, Philippines Statistical Yearbook
Singapore	Labor Force Survey, Singapore Yearbook of Manpower Statistics
Sri Lanka	Central Bank of Sri Lanka Annual Report
Thailand	Labor Force Survey
Vietnam	Estimates by General Statistics Office

102: Holz (2006) provides a useful reference on Chinese official statistics.

A.5 Industry Classification

The concordance between the industry classification used in Chapter 6 and the International Standard Industry Classification of All Economic Activities (ISIC), Rev. 3, is shown in the following table.

	ISIC Rev.3	Databook		
A - Agriculture, hunting and forestry	01	1		Agriculture, hunting and related service activities
	02	1		Forestry, logging and related service activities
B - Fishing	05	1		Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing
C - Mining and quarrying	10	2		Mining of coal and lignite; extraction of peat
	11	2		Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying
	12	2		Mining of uranium and thorium ores
	13	2		Mining of metal ores
	14	2		Other mining and quarrying
D - Manufacturing	15	3	3.1	Manufacture of food products and beverages
	16	3	3.1	Manufacture of tobacco products
	17	3	3.2	Manufacture of textiles
	18	3	3.2	Manufacture of wearing apparel; dressing and dyeing of fur
	19	3	3.2	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
	20	3	3.3	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
	21	3	3.4	Manufacture of paper and paper products
	22	3	3.4	Publishing, printing and reproduction of recorded media
	23	3	3.5	Manufacture of coke, refined petroleum products and nuclear fuel
	24	3	3.5	Manufacture of chemicals and chemical products
	25	3	3.5	Manufacture of rubber and plastics products
	26	3	3.6	Manufacture of other non-metallic mineral products
	27	3	3.7	Manufacture of basic metals
	28	3	3.8	Manufacture of fabricated metal products, except machinery and equipment
	29	3	3.8	Manufacture of machinery and equipment n.e.c.
	30	3	3.8	Manufacture of office, accounting and computing machinery
	31	3	3.8	Manufacture of electrical machinery and apparatus n.e.c.
	32	3	3.8	Manufacture of radio, television and communication equipment and apparatus
	33	3	3.8	Manufacture of medical, precision and optical instruments, watches and clocks
	34	3	3.8	Manufacture of motor vehicles, trailers and semi-trailers
	35	3	3.8	Manufacture of other transport equipment
	36	3	3.9	Manufacture of furniture; manufacturing n.e.c.
	37	3	3.9	Recycling
E - Electricity, gas and water supply	40	4		Electricity, gas, steam and hot water supply
	41	4		Collection, purification and distribution of water
F - Construction	45	5		Construction
G - Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	50	6		Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
	51	6		Wholesale trade and commission trade, except of motor vehicles and motorcycles
	52	6		Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
H - Hotels and restaurants	55	6		Hotels and restaurants
I - Transport, storage and communications	60	7		Land transport; transport via pipelines
	61	7		Water transport
	62	7		Air transport
	63	7		Supporting and auxiliary transport activities; activities of travel agencies
	64	7		Post and telecommunications
J - Financial intermediation	65	8		Financial intermediation, except insurance and pension funding
	66	8		Insurance and pension funding, except compulsory social security
	67	8		Activities auxiliary to financial intermediation
K - Real estate, renting and business activities	70	8		Real estate activities
	71	8		Renting of machinery and equipment without operator and of personal and household goods
	72	8		Computer and related activities
	73	8		Research and development
	74	8		Other business activities
L - Public administration and defence; compulsory social security	75	9		Public administration and defence; compulsory social security
M - Education	80	9		Education
N - Health and social work	85	9		Health and social work
O - Other community, social and personal service activities	90	9		Sewage and refuse disposal, sanitation and similar activities
	91	9		Activities of membership organizations n.e.c.
	92	9		Recreational, cultural and sporting activities
	93	9		Other service activities
P - Private households with employed persons	95	9		Private households with employed persons
Q - Extra-territorial organizations and bodies	99	9		Extra-territorial organizations and bodies

Note: "n.e.c" represents "not elsewhere classified."

References

ADB (2007) *Purchasing Power Parities and Real Expenditure: 2005 International Comparison Program in Asia and the Pacific*, December, Manila: ADB.

ADB (2009) *Asian Development Outlook 2009*, March, Manila: ADB.

APO (2011) *APO Productivity Databook 2011*, March, Tokyo: APO.

Baier, Scott L., Gerald P. Dwyer, and Robert Tamura (2006) "How Important Are Capital and Total Factor Productivity for Economic Growth?" *Economic Inquiry* 44(1), pp. 23–49.

Bloom, David E., David Canning, and Pia N. Malaney (2000) "Population Dynamics and Economic Growth in Asia," *Population and Development Review* 26, pp. 257–290.

Bosworth, Barry P. (2005) "Economic Growth in Thailand: The Macroeconomic Context," paper presented to World Bank project on investment climate, firm competitiveness and growth in Thailand.

Bosworth, Barry P., and Susan M. Collins (2008) "Accounting for Growth: Comparing China and India," *Journal of Economic Perspective* 22(1), pp. 45–66.

Caner, Mehmet, Thomas Grennes, and Fritzi Koehler-Geib (2010) "Finding the Tipping Point When Sovereign Debt Turns Bad," paper submitted to Conference Volume: World Bank Conference on Debt Management.

Caselli, Francesco (2005) "Accounting for Cross-Country Income Differences," in P. Aghion and S. N. Durlauf (eds) *Handbook of Economic Growth*, Amsterdam: North Holland, pp. 679–741.

Cororaton, Caesar B. (2002) "Total Factor Productivity in the Philippines," Discussion Paper Series 2002–01, Philippine Institute for Development Studies, Makati.

Crafts, Nicholas (1999) "East Asian Growth Before and After the Crisis," *IMF Staff Papers* 46(2), pp. 136–166.

Department of Statistics Malaysia (2011) *National Accounts Capital Stock Statistics 1955–2009*, April.

Diewert, W. Erwin, and Denis Lawrence (2006) "Measuring the Contributions of Productivity and Terms of Trade to Australia's Economic Welfare," report by Meyrick and Associates to Australian Government Productivity Commission, Canberra.

Diewert, W. Erwin, and Catherine J. Morrison (1986) "Adjusting Outputs and Productivity Indexes for Changes in the Terms of Trade," *Economic Journal* 96(3), pp. 659–679.

Diewert, W. Erwin, and Alice O. Nakamura (2007) "The Measurement of Productivity for Nations," in J. Heckman and E. Leamer (eds) *Handbook of Econometrics*, Vol. 6A, Amsterdam: North Holland, pp. 4501–4586.

Diewert, W. Erwin, Hideyuki Mizobuchi, and Koji Nomura (2005) "On Measuring Japan's Productivity, 1995–2003," Department of Economics Discussion Paper Series No. 05–22, December, Vancouver: University of British Columbia.

Economist Intelligence Unit (2010) "Country Report: Myanmar, January 2010," available at http://www.eiu.com/.

Eichengreen, B, Donghyun Park, and Kwanho Shin (2011) "When Fast Growing Economies Slow Down: International Evidence and Implications for China," NBER Working Paper Series 16919.

Gollin, Douglas, Stephen L. Parente, and Richard Rogerson (2004) "Farm Work, Home Work and International Productivity Differences," *Review of Economic Dynamics* 7, pp. 827–850.

Holz, Carsten A. (2006) "Measuring Chinese Productivity Growth, 1952–2005," mimeo, Social Science Division, Hong Kong University of Science and Technology.

IMF (2011) World Economic Outlook, September.

IMF (2012) World Economic Outlook, January.

Jorgenson, Dale W. (2009) *The Economics of Productivity*, Cheltenham: Edward Elgar Publishing.

Jorgenson, Dale W., and Zvi Griliches (1967) "The Explanation of Productivity Change," Review of Economic Studies 34(3), pp. 249–283.

Jorgenson, Dale W., and Koji Nomura (2005) "The Industry Origins of Japanese Economic Growth," *Journal of Japanese and International Economies* 19 (December), pp. 482–542.

Jorgenson, Dale W., and Koji Nomura (2007) "The Industry Origins of the U.S.-Japan Productivity Gap," *Economic Systems Research* 19 (September), pp. 315–341.

Jorgenson, Dale W., Mun S. Ho, and Kevin J. Stiroh (2005) *Information Technology and the American Growth Resurgence*, Cambridge, MA: MIT Press.

Kohli, Ulrich (2004) "Real GDP, Real Domestic Income and Terms of Trade Changes," *Journal of International Economics* 62(1), pp. 83–106.

Kohli, Ulrich (2006) "Real GDP, Real GDI, and Trading Gains: Canada, 1981–2005," *International Productivity Monitor* 13, pp. 46–56.

Kuroda, Masahiro, Kazushige Shimpo, Koji Nomura, and Nobuyuki Kobayashi (1997), KEO Database – *The Measurement of Output, Capital, and Labor*, KEO Monograph Series No. 8, Tokyo: Keio University

(in Japanese).
Lau, Eunice, and Prabhat Vaze (2002) "Accounting Growth: Capital, Skills and Output," paper presented at Department of Trade and Industry National Statistics Productivity Workshop, November, London.
Leigh, Daniel, Pete Devries, Charles Freedman, Jaime Guajardo, Douglas Laxton, and Andrea Pescatori (2010) "Will It Hurt? Macroeconomic Effects of Fiscal Consolidation in World Economic Outlook," *IMF World Economic Outlook*, Chapter 3.
Maddison, Angus (1995) *Monitoring the World Economy* 1820 –1992, Paris: OECD.
Maddison, Angus (1998) *Chinese Economic Performance in the Long Run*, Paris: OECD Development Centre.
Nomura, Koji (2004) *Measurement of Capital and Productivity in Japan*, Tokyo: Keio University Press (in Japanese).
OECD (2001) *Measuring Productivity - OECD Manual*, Paris: OECD.
OECD (2008) *OECD Compendium of Productivity Indicators*, Paris: OECD.
OECD (2009) *Measuring Capital- OECD Manual*, 2nd edn, Paris: OECD.
OECD (2011) *OECD Economic Outlook*, No. 90, November.
Ohkawa, Kazushi, Nobukiyo Takamatsu, and Yuzo Yamamoto (1974) *Estimates of Long-Term Economic Statistics of Japan since 1868* Vol. 1, *National Income*, Tokyo: Toyo Keizai Shinposha (in Japanese).
Park, Yung Chul, and Kwanho Shin (2009) "Economic Integration and Changes in the Business Cycle in East Asia: Is the Region Decoupling from the Rest of the World?" *Asian Economic Papers* 8(1), pp. 107–140.
Schreyer, Paul (2002) "Computer Price Indices and International Growth and Productivity Comparisons," *Review of Income and Wealth* 48(1), pp. 15–33.
Schreyer, Paul, Pierre-Emmanuel Bignon, and Julien Dupont (2003) "OECD Capital Services Estimates: Methodology and a First Set of Results," OECD Statistics Working Paper 2003/6, Paris: OECD.
Stiglitz, Joseph (2006), *Making Globalization Work: The Next Steps to Global Justice*, Penguin Allen Lane.
Stiglitz, Joseph E., Amartya Sen, and Jean-Paul Fitoussi (2009) *Report by the Commission on the Measurement of Economic Performance and Social Progress*.
Solow, Robert (1957), "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics* 39(3), pp. 312–320.
Timmer, Marcel P., and Bart van Ark (2000) "Capital Formation and Productivity Growth in South Korea and Taiwan: Realising the Catch-up Potential in a World of Diminishing Returns," Groningen Growth and Development Centre, University of Groningen.
Turner, Adair (2009) "Population Priorities: The Challenge of Continued Rapid Population Growth," *Philosophical Transactions of the Royal Society* 364, pp. 2977–2984.
United Nations (1993) *System of National Accounts 1993*, New York: United Nations.
United Nations (2007) Update of the 1993 SNA: Full set of consolidated recommendations, Statistical Commission, Thirty-Eight session.
United Nations (2008) International Standard Industrial Classification of all Economic Activities, Revision 4, Department of Economic and Social Affairs Statistics Division, Statistical Paper series M No.4/Rev.
United Nations (2009) *System of National Accounts 2008*, New York: United Nations.
United Nations (2011) *World Population Prospects: The 2010 Revision*.
Van der Eng, Pierre (2008) "Capital Formation and Capital Stock in Indonesia, 1950–2007," Working Papers in Trade and Development 2008/24, Australian National University, Canberra.
Van der Eng, Pierre (2009) "Total Factor Productivity and Economic Growth in Indonesia," Working Papers in Trade and Development 2009/01, Australian National University, Canberra.
Warr, Peter (2006) "Productivity Growth in Thailand and Indonesia: How Agriculture Contributes to Economic Growth," Working Paper in Economics and Development Studies 2006/06, Padjadjaran University, Bandung.
World Bank (2008) *Global Purchasing Power Parities and Real Expenditures: 2005 International Comparison Program*, Washington, DC: World Bank.
World Bank (2011) *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*, Washington, DC: World Bank.
Young, Alwyn (1995) "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience," *Quarterly Journal of Economics* 110(3), pp. 641–680.
Young, Alwyn (2003) "Gold into Base Metals: Productivity Growth in the People's Republic of China during the Reform Period," *Journal of Political Economy* 111(6), pp. 1220–1261.

ASIAN PRODUCTIVITY ORGANIZATION

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