

GLOBALISATION AND LINKAGES: MACRO-STRUCTURAL CHALLENGES AND OPPORTUNITIES

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This paper was prepared as a contribution to the Organisation wide study "Towards a new global age: Challenges and opportunities" (Linkages 2) presented in OECD (1997*a* and *b*). The editor and principal author is Head of Macroeconomic Analysis and Systems Management Division of the OECD Economics Department. Individual contributions were made by Marcos Bonturi, Alain De Serres, Thomas Egebo, Alessandro Goglio, Lisbeth Hellvin, Marie Odile Louppe, David Turner, Anne Vourc'h and Bernard Wacquez. Special thanks go to Christophe Madaschi, Laurence Le Fouler and Frédérique Guillemine for statistical support and to Jan-Cathryn Davies, Lyn Louichaoui, Sylvie Ricordeau and Anne Eggimann for technical preparation. Thanks also go to numerous colleagues, notably Robert Ford and Michael Feiner, for their comments on earlier drafts.

INTRODUCTION AND BACKGROUND

In May 1995, the OECD Development Centre published a study entitled “Linkages: OECD and major developing economies” (Linkages 1), examining current and prospective economic developments in 15 developing economies,¹ and their relationships with OECD economies. It focused mainly on developments in China, India and Indonesia but excluded the dynamic non-Member economies (DNMEs) and the central and eastern European countries (CEECs). Examining economic linkages – trade, investment, capital flows and technology exchanges – many of these economies were found to be pursuing “linkage-intensive” development strategies, integrating them into the global economy (“globalisation”). While the world economy is still dominated by OECD countries, new policies in these emerging economies represent an important turnaround with implications for the OECD, creating new centres of economic influence and increasingly affecting patterns of world trade, investment and production. The study concluded that OECD countries are likely to realise significant net gains from the rapid economic development of these economies, which represent potentially large expanding markets for OECD exports of goods, services, capital and technical know-how.

The OECD Linkages 2 study was set up on an Organisation-wide basis, to extend this analysis to a wider range of non-Member economies and to examine the broad implications for the OECD as an organisation and its outreach strategy, in particular with respect to the “Big Five” economies.² Specifically, this has involved:

- the examination of issues from a longer-term perspective, drawing on scenarios to 2020 which take into account a range of alternative economic, political and social developments;
- a focus on the effects of increased interdependence, through trade, investment, finance, regional integration, technology and demographic factors; and
- analysis of the related policy implications for macroeconomic and structural policies, trade, investment and financial liberalisation, development co-operation and environmental policies.

This paper provides a summary of the OECD Economics Department contribution to the study. It examines medium- to long-term aspects of developments in the OECD area and its linkages with the non-OECD economies, primarily from

structural and macroeconomic perspectives.³ It reviews the past evolution of the world economy and the current economic situations in key regions focusing on:

- macro-structural developments in the OECD;
- the non-OECD growth experience: the sources of growth and associated policy settings;
- the role of globalisation and linkages between OECD and non-OECD regions in the development process; and
- the influence of policies and policy reforms on factor productivity and potential growth in OECD and non-OECD economies.

It goes on to examine possible future developments in an economic environment characterised by a rapid pace of globalisation, through trade and investment liberalisation, and a higher degree of economic interdependence.

In doing so, it sketches out a number of forward-looking scenarios for the world economy over the next 25 years. Based on a growth accounting framework, these scenarios provide a range of estimates of economic growth by country and region, which depend in turn on a wide range of assumptions about key underlying factors and policies. Such scenarios are not, therefore, forecasts to which specific probabilities can be attached. Their value lies not in predictive accuracy of specific economic conditions or events, but in the insights which they give about the factors likely to influence future growth and development, and the illustration of the broad implications of such factors for absolute and relative economic performance in the medium to longer term. The comparison of quantitative scenarios also facilitates the analysis of the risks and uncertainties, and hence the requirements for achieving satisfactory global economic performance on a durable basis.

Although prominent position is given to a specific “high growth” case, this scenario is optimistic in embodying a number of favourable assumptions about future policies and therefore serves as an objective to which policies might aspire. However, numerous obstacles, tensions and adverse factors abound which could lead to less satisfactory outcomes for one or all participants in the world economy, and scenarios essentially based on extrapolations of current trends are seen to result in significantly worse outcomes. An important aim of the study is, therefore, to throw some light on the necessary conditions for growth and development and the policies needed to make unsatisfactory outcomes less likely to occur. In this context, the final section of this paper examines a number of structural and macroeconomic factors specific to the OECD economies which could be important sources of tension in the longer term, and the way in which these may interact with the non-OECD economies.

A key component of any appraisal of the future is a review of the current and past economic situation, since these represent the basic starting conditions and the underlying constraints to likely developments and policies. They also provide useful lessons on the success or failure of different policy approaches. The first part of this paper, therefore, provides a “backward look” at economic growth and macroeconomic developments in the OECD and non-OECD regions over the past 25 years and their interaction, notably through international trade and investment, and a review of main factors associated with underlying factors and policies which have influenced growth developments.

THE ECONOMIC EXPERIENCE OF THE PAST 25 YEARS: A BACKWARD LOOK

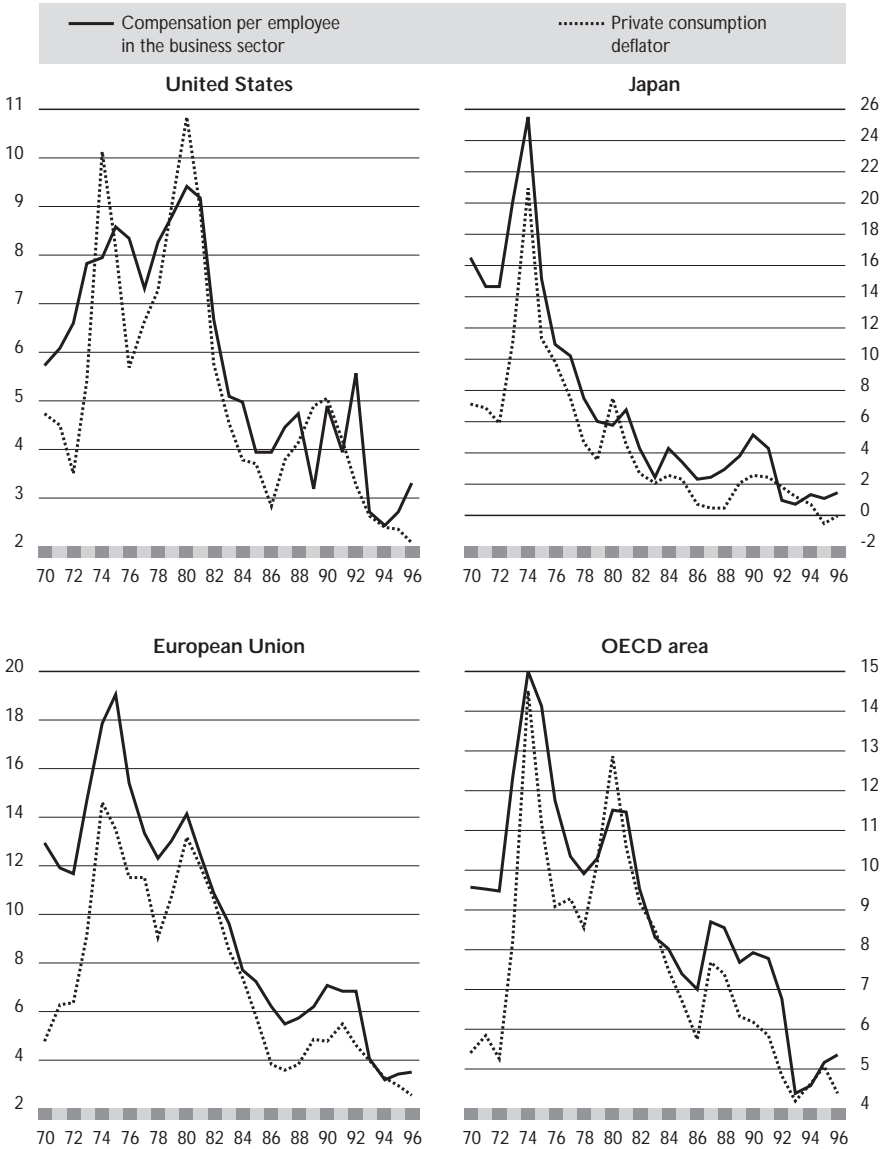
The past 25 years have been characterised by significant and fundamental changes in the economic and institutional landscape of the world economy; changes which have challenged the capacity of economies and societies to adapt. Widespread lowering of national and regional barriers to trade and foreign direct investment, combined with major improvements in transport, production and communications technologies have led to rapid increases in world trade and investment flows and closer links between OECD and non-OECD economies. Liberalisation of domestic and international financial markets has enabled virtually free, but sometimes more volatile, flows of financial resources. A generalised shift to floating exchange rates among major currency blocks has, at times, caused substantial swings in the value of major currencies and terms of trade. Commodity prices, most notably those of crude oil and petroleum, have fluctuated markedly in the first half of the period, forcing large relative price changes. With price inflation soaring to two-digit rates in many OECD countries in the 1970s and early 1980s, the achievement of low inflation has become increasingly entrenched as an over-riding objective of economic policy, with most OECD countries now having achieved this objective.

Developments within the OECD

In spite of the major reductions in inflation achieved to date (Figure 1) and the stimuli to potential efficiency and growth arising from structural changes and liberalisation, the broad macroeconomic performance of OECD countries over the past two to three decades has worsened in a number of important respects:

- Productivity growth has slowed throughout the area (Table 1), even though Japan and Europe were catching up to US productivity levels or even becoming productivity leaders in some industries.⁴ In manufacturing, there remains scope for further catching up to best practices, while productivity in service sector industries often remains low in Europe and Japan, reflecting the effects of government regulations and limited exposure to foreign competition.

◆ Figure 1. **Indicators of inflation**
 Percentage changes from previous year



Source: OECD Economic Outlook 60.

Table 1. **Productivity in the business sector**

Percentage changes at annual rates

	United States ¹	Japan	European Union ²	OECD ²
Total factor productivity ³				
1961-70 ⁴	2.5	6.1	3.3	3.3
1971-80	0.6	1.8	1.7	1.3
1981-90	0.8	1.8	1.4	1.2
1991-95 ⁵	0.4	-0.3	0.9	0.5
Labour productivity				
1961-70 ⁴	2.6	9.2	5.4	4.8
1971-80	0.9	3.7	3.1	2.3
1981-90	1.1	2.9	2.2	1.8
1991-95 ⁵	0.6	0.7	1.5	1.0
Capital productivity				
1961-70 ⁴	2.3	-2.8	-0.9	0.0
1971-80	0.1	-3.9	-1.2	-1.1
1981-90 ⁵	0.1	-1.4	-0.1	-0.3
1991-95 ⁵	-0.1	-3.4	-0.4	-0.8

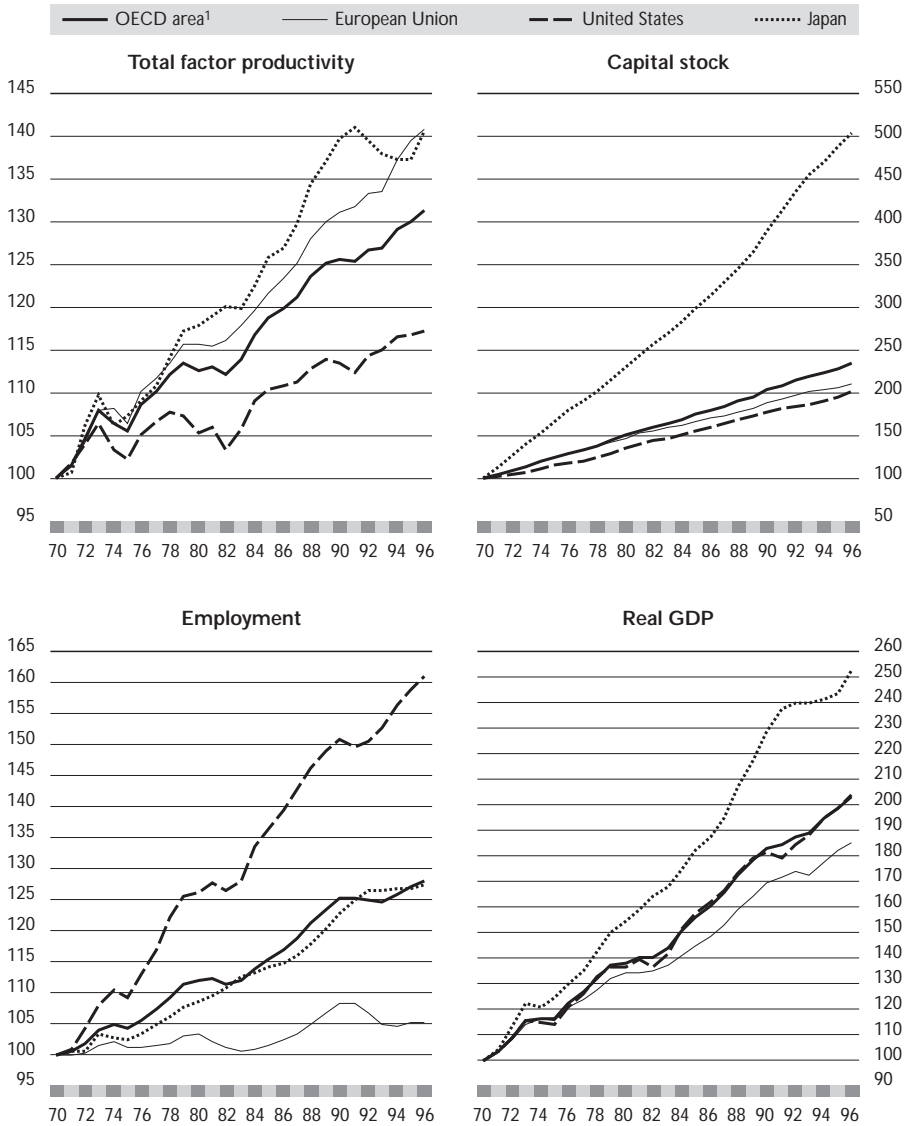
1. Estimates for the United States are based on available capital stock statistics, which do not incorporate the most recent changes in national accounts measurement principles.
2. Aggregates are calculated on the basis of 1992 GDP for the business sector expressed in 1992 purchasing power parities.
3. TFP growth is measured as a weighted average of the growth in labour and capital productivity, with the sample period averages for capital and labour shares as weights.
4. 1962 for Japan.
5. 1994 for Japan.

Source: *OECD Economic Outlook 60*.

- Unemployment has risen steeply in many countries, most notably in Europe (Figure 2), as structural policies have responded only slowly to changes in conditions affecting labour markets, in particular those related to the trend decline in demand for unskilled workers; in other countries income differentials have widened significantly.⁵
- National saving rates have declined throughout the area, reflecting: a decline in private saving (albeit from a very high rate) in Japan; lower government saving in Europe; and a combination of both in the United States. This has led, in turn, to rising levels of public debt, higher real interest rates and less rapid capital accumulation in the OECD area (Figure 3).

The combination of these factors has contributed to a slowing in the growth of real incomes and employment in the OECD area over the period (Figure 4). Developments in individual major OECD countries and regions reflect a combination of these common elements and more diverse country- and region-specific factors.

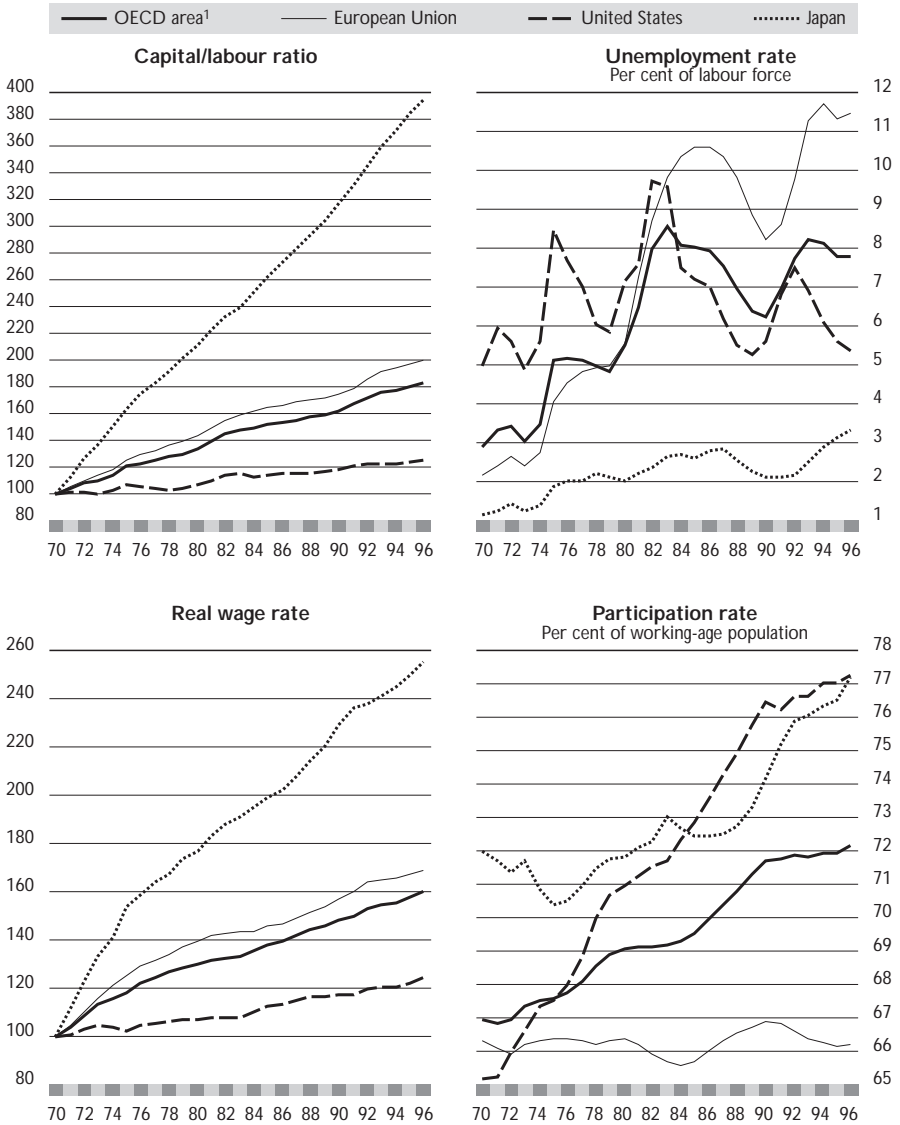
◆ Figure 2. **Key indicators of supply performance in the OECD area**
 Total economy, index 1970 = 100



1. Excluding Mexico.

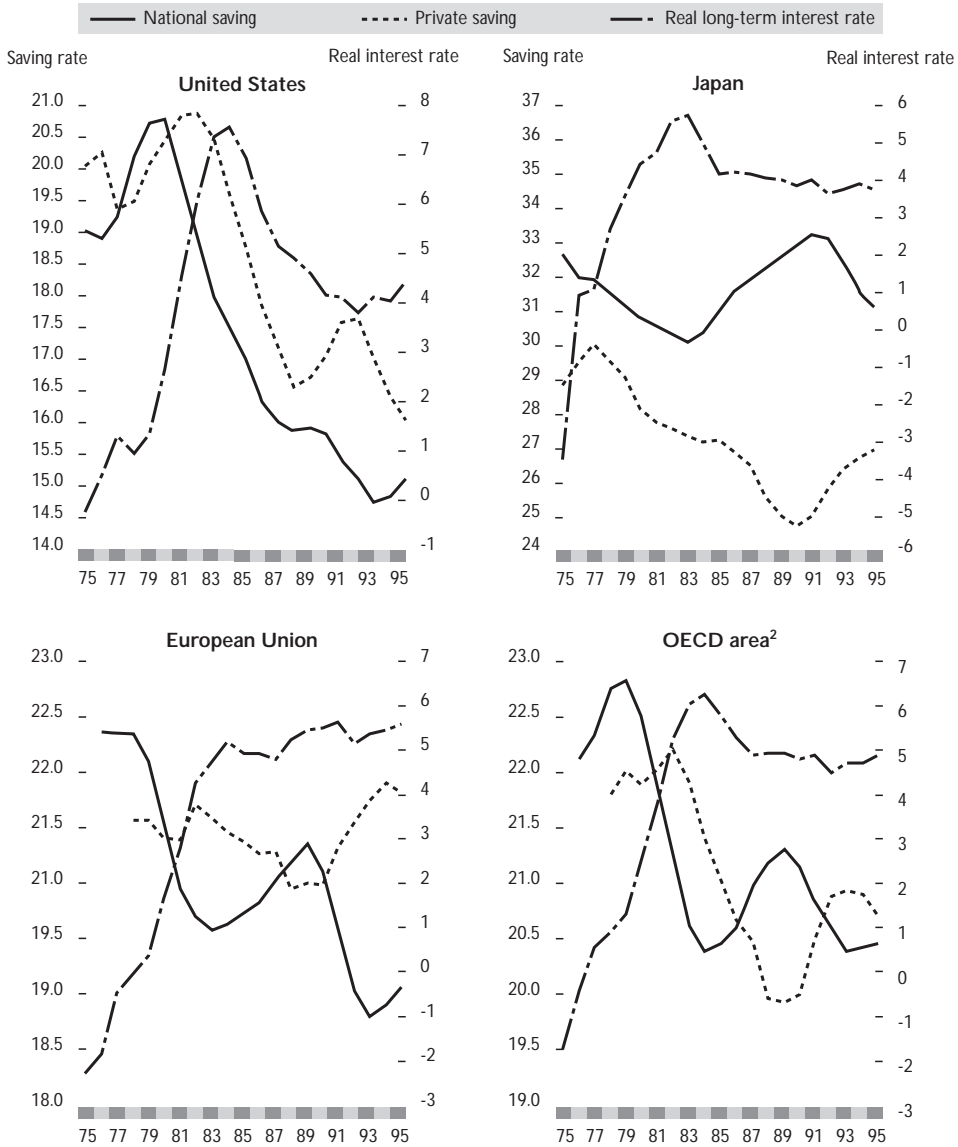
Source: OECD, Analytical Databank.

◆ Figure 2. (cont.) **Key indicators of supply performance in the OECD area**
 Total economy, index 1970 = 100



1. Excluding Mexico.
 Source: OECD, Analytical Databank.

◆ Figure 3. **Saving rates and real interest rates¹**
Saving as a percentage of nominal GDP

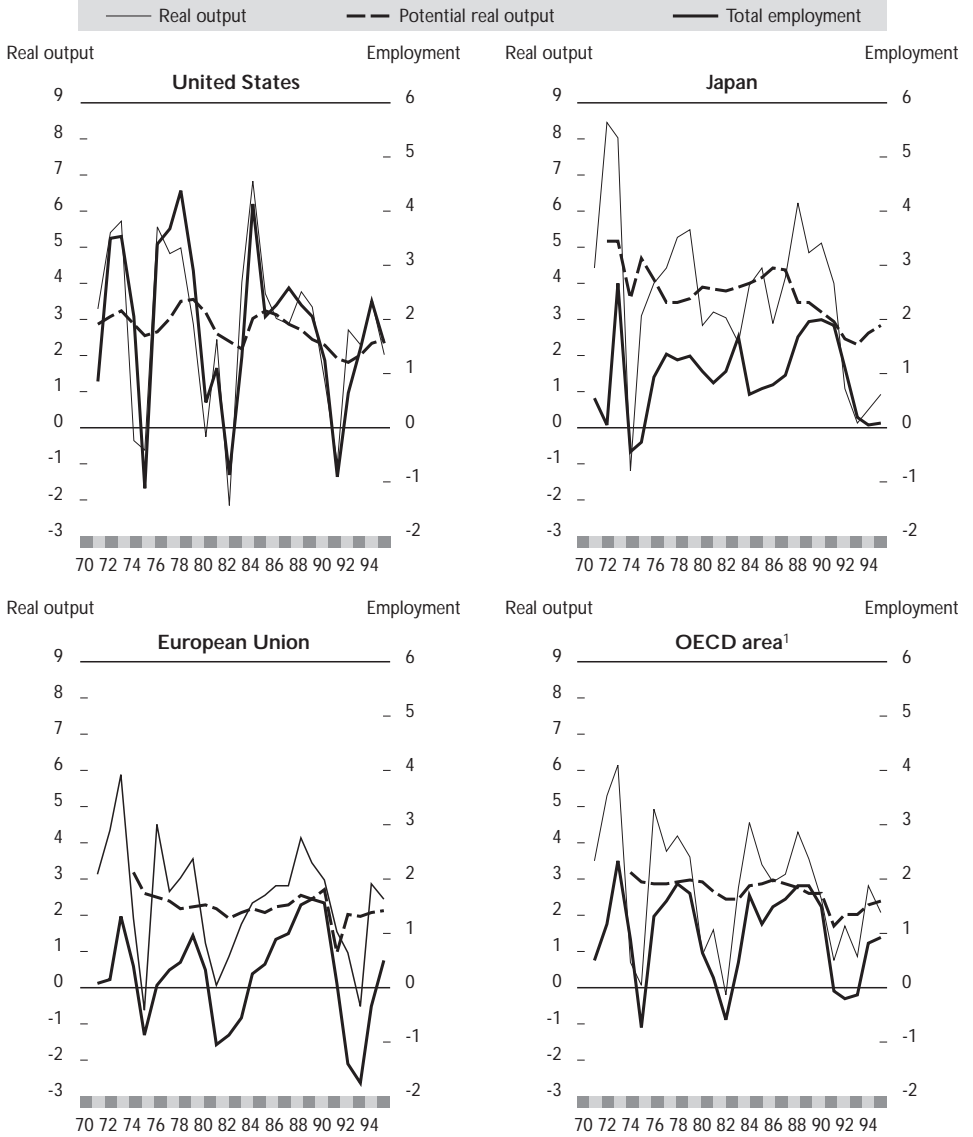


1. Smoothed by a 3-year centered moving average.

2. Excluding Mexico.

Source: OECD Economic Outlook 60.

◆ Figure 4. **Real income and employment in the OECD area**
 Percentage changes previous year



1. Excluding Mexico.
 Source: OECD Economic Outlook 60.

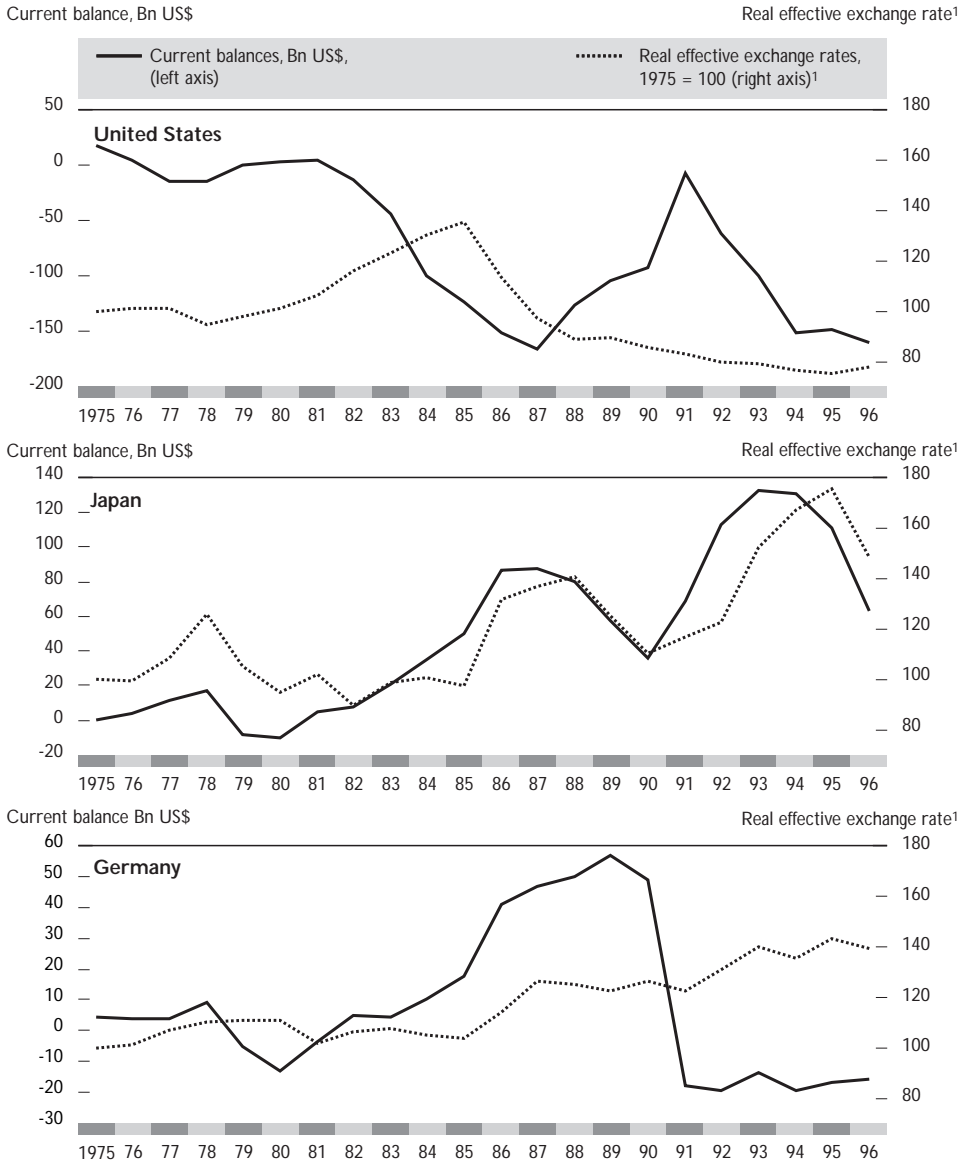
In the United States, a substantial share of total output growth can be attributed to increased inputs of production factors as opposed to their more efficient use (Figure 2); over the past 25 years total factor productivity has risen at an average annual rate of little over 0.5 per cent. Flexible labour markets and wage determination have ensured an unemployment rate which has fluctuated around a fairly stable level, and the main thrust of macroeconomic policies has been to reduce inflation while stabilising economic activity at near full employment. Employment growth has been strong in the face of a rising labour force, due to a growing population, a rise in the share of the working age population, and significant increases in female participation. However, changes in technology and possibly also trade and investment developments have resulted in a tendency for labour demand to shift towards skilled groups. With education and training attainments failing to keep pace, strong employment performance has come at the expense of widening income differentials and stagnating, or even falling, real wages among the unskilled.

Since the early 1980s, the contribution of widening US budget deficits and unfavourable debt dynamics have led to a substantial rise in government indebtedness. As the private sector's propensity to save has declined, government debt has risen and the external account has remained in substantial deficit. As a result, the net foreign asset position has shifted to be one where the United States is now the world's largest net debtor and importer of capital. This in turn is generally held to have contributed to a trend decline in the nominal and real value of the dollar against other key currencies (Figure 5).

In spite of relatively rapid growth in government employment, unemployment rates in most European countries have risen dramatically over the period (Figure 2); employment in the private sector has stagnated, reflecting increased structural problems in labour markets. Although there are some differences in the exact causes across individual countries, generous unemployment and social benefits and high marginal taxes have kept incentives to seek gainful employment low, and high minimum wages, employment-protection legislation and employment-tax wedges have made companies reluctant to hire workers.⁶ Thus, real wage growth has remained high in Europe despite growing joblessness and, with a few notable exceptions, for example in the United Kingdom, few new jobs have been created.

Over the past 25 years, Europe has achieved roughly the same rise in total output as the United States, with largely the same increase in capital⁷ (Figure 2). But with real wages increasing rapidly, capital accumulation has tended to be largely capital deepening, as opposed to capital widening as in the United States. As a result, employment has remained stagnant despite favourable demographic changes, including a rising share of the working age population and rising female participation. These demographic changes have also been offset by a

◆ Figure 5. **Current balances and real effective exchange rates¹**



1. Defined as the relative unit labour costs in manufacturing. An increment means a deterioration of competitiveness.
Source: OECD Economic Outlook 60.

considerable fall in male participation rates, notably among older workers who have benefited from generous early retirement schemes. Thus, while Europe was able to employ 40 per cent of its population in 1970, this ratio has fallen to 35 per cent by 1995. With wage structures remaining inflexible in Europe, rising joblessness has in particular affected the unskilled. Indeed, shedding of unskilled labour in Europe, but not in the United States, may explain at least partly why total factor productivity growth in Europe has generally been higher than in the United States.

Expansionary fiscal policies and inadequate responses to fiscal pressures associated with rising unemployment have led to worsening fiscal positions and accelerating public debt accumulation in Europe. Not only has this reduced savings directly, and thereby contributing to higher real interest rates, but the failure to reduce deficits has at times also undermined the credibility of monetary policies, putting even further upward pressure on real interest rates in Europe.

Whilst productivity growth in Japan has been generally higher than in other OECD economies, it has slowed markedly as the country approached the global production technology frontier in manufacturing (the dramatic further slowing in the early 1990s may largely reflect cyclical developments) (Table 1). This slowing is also likely to have reduced the marginal return to further investment and investment rates have declined. With national and private saving rates still remaining very high in relation to other OECD countries (Figure 3) and with large and continuing current account surpluses, Japan has become the world's largest net creditor and exporter of capital. In spite of some recent reversal in trends, the yen has tended to appreciate over the period in real and nominal terms (Figure 5).

Although capital accumulation in Japan has been even more capital deepening than in Europe (Figure 2), unemployment has remained low, reflecting relatively flexible wages, labour force responsiveness and considerable investment in human capital formation. In fact, like the United States but less spectacularly, Japan has been able to employ an increasing share of its population, as the share of the working age population has risen and an increasing number of women have joined the labour force.

Evolution of policies and future challenges

Throughout the period, there has been a progressive shift in the thrust and direction of economic policies in virtually all OECD countries towards the improvement of structural performance. Recognising the many failures of the 1970s, where macroeconomic policies were too often directed to short-term objectives, there has been a steady shift in emphasis through the 1980s and first half of the 1990s towards more medium-term objectives and, in particular, the

task of maintaining the necessary underlying conditions for sustainable growth in output and employment.⁸ Thus macroeconomic policies in most OECD countries have become more clearly focused on the control of inflation and the need to consolidate public finances as opposed to short-term demand management,⁹ whilst microeconomic and structural policies have increasingly emphasised the role of competition and markets in achieving improved allocation of resources and higher rates of efficiency. Over the period, it has also become increasingly clear that many key macroeconomic problems – notably high unemployment and slow growth – are largely of a structural nature, and that there are significant interactions between structural reforms and macroeconomic policies whereby one set of policies or reforms enhance or limit the effects of others.¹⁰

Although there has been some progress and also limited success in some countries, the policy responses to the macro-structural challenges have to date been generally insufficient. While price stability has been largely achieved, fiscal positions are now generally worse than they were in the late 1970s and unemployment remains high. Structural reforms have been significant in some areas, notably in the financial sector and international trade, but have lagged in others, notably labour markets. In part, uneven progress has reflected uncertainties about the net benefits and concern about transition costs, with the latter being more easily identifiable than the former. Overall such factors have contributed to political resistance to reform.

Although there is some variation across OECD countries and regions, according to differences in prevailing economic conditions, institutional settings and approaches to policies, the challenges which they face over the coming decades will not be dissimilar from those of the recent past. The sustainability of fiscal positions and the implications of rising public debt for financial and capital markets continue to be of concern in most countries. Low or declining rates of productivity growth are seen as major factors in limiting growth and employment in the longer term. Lack of labour market flexibility, inadequate labour market policies and ineffective social protection continue to expose members of society to unemployment and varying forms of social deprivation. Government regulation and discriminatory practices in many sectors continue to impede national and international competition.

At the same time, a number of new factors are likely to come into play over the longer term, ones which interact with existing problems faced by OECD economies. In particular, longer-term (largely unfavourable) demographic trends – including slow (or declining) population growth with an ageing structure – will become increasingly important. Directly and indirectly, such demographic factors have important effects on the size of the labour force, and hence potential employment and output growth, on savings and investment behaviour and on public finances and financial markets. Added to these, current and future trends

in globalisation in trade, investment and production, and the development of the major non-OECD economies will be of major significance, both in creating competitive pressures and new market opportunities for OECD economies.

Developments within the non-OECD

Starting from relatively low output levels, economic growth in the non-OECD area has been stronger than for the OECD over the past 25 years, with GDP growth rates averaging 5 per cent per annum (Table 2 and Figure 6). Particularly strong growth was achieved in the 1970s, with rates commonly in excess of 6 per cent in many countries, but activity slowed during the 1980s, most notably in Latin America, the Middle East and Africa, before returning more recently to higher growth rates.

Within this picture of rapid growth for the area as a whole, there are, however, significant regional variations. Economic performance has been strongest in the dynamic Asian economies, Indonesia and, more recently, China, which have all experienced growth well in excess of 6 per cent per annum for most of the period. GDP growth in the rest of Asia, including India, has been more moderate, averaging 4 per cent per annum, and with the exception of Brazil during the 1970s, has been substantially lower in most other non-OECD regions, notably so in Africa, Latin America and the Middle East. In many of these regions, growth was adversely affected by the sequence of financial crises and macroeconomic instability which most Asian economies have managed to avoid. In Brazil real GDP growth fell from an average rate of over 8 per cent per annum in the 1970s, to close to 2 per cent per annum in the following decade and many other non-OECD economies have experienced similar setbacks, particularly in Latin America and Africa. Real GDP in the former Soviet Union (FSU) on the other hand, grew by an average 2 per cent per annum between 1970 and 1990, but fell by approximately 40 per cent between 1990 and 1995.¹¹

Reflecting these relative trends, Asia's share of world GDP has increased almost threefold since 1970, that of Latin America has been static, those of the Middle East and Africa have declined moderately, and that of Russia and other Comecon countries have fallen by about two-thirds¹² (first two panels of Figure 7).¹³

Sources of growth

Over the period, capital accumulation, and to a lesser extent, employment growth, have been the main sources of output growth in the non-OECD area (Table 2). The contribution of total factor productivity (TFP) has been relatively low for the non-OECD area as a whole, reflecting stagnant or even negative rates in some regions such as the former Soviet Union, Latin America, the Middle East

Table 2. **Productivity and growth in the non-OECD economies**¹

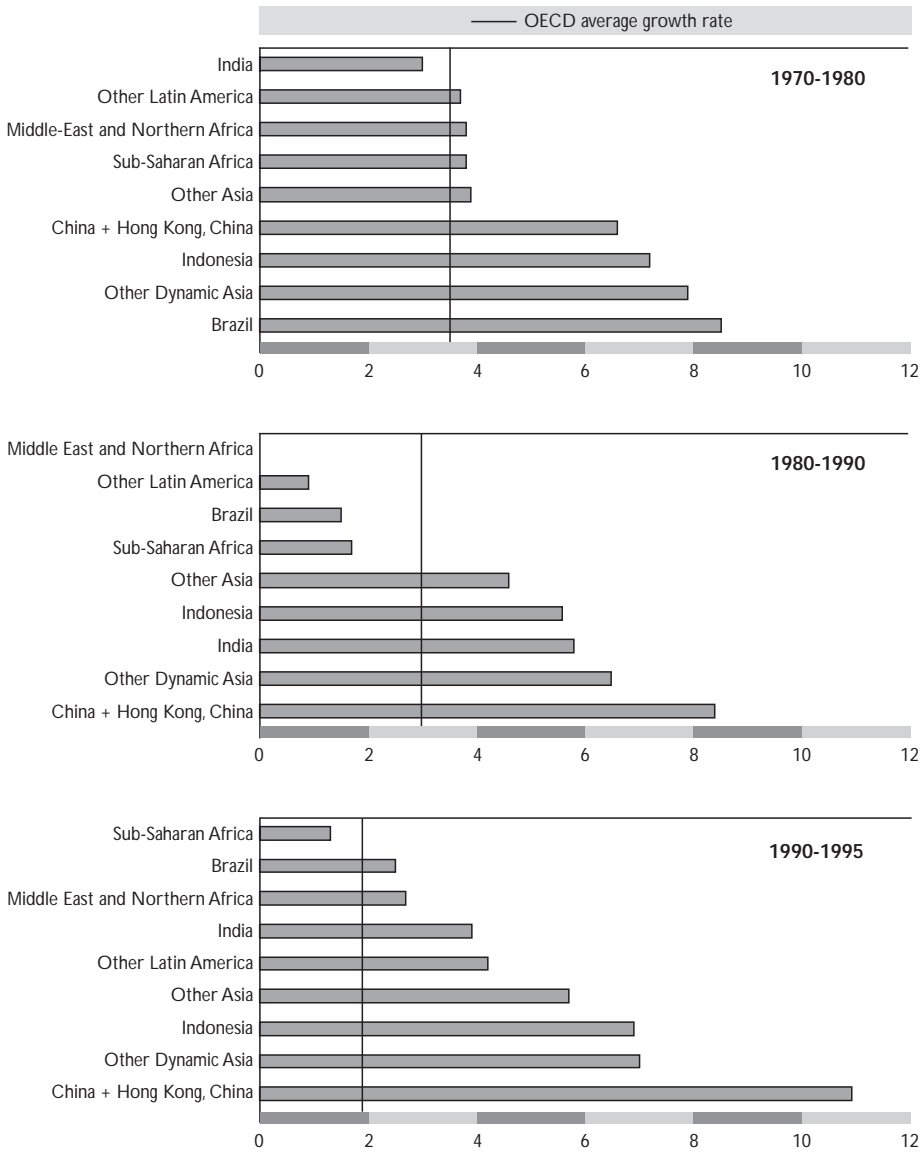
Average annual growth rates, in percentage

	Capital share	Real GDP growth				Employment growth				Capital growth				TFP growth			
		1970-1995	1970-1980	1980-1990	1990-1995	1970-1995	1970-1980	1980-1990	1990-1995	1970-1995	1970-1980	1980-1990	1990-1995	1970-1995	1970-1980	1980-1990	1990-1995
OECD	..	2.9	3.4	2.9	1.8	0.4	0.4	0.4	0.2	1.4	1.7	1.4	1.1	1.0	1.1	1.1	0.5
Brazil	0.60	4.4	8.5	1.5	2.5	1.0	1.3	0.9	0.6	3.4	5.8	2.2	1.2	0.0	1.5	-1.6	0.7
China and Hong Kong, China	0.50	8.2	6.6	8.4	10.9	-	-	1.2	0.6	-	-	4.6	4.4	-	-	2.6	5.9
India	0.40	4.3	3.0	5.8	3.9	0.9	0.9	0.9	1.2	1.9	1.8	2.0	1.8	1.5	0.3	3.0	0.9
Indonesia	0.55	6.5	7.2	5.6	6.9	1.0	1.0	1.1	0.9	5.4	6.2	5.7	3.5	0.1	0.1	-1.1	2.5
Russia	-	-0.5	2.4	1.5	-9.4	-	-	-	-	-	-	-	-	-	-	-	-
Other Dynamic Asia	0.45	7.2	7.9	6.5	7.0	1.4	1.6	1.3	1.1	4.1	5.0	3.6	3.1	1.7	1.3	1.5	2.8
Other Asia	0.60	4.5	3.9	4.6	5.7	-	-	1.0	1.3	-	-	2.6	3.5	-	-	1.0	1.0
Other Latin America	0.60	2.7	3.7	0.9	4.2	1.0	0.9	1.0	1.0	1.7	2.0	1.1	2.3	0.0	0.7	-1.1	0.9
Middle East and North Africa	0.50	2.0	3.8	0.0	2.7	-	-	1.6	2.0	-	-	-0.5	0.9	-	-	-1.0	-0.1
Sub Saharan Africa	0.55	2.5	3.8	1.7	1.3	1.1	1.1	1.1	1.4	2.2	3.2	2.0	0.6	-0.9	-0.5	-1.4	-0.7
Non-OECD	..	4.2	4.6	3.7	4.7	1.1	1.0	1.1	1.1	2.6	3.2	2.1	2.5	0.4	0.5	0.2	1.9

1. The aggregate Real GDP growth for both the OECD and non-OECD zones include all countries. The aggregates for the different components of growth exclude Mexico, Poland, Hungary, the Czech Republic and Russia for which a complete data set is unavailable.

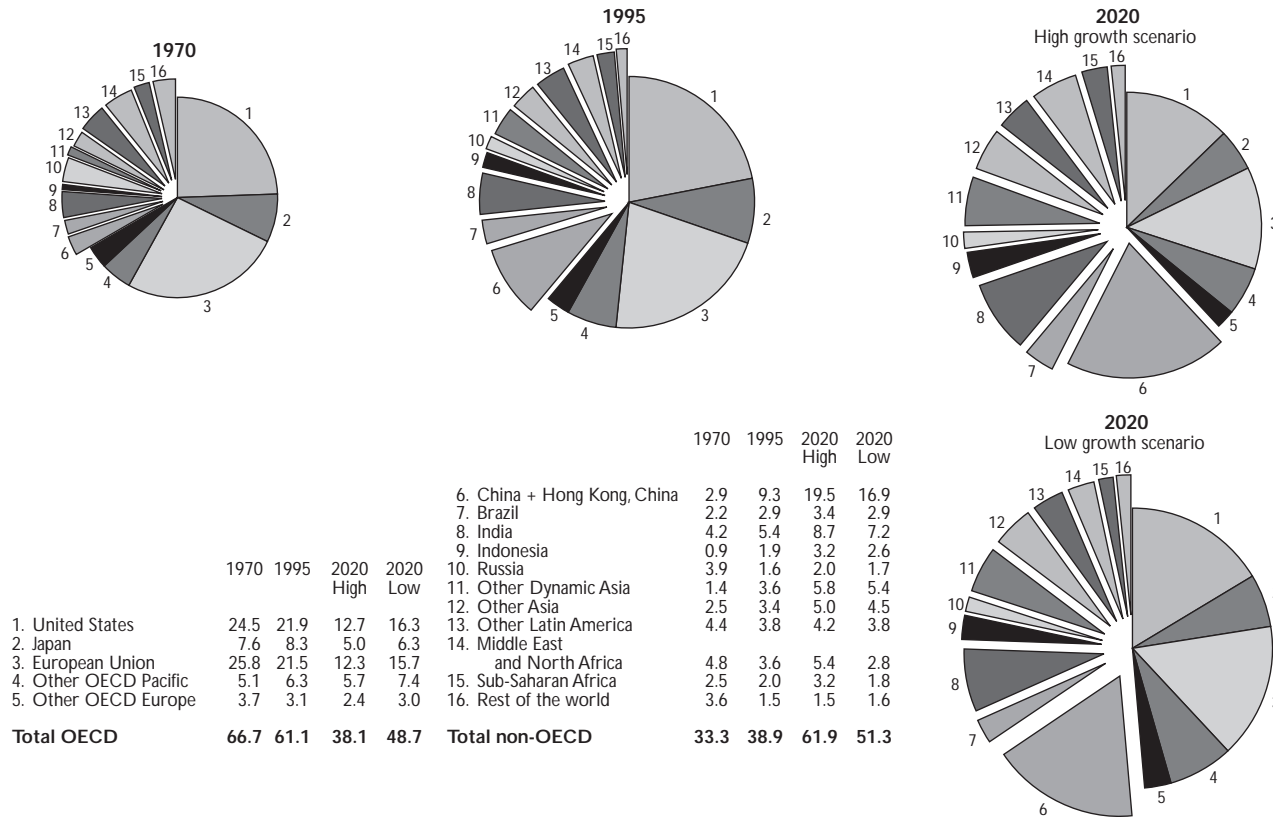
Source: World Bank, OECD.

◆ Figure 6. **Real GDP growth in principal non-OECD regions**
Average annual growth rates



Source: OECD, World Bank.

◆ Figure 7. *Shares of world GDP
In PPP 1992*



Source: United Nations, World Bank.

and Africa in the 1980s. Following a recent period of macroeconomic adjustment, TFP growth rates have picked up in many non-OECD regions, whilst those for the Middle East and Africa continue to be negative. Rapid growth in the dynamic Asian economies and China has been underpinned throughout the period by strong investment and rising TFP growth.

Rapid growth in the dynamic Asian economies and China has been characterised by a large increase in the use of productive resources, especially physical capital. This was in large part a result of exceptionally high investment and saving rates. The contribution of TFP to output growth was less significant and varied across countries. This result is corroborated by the work of Young (1995), Kim and Lau (1994) and Collins and Bosworth (1996). Concentrating on the experience of the NIEs, Young (1995) concludes that between 1965 and 1990 TFP growth ranged from -0.3 per cent in Singapore to 2.3 per cent in Hong Kong, China.¹⁴

These findings contradict the original premise that productivity growth in South East Asia was exceptionally high and have stimulated an intense debate about the sources of growth in the region. Many argue that the modernisation of physical capital and the increase in labour force skills have been major sources of productivity gains (World Bank, 1993; Petri, 1993; Page, 1994). This is supported by the fact that since the early 1980s, TFP growth for the dynamic Asian economies and China was, on average, higher than for the OECD economies. According to these studies, increasing openness to foreign trade and technologies ensure that convergence between the technologies of the emerging Asian economies and the OECD countries is likely to continue in the future.

Others, like Krugman (1994) and Young (1995) claim that with the major exception of Japan¹⁵ the “Asian Miracle” was a result of the typical ingredients of the neo-classical growth model – through increased use of capital and an increase in the labour force (via rising participation rates and internal migration flows). As such, South East Asia may be expected to enter a phase of diminishing returns where output growth will be slower or rapid growth can only be sustained for a longer period of time if saving/investment balances deteriorate sharply.

Evidence suggests that, on average, the per capita stock of physical capital in South East Asia is still less than half of that of the United States and Japan. Collins and Bosworth (1996) conclude that labour productivity will continue to improve as younger, better educated workers replace older, less skilled generations. Combined with improvements in the productivity of capital, returns to investment are likely to remain sufficiently high to encourage further capital deepening in the future. On balance, output growth seems likely to decelerate from the rapid pace of the last two and a half decades as economies in the region become more developed, but remain high enough for per capita incomes in South East Asia to continue to converge steadily towards the OECD average.

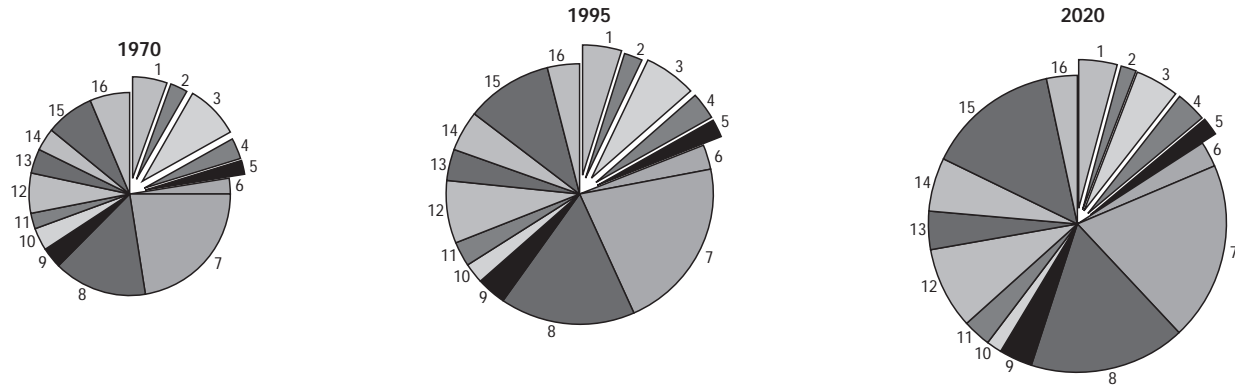
Over the period, most non-OECD economies have been undergoing major demographic adjustments from high to low rates of birth and mortality, similar to those experienced by Europe and North America following the Industrial Revolution. Mortality rates fell rapidly in all regions during the 1960s and 1970s, but there are significant variations in how this is reflected in population growth and dependency rates, given the offsetting influence of lower fertility rates. Reductions in birth rates occurred somewhat earlier in Latin America, Indonesia and the dynamic Asian economies than elsewhere and led fairly rapidly to lower rates of population growth. Reductions in fertility in India, Other Asia, the Middle East and Africa have been more modest and as a result, the shares of these regions in world population have increased substantially since 1970 (Figure 8). In most of the non-OECD area, lower birth rates have also been reflected in lower dependency rates, most significantly for Central and South America and South East Asia (Table 3), where dependency rates currently vary between 50 to 65 per cent in East Asia and Central and South America, compared with high and static rates of 90 per cent in Sub-Saharan Africa.¹⁶

Educational levels have improved in most regions. Combined with growing migration flows from rural to urban areas, rising education levels have resulted in significant changes in the structure of the labour force and, with participation rates more or less stable in most of the non-OECD area, the labour force has grown broadly in line with the working-age population. Important exceptions are for India and Sub-Saharan Africa which have experienced some declines in labour force participation rates (Table 3).

Compared with the OECD area, higher output growth for the non-OECD as a whole has more than offset the effects of higher population growth, leading to a narrowing of income gaps. In the early 1970s, the gaps between OECD and non-OECD economies were very wide, with average real per capita incomes in most non-OECD regions generally less than 10 per cent of the OECD average (Figure 9). Important exceptions were for the Middle East and North Africa, Russia and Latin America, with per capita incomes of about one-third of the OECD average.¹⁷ Since then, per capita income gaps have shrunk substantially in many of the dynamic Asian economies, and moderately so in China, Indonesia and India (though average income levels remain relatively low in these three countries). In other regions, little improvement has occurred. For Brazil, the income gap in 1995 was similar to that in 1970 and wider than in 1980, whilst for the rest of Latin America, the former Soviet Union, the Middle East and Africa, the gap has increased over the period.

As noted above, the most important overall source of output growth in the non-OECD areas has been capital accumulation, sustained by relatively high investment rates (Table 2). Over the past 25 years, the capital stock for the non-OECD area grew by an average 3 per cent per annum (compared with 1 per cent per annum in the OECD) and employment by just under 2 per cent per annum.

◆ Figure 8. *Shares of world population*



	1970	1995	2020
1. United States	5.5	4.6	4.1
2. Japan	2.8	2.2	1.6
3. European Union	8.7	6.5	4.8
4. Other OECD Pacific	3.2	3.3	3.2
5. Other OECD Europe	2.1	2.3	2.1
Total OECD	22.4	19.0	15.8
6. Brazil	2.6	2.8	2.9
7. China + Hong Kong, China	22.6	21.6	19.3
8. India	15.0	16.4	17.1
9. Indonesia	3.2	3.5	3.4
10. Russia	3.5	2.6	1.8
11. Other Dynamic Asia	2.7	3.0	3.0
12. Other Asia	6.4	7.8	8.9
13. Other Latin America	3.7	3.9	4.0
14. Middle East and North Africa	3.6	4.9	6.1
15. Sub-Saharan Africa	7.9	10.4	14.4
16. Rest of the world	6.4	4.0	3.3
Total non-OECD	77.6	81.0	84.2

Source: United Nations, World Bank.

Table 3. **Demographic trends over the last 25 years**

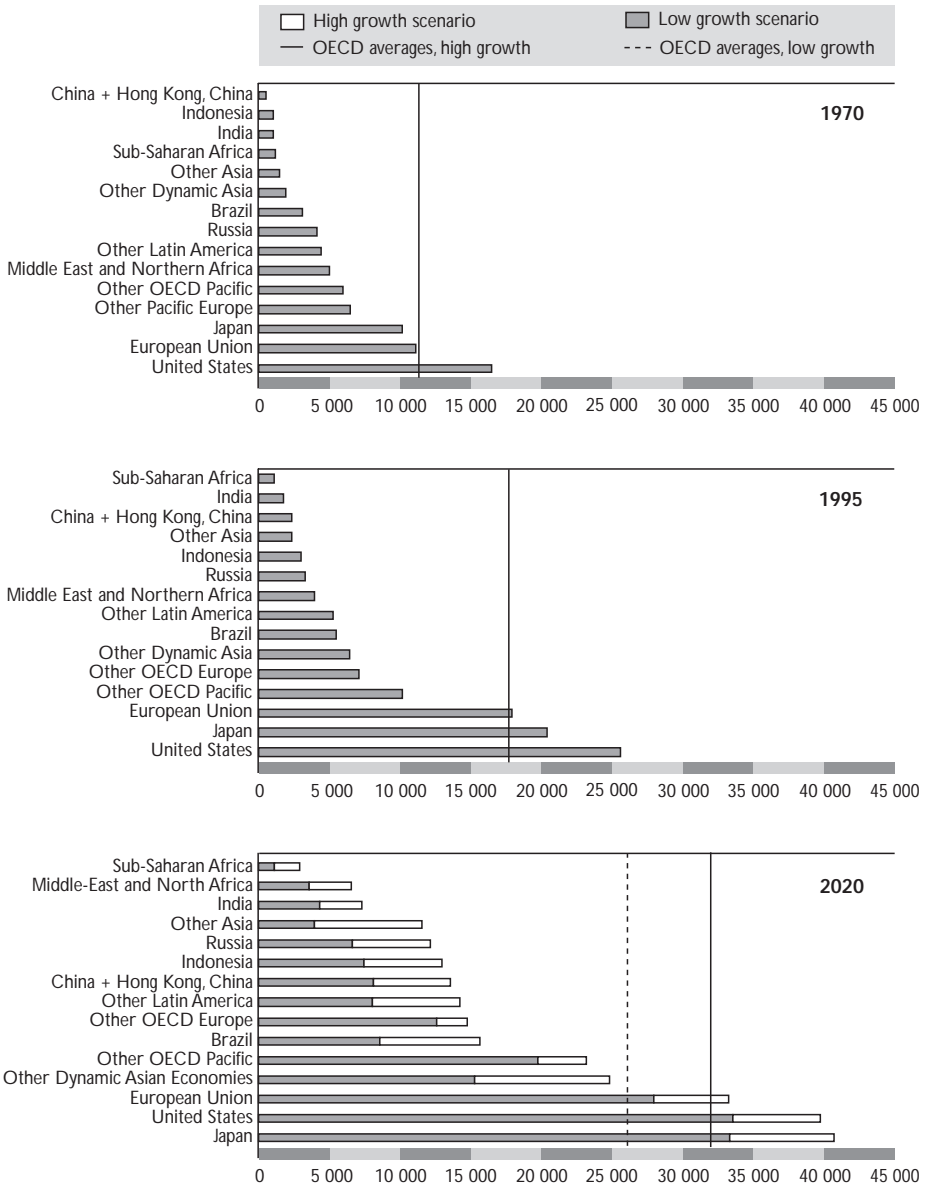
	Dependency ratio ¹				Labour force participation rate			
	1970	1980	1990	1995	1970	1980	1990	1995
United States	61.4	51.1	52.0	53.1	65.2	71.0	76.6	77.0
Japan	45.1	48.4	43.7	43.6	72.0	71.8	74.2	76.6
European Union	58.5	55.1	48.8	48.7	66.1	66.9	67.2	64.2
Total OECD²	61.4	56.5	51.6	51.2	64.4	65.7	66.9	65.9
Brazil	84.1	71.7	64.4	60.1	60.6	62.6	60.9	60.5
China and Hong Kong, China	79.5	68.1	50.1	48.8	92.4	92.0	88.3	88.0
India	83.0	79.7	65.4	59.5	69.4	67.0	64.5	63.8
Indonesia	78.8	74.2	68.3	66.1	72.2	67.1	63.9	63.0
Russia	52.1	46.8	49.2	49.5	..	77.7	76.0	68.0
Other Dynamic Asia	90.8	74.5	63.8	59.7	76.9	73.3	71.9	71.2
Other Asia	..	90.2	81.8	77.4	..	67.4	66.5	67.4
Other Latin America	82.5	75.7	70.5	64.4	58.5	57.1	57.5	58.2
Middle East and Northern Africa	..	89.0	85.0	76.8	..	51.5	50.9	51.5
Sub Saharan Africa	92.4	95.0	95.0	91.2	87.2	85.1	81.2	80.5
Non-OECD²	70.1	77.1	67.2	64.0	74.1	76.0	73.1	72.4

1. Defined as people with less than 15 or more than 65 years of age to working age population.

2. OECD and Non-OECD averages weighted by population size.

Source: OECD, World Bank.

◆ Figure 9. **GDP per capita**
PPP 1992



Source: OECD.

Capital accumulation was especially significant in the dynamic Asian economies, China and Indonesia, averaging more than 4 per cent per annum. At the other end of the spectrum, India, Other Latin America, Middle East and Africa, have experienced low rates of capital accumulation.

Strong human capital combined with growing economic links with the rest of the world, through trade and investment, have enabled East Asia to take considerable advantage of technology transfer possibilities. Education raises the economy's ability to implement new technology, which in turn tends to enhance productivity and the profitability of investment (Collins and Bosworth, 1996; Morriset and Revoredo, 1995). As an indicator of the average education stock, Table 4 compares average years of schooling by region. On this crude basis, average years of schooling in the non-OECD are less than half those in the OECD. Within the non-OECD, the average education stock derives mainly from primary education, although secondary and tertiary components have grown considerably over the period. These figures do not include the FSU, which has education levels similar to OECD averages. Outside the FSU, levels of education are highest in East Asia and Latin America, where primary education inputs are relatively close to OECD averages.

A further factor important to the catch-up has been income distribution. Societies where equity and income are better distributed may experience fewer social pressures to adopt re-distributive policies which may be costly since they

Table 4. **Educational attainment in selected non-OECD regions and countries¹**

	Average years of schooling		Growth rate, 1960-94 ²
	1960	1994	Years of schooling
China	1.7	5.3	3.5
Indonesia	1.1	5.0	4.5
Other Dynamic Asia	2.7	7.2	3.0
Malaysia	2.3	7.0	3.3
Philippines	3.8	7.4	2.0
Singapore	3.0	6.1	2.1
Thailand	3.5	7.5	2.3
Taiwan	3.2	8.2	2.8
South Asia	1.3	3.4	2.8
Africa	1.6	3.5	2.4
Middle East	1.4	4.9	3.8
Latin America	3.0	5.5	1.8
OECD	7.3	9.8	0.9

1. Computed using the 88 country sample. Regional averages are calculated by weighting each country by its average GDP over 1960-94, as measured in 1985 dollars.

2. Annual percentage rate.

Source: Collins and Bosworth (1996).

often involve a higher tax burden on investors. In such societies, more resources might be directed towards activities that contribute to economic growth, such as education (Alesina and Rodrik, 1994; Rodrik, 1994; Persson and Tabellini, 1994). The absence of significant inequalities may also interact with the development of domestic credit markets, increasing opportunities to poorer sections of society to invest and thus favouring productivity growth (Bruno *et al.*, 1996).

Cross-country comparisons using Gini coefficients reveal that most East Asian economies already had relatively low levels of income inequality in the 1960s (Table 5).¹⁸ In part, this may have acted as a catalyst for private investment, to the extent that it was related to entrepreneurship and to the existence of a large consumer market and the establishment of a middle class (World Bank, 1993). However, income distributions in many other non-OECD economies have widened over time and, to the extent that capital has often been heavily subsidised, especially in Latin America, many countries have had excessively high capital/labour ratios and very low absorption of unskilled labour. The result has been increasing gaps between skilled and unskilled wages; a prosperous middle class but with the majority of population close to absolute poverty. Latin America has also experienced much higher inequality of land distribution, which has contributed to social and political instability and led to economic volatility. By contrast, the land reforms undertaken in the 1950s in Asia tended to favour more stable political systems.

In most non-OECD countries, capital accumulation has been strongly correlated with investment rates, which averaged over time, have generally mirrored national saving rates (Figure 10). Hence current account imbalances have tended to be relatively minor; current account deficits above 3 per cent of GDP have seldom persisted over prolonged periods of time, with the notable exception of Brazil and the dynamic Asian economies in the 1970s, a period in which both regions attracted very large inflows of foreign investment (Figure 11).

Overall there has been a positive relationship between output growth and domestic saving rates, with main influences on saving coming from demographic trends and policies, through government saving and indirectly through tax and interest rate policies (Masson *et al.*, 1995a and b; Schmidt-Hebbel *et al.*, 1995). In the early 1970s, saving rates in most non-OECD economies were generally less than 20 per cent of GDP. Since then China, the dynamic Asian economies and Indonesia have experienced rates of saving rising well in excess of 30 per cent. For these economies, rising levels of national savings have ensured that investment was in large part financed domestically. Domestic savings in Latin America, the Middle East and Africa have been closer to the OECD average – ranging between 20 and 25 per cent of GDP – but often subject to sharp swings. In Latin America, macroeconomic instability and underdeveloped financial markets have been important factors discouraging savings. Foreign borrowing has at times

Table 5. **Income distribution: Gini coefficients for selected OECD and non-OECD economies**Averages in the decade¹

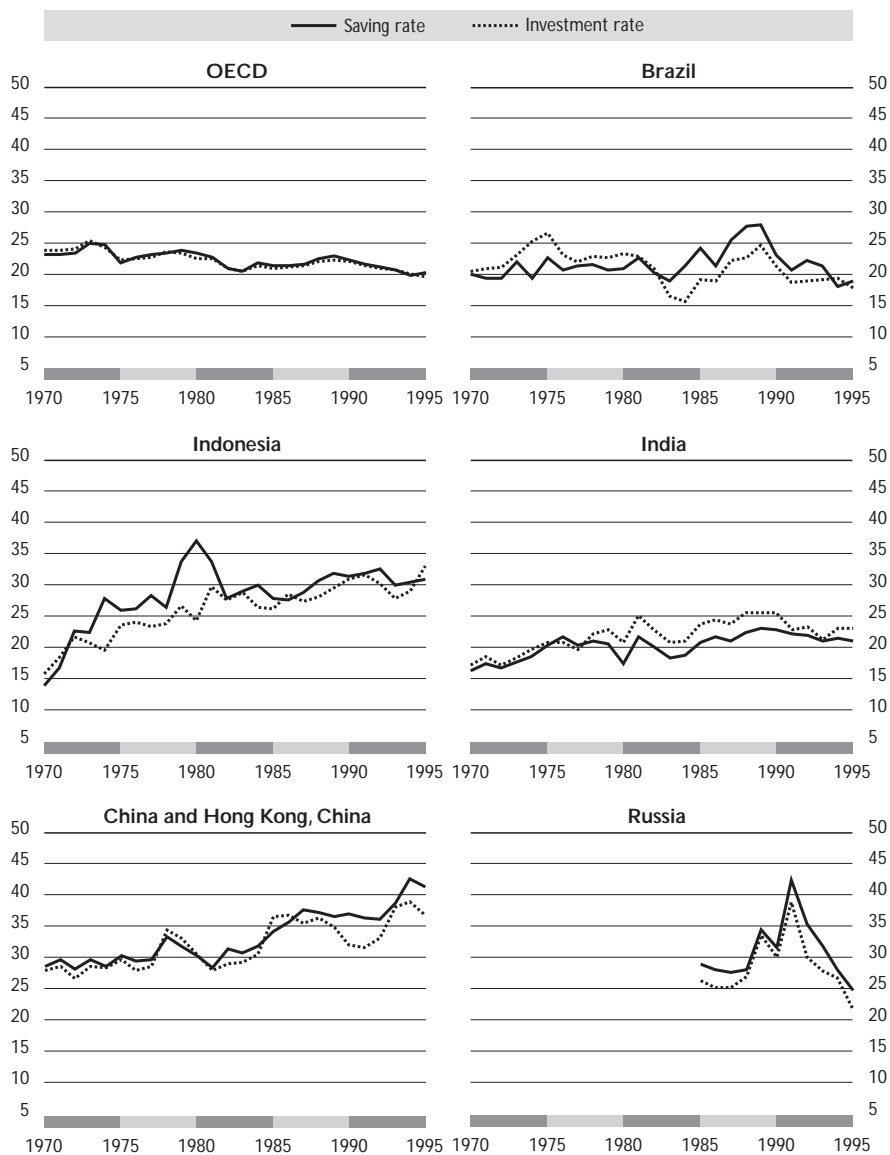
	1960s	1970s	1980s	1990-1995
OECD				
United States	34.6	34.5	36.9	37.9
Japan	35.6	34.1	34.4	35.0
Germany	..	36.0	35.8	45.4
France	48.0	41.6	37.8	..
Italy	..	37.4	33.4	32.2
United Kingdom	25.0	24.3	27.3	32.4
Canada	31.6	31.6	31.5	27.6
Non-OECD				
Brazil	53.0	59.0	55.6	..
China	..	..	31.5	36.2
Hong Kong	47.5	41.9	41.4	45.0
India	31.5	30.9	31.4	31.1
Indonesia	33.0	36.6	33.4	33.1
Other Dynamic Asia				
Chinese Taipei	31.2	29.3	29.0	30.5
Malaysia	..	51.1	48.0	..
Philippines	42.9	45.3	40.0	..
Singapore	..	..	39.0	40.7
Thailand	42.0	41.7	37.8	50.2
Other Asia				
Bangladesh	..	37.4	33.4	32.2
Pakistan	..	..	35.5	33.4
Sri Lanka	46.0	38.8	43.7	..
Other Latin America				
Bahamas	..	48.2	44.4	43.0
Chile	..	..	54.8	53.1
Colombia	..	52.1	51.2	..
Costa Rica	52.6	46.1	45.1	..
Honduras	..	..	54.0	52.7
Trinidad and Tobago	..	48.5	41.7	..
Venezuela	..	41.5	..	..

1. The table includes all countries with four or more observations in a given decade, based on household survey data with national coverage.

Source: Bruno, Ravallion and Squire (1996) and Rodrik (1994).

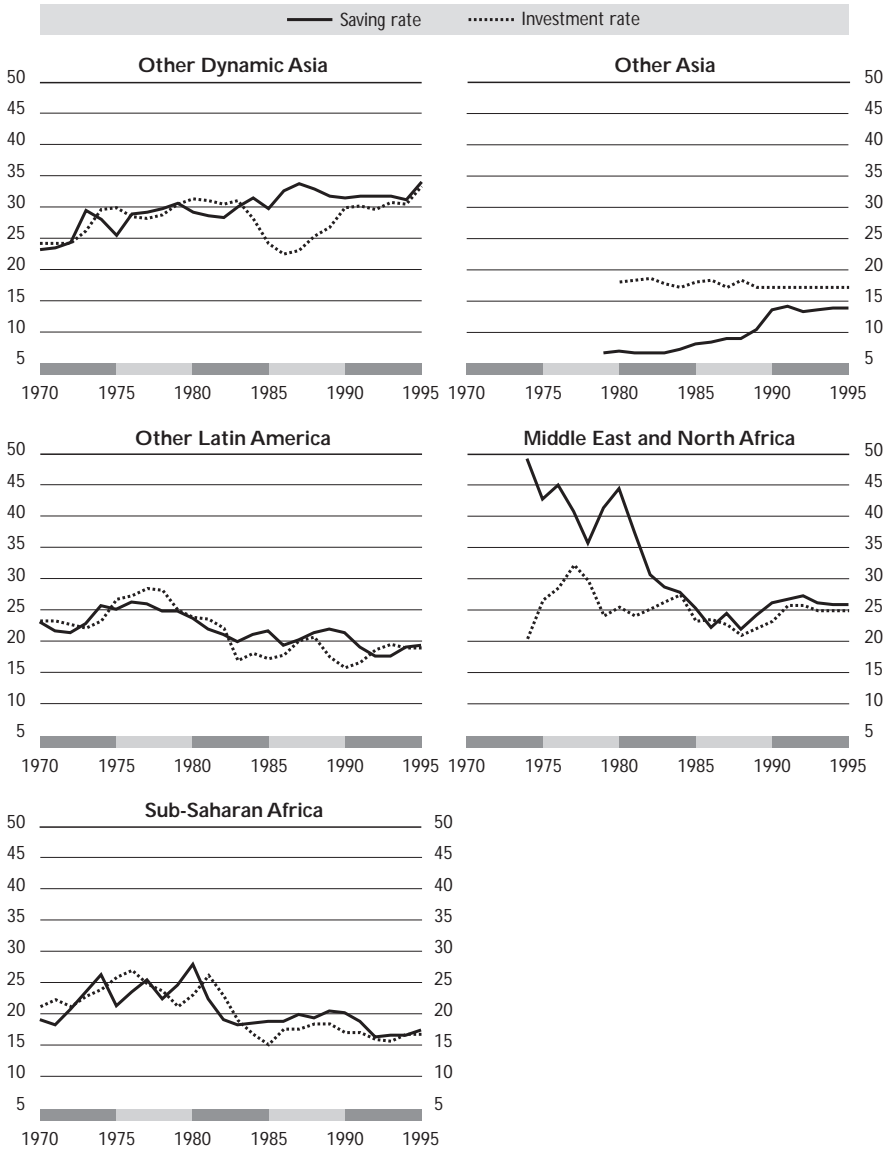
supplemented domestic savings and periods of strong capital inflows have often been followed by episodes of capital flight, which, in turn, have created considerable uncertainty and depressed business investment. In the FSU, saving and investment rates averaged above 30 per cent over the period, but this did not necessarily translate into high output growth, since a significant share of this investment had very low returns.

◆ Figure 10. **Saving and investment rates**
As a percentage of GDP

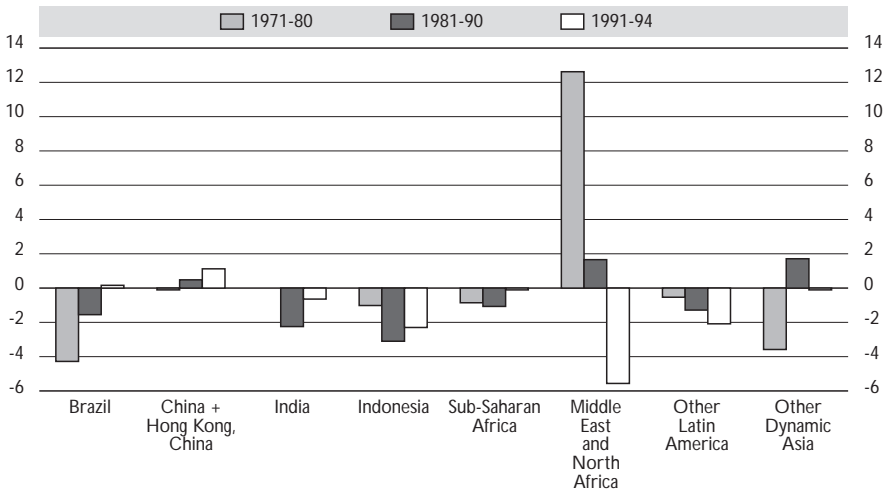


Source: OECD, World Bank.

◆ Figure 10. (cont.) **Saving and investment rates**
As a percentage of GDP



◆ Figure 11. **Current account balances of non-OECD regions**
As a percentage of GDP

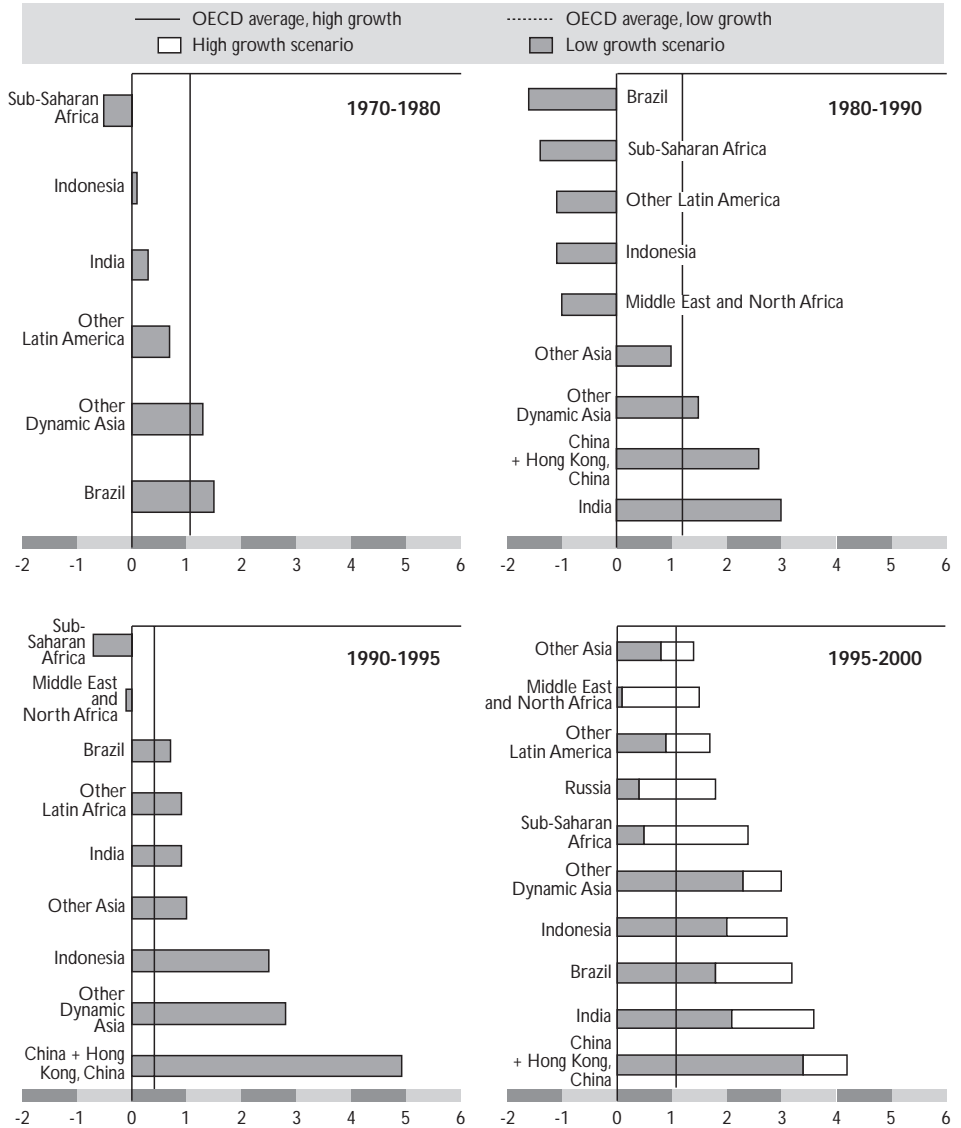


Source: World Bank.

Factor productivity growth also provides a complementary indicator of the catching-up process, with TFP growth much higher in the Asian economies than in the OECD since the early 1980s (Figure 12 top panels). In contrast, Latin America, the Middle East and Africa have experienced large swings in TFP, notably in the 1980s, when many of these economies experienced prolonged periods of macroeconomic instability and significant balance-of-payment constraints. Too often import controls were strengthened to constrain imports, but by restricting access to foreign technologies, such actions have adversely affected productivity growth in the business sector. More recently, TFP growth rates in Brazil and other Latin American economies have risen above the OECD average, whilst those for the Middle East and Africa remain below the OECD average and continue to decline.

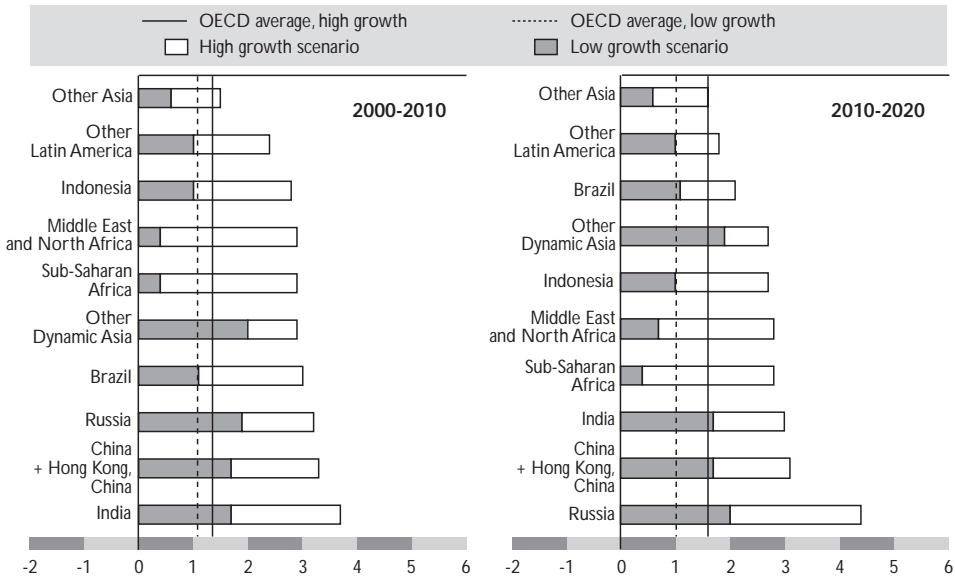
The substantial rise in productivity in China between 1980 and 1995 is mainly associated with the performance of the non-state business sector, most notably the expansion of township and village enterprises and other individual activities in the special economic zones of the coastal provinces. On the other hand, the question of the performance of the state-owned sector remains controversial, largely reflecting the lack of reliable production and financial information for state

◆ Figure 12. **Comparative rates of growth of Total Factor Productivity (TFP)**
Per cent per annum averages



Source: OECD.

◆ Figure 12. (cont.) **Comparative rates of growth of Total Factor Productivity (TFP)**
Per cent per annum averages



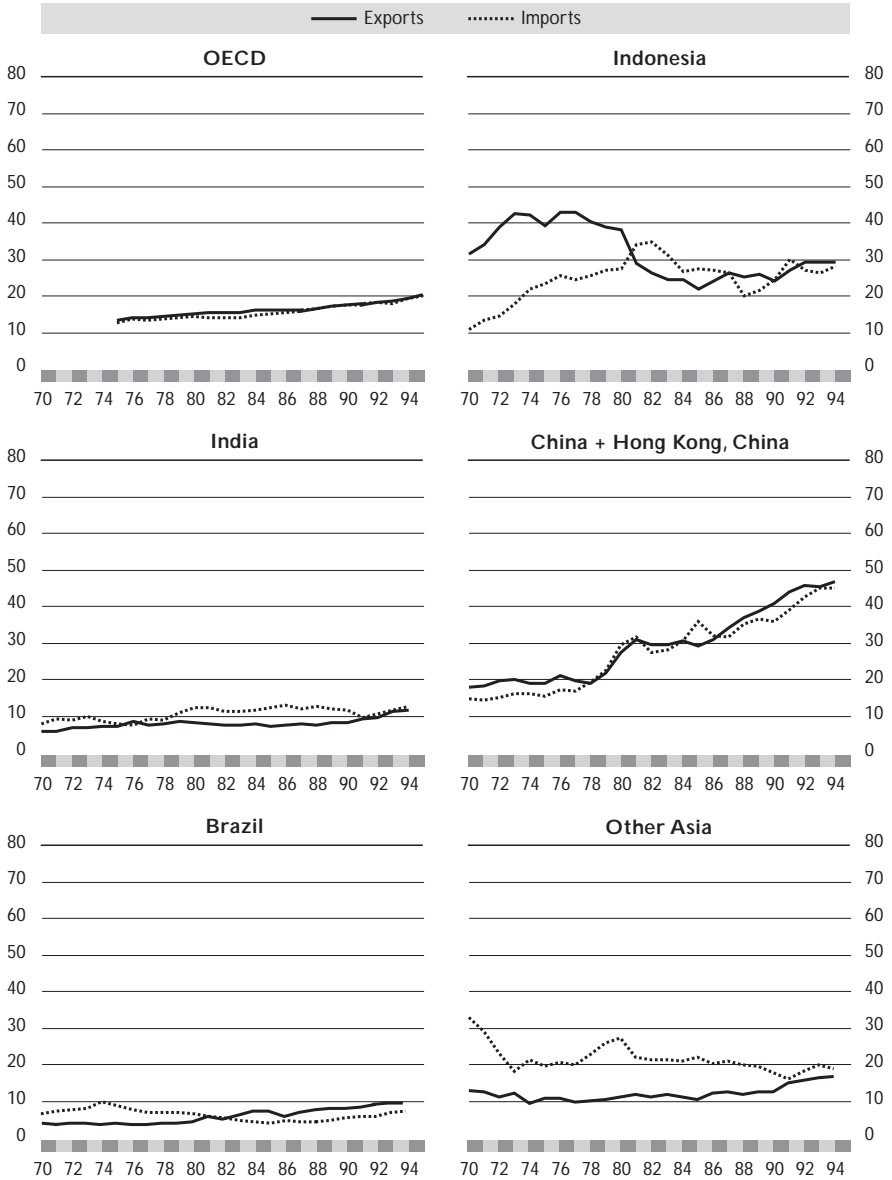
Source: OECD.

firms (Woo *et al.*, 1994, and Groves *et al.* 1996). The start-up of the reform of the State Owned Enterprises (SOEs), a politically complex issue to manage, came at a later stage than agriculture and trade reforms and since its inception in 1984 it has progressed with difficulty.¹⁹

The degree of openness has also been an important factor influencing relative income developments and productivity growth, through technology transfers. Since the early 1970s, trade in the dynamic Asian economies has consistently outpaced output growth, with trade-to-output ratios rising well above the OECD average (Figure 13). The integration of these economies into the world economy has taken place through a wide range of policies which were in large measure outward oriented (Petri, 1993; World Bank, 1993).

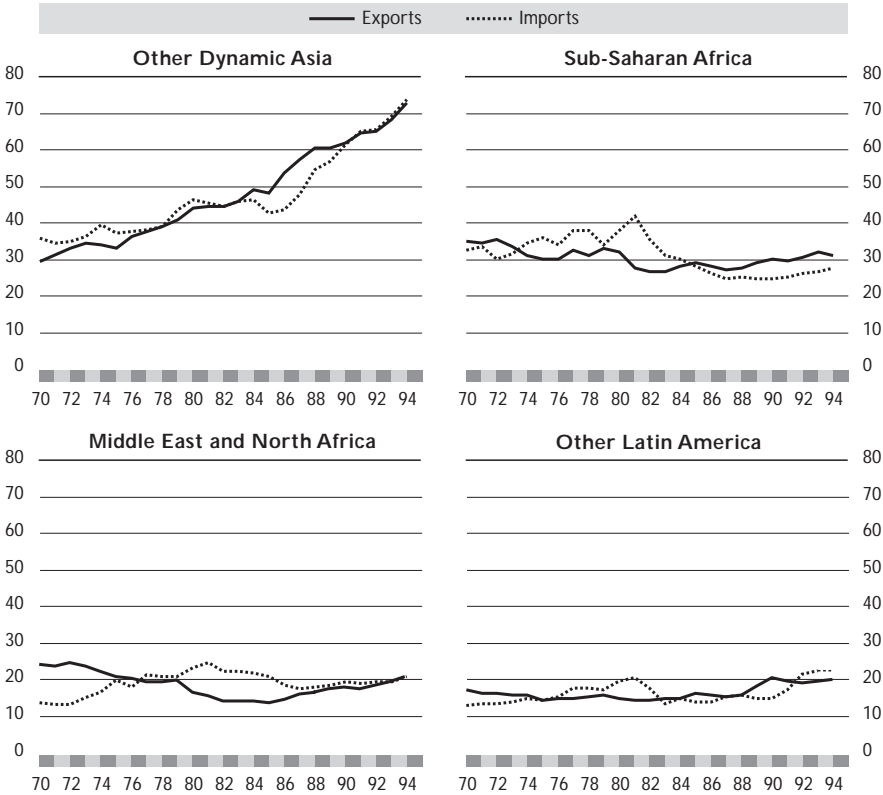
In a number of Asian economies, most notably Hong Kong, China and Singapore, these were essentially free market policies associated also with the partial or complete elimination of trade and foreign investment barriers. Other

◆ Figure 13. Trade to GDP ratios



Source: OECD, World Bank.

◆ Figure 13. (cont.) Trade to GDP ratios



Source: OECD, World Bank.

economies, Korea and Chinese Taipei, for example, have used more interventionist policies, protecting and subsidising industries directly or indirectly linked to exports and, as far as possible, managing real exchange rates and trade competitiveness at relatively stable and advantageous levels. Though possibly effective in the short term, such policies are distortionary and often prove difficult to sustain over the longer term, particularly in an environment of growing international competition. For example, the tax and credit allocation policies to promote selected Korean industries in the 1970s imposed high costs in terms of overcapacity, falling rates of return and growing distortions in the banking system

(OECD, 1996c). This subsequently led the government to make intervention less industry-specific in the 1980s, as well as promoting trade liberalisation and the gradual opening of financial markets. Average tariff rates were reduced significantly and many import quotas abolished, while interest rates were partially deregulated. Nonetheless, there remains considerable scope for further dismantling the considerable range of industrial policy measures encountered in many non-OECD countries (Table 6 and APEC, 1995).

During the 1980s, a further boost to Asian trade was provided by the trade and foreign investment reforms in China, creating the conditions for a further upsurge in manufacturing exports in neighbouring countries. Rising foreign direct investment (FDI) inflows from the OECD, especially Japan, and from other Asian economies, notably Korea, Chinese Taipei and Hong Kong, China, have also stimulated trade in the region.

In most other non-OECD regions, the shift to increasing trade openness has lagged significantly behind developments in Asia, with many of these economies continuing to follow import substitution policies. In these, governments have tended to give priority to investment in a few manufacturing sectors, in the expectation that through increased economies of scale and learning they would become more competitive. Many of these economies underwent periods of rapid industrialisation, especially during the 1970s, but at the cost of significant distortions, stemming from administered prices, over-valued currencies and exchange controls needed to facilitate imports of capital goods.

In China the launch of market-oriented reforms in the late 1970s resulted in a trade boom and a surge of inward investment. In Brazil and other parts of Latin America, trade liberalisation has taken place as part of wide-reaching structural adjustment policies in the 1980s and early 1990s, but is reflected mostly in terms of higher import penetration. Trade opening has been an integral component of the transition process in Central and Eastern Europe. In many regions, trade liberalisation has been facilitated by the reduction of balance-of-payment constraints and by a wave of regional integration efforts, including the launching of the MERCOSUR and APEC, and the revitalisation of a number of old regional trading agreements. India, Indonesia, Other Asia, the Middle East and Africa, have more recently followed similar processes, although trade shares in GDP for the Middle East and Africa remain close to those prevailing in the 1970s.

Policy lessons

A major stabilising factor in the dynamic Asian economies and Indonesia has been the record of long-run prudent fiscal and monetary policies, which have fostered low inflation and ensured manageable levels of external debt (Table 7). Real interest rates have been generally low but positive, conducive to strong

Table 6. **Industrial policy measures in selected economies**

	Central and South America			South and East Asia							
	Argentina	Brazil	Chile	China	Indonesia	Chinese Taipei	Hong Kong, China	Korea ¹	Malaysia	Singapore	Thailand
Screening/notification	X	X	X	X	X	X		X	X		X
Restricted/closed sectors	X	X	X	X	X	X	X	X	X	X	X
Performance requirements		X	X	X	X	X		X	X		X
Fiscal incentives	X	X		X	X	X		X	X	X	X
Taxation incentives	X	X	X	X	X	X		X	X	X	X
Priority sectors	X	X		X	X	X			X		X
Exchange controls		X		X		X		X			

Note: X indicates use of instrument.

1. Korea has joined the OECD in 1996.

Source: APEC (1995) and OECD.

Table 7. Selected macroeconomic indicators for non-OECD economies

	1971-1980 ¹					1981-1993 ¹					1991-1993 ¹				
	GDP deflator	General Government ²			External debt as a share of exports	GDP deflator	General Government ²			External debt as a share of exports	GDP deflator	General Government ²			External debt as a share of exports
		Revenue	Expenditures	Balance			Revenue	Expenditures	Balance			Revenue	Expenditures	Balance	
Brazil	41.9	20.6	25.6	..	303.3	368.9	25.5	26.1	-8.8	383.4	1 700.3	25.9	26.2	-2.0	320.0
China	0.9	..	..	..	..	6.3	24.5	26.2	-1.7	57.8	11.3	15.2	17.4	-2.2	76.9
India	9.3	11.8	12.4	-4.6	256.5	8.1	13.5	16.1	-7.6	299.8	9.2	14.8	17.0	-5.3	353.5
Indonesia	23.6	17.5	18.8	-2.6	174.1	8.5	20.1	21.2	-1.5	196.5	11.0	18.4	18.3	0.2	226.7
Russia	..	..	..	..	..	3.5	..	..	..	..	..	..	..	..	58.9
Other Dynamic Asia	..	16.3	17.5	-2.9	95.6	..	20.3	21.0	-2.4	150.7	..	23.0	19.4	3.4	90.7
Malaysia	7.6	21.4	24.8	-6.7	44.2	2.1	27.1	31.1	-6.8	94.2	4.0	28.5	27.3	0.7	45.3
Philippines	14.9	13.8	13.8	-1.3	173.0	14.4	13.4	14.3	-3.1	304.1	8.2	17.6	19.1	-1.6	218.8
Thailand	9.9	23.7	18.3	1.1	83.1	4.0	32.3	25.4	3.9	141.1	4.1	32.9	20.2	11.8	100.0
Other Asia	..	13.1	16.0	-5.3	329.2	..	15.4	19.6	-5.7	365.8	..	15.6	21.1	..	323.3
Other Latin America	..	16.0	15.9	-0.9	166.8	..	16.4	18.0	-2.7	329.8	..	13.9	13.7	-0.1	291.2
<i>of which:</i>															
Argentina	129.9	14.4	14.7	-0.3	300.4	494.8	11.6	13.3	-3.6	560.2	8.7	10.0	9.1	..	452.1
Chile	166.5	30.5	32.6	-1.6	241.3	20.3	26.8	28.2	-0.4	325.5	14.9	22.6	20.8	1.9	159.7
Colombia	22.9	11.2	12.1	-0.7	175.7	24.3	12.1	14.4	-2.5	250.7	22.1	12.5	14.0	-1.7	193.7
Peru	33.5	14.1	16.6	-2.5	40.7	345.5	11.8	16.2	-4.5	111.1	42.4	11.2	12.4	-1.3	199.0
Uruguay	66.0	22.0	23.5	-1.9	1 074.0	63.0	23.6	26.0	-2.9	2 242.6	53.2	29.1	28.4	0.7	1 501.0
Venezuela	15.6	23.8	19.3	-0.2	467.6	22.1	23.2	22.9	-1.4	1 080.2	41.6	20.2	20.8	-0.6	1 216.9

1. Annual averages.

2. .. Government accounts expressed as a percentage of GDP.

Source: World Bank.

household saving and favourable to capital accumulation. Confronted by the need to adjust internal and external imbalances in the years following the second oil shock, many Asian governments – notably in Korea, Thailand, Malaysia and Indonesia – were sufficiently flexible at the macroeconomic level to intervene in a timely manner and thereby avert domestic crises.

China also has a tradition of active macroeconomic management, a factor which facilitated the launching of market-oriented reforms. In striking contrast to most other formerly centrally-planned economies, China did not need to begin reforms with a stabilisation programme; the public sector deficit was apparently near to balance, and because it was not a borrower from the world capital market or a recipient of foreign aid, China did not face an external debt problem.²⁰

By contrast, many other non-OECD economies, notably those in Latin America, the Middle East and Africa, have followed more inward-oriented, interventionist policies, with public enterprises accounting for a large share of total investment. The use of expansionary fiscal and monetary policies to strengthen domestic demand and induce higher employment has also been prevalent. Such policies have generally resulted in uncompetitive domestic industrial sectors, limited export growth and the inability to adjust quickly to external shocks from fluctuations in world interest rates and in commodity prices. As a result, these countries have often experienced periods of severe macroeconomic instability and successive boom and bust cycles, as the external environment changed. For example, in most of Latin America and Sub-Saharan Africa, the inability to adjust to higher energy prices in the aftermath of major oil shocks, combined with historical over-reliance on foreign borrowing or aid, sowed the seeds of crises that lasted for most of the 1980s. In these regions, necessary current-account adjustment was achieved through a mix of heavy devaluation and import restrictions. Fiscal adjustment was not so simple. Revenues could not be easily raised, while public expenditures were cut, but not enough to prevent the fiscal deficit from actually increasing in many countries. Inflation and recession followed.

More recently a number of governments which previously followed inward-oriented policies, have embarked on a path of extensive market-oriented reforms, entailing actions intended to improve the overall efficiency of the economy via better allocation of financial and productive resources. Fiscal discipline, privatisation and deregulation and a considerable amount of liberalisation of trade and financial flows have been important elements of this strategy.²¹ In some countries (most notably Chile), the reform of the tax system and the gradual switch-over from a publicly-run pay-as-you-go to a privately-run fully-funded pension system also seem to have contributed to significant increases in domestic saving and to macroeconomic stability, through the deepening of domestic financial markets.

In practice, the mix and sequencing of policy reforms has differed considerably across economies, depending on their structure prior to reforms. For example, in transition economies the scope for reforms was very wide compared to more market-oriented economies (Hiemenz and Funke, 1994). In many reform programmes, fiscal and monetary stabilisations have been implemented at an early stage, followed by liberalisation of trade and then domestic financial markets. Often the latter were only successful once domestic price distortions were eliminated and inflation rates and fiscal deficits significantly reduced. Stable and well-established liberalisation of capital flows has generally required a sound domestic financial system. Otherwise the domestic economy and banking system are likely to be exposed to the destabilising effects of volatile capital flows, linked to the arbitrage between domestic and international interest rates.

Recent success in policy reforms has been based in large part on the experiences of those countries where outward orientation has been a major element of economic policy, including most of the East Asian economies and, more recently, Chile. Overall, the most important lessons from these experiences can be summarised as follows:

- Sound fiscal and monetary policies, well developed financial and goods markets, and the creation of a climate conducive to a more equitable income distribution are necessary to achieving macroeconomic and political stability.
- Macroeconomic and political stability facilitate long-term planning, providing a favourable climate for private investment and increase policy flexibility, raising the capacity of governments to react appropriately to external shocks.
- Open, market-oriented trade and investment policies encourage companies to become competitive and to adapt to world markets.
- Foreign competition provides a more favourable framework for technological change and productivity growth.
- Given non-reversibility of market-oriented policies, the business sector will make the effort to expand the product mix and increase productive efficiency.

Globalisation and the interactions between OECD and non-OECD economies

Driven by a variety of factors – the steady dismantling of barriers to trade and investment, innovation and rapid changes in production, telecommunications, and transport technologies, financial market integration and the shift to market-oriented policies in key non-OECD “emerging” markets – the process of international globalisation over the past three decades has had significant effects on the

relationships between OECD and non-OECD, most notably with respect to trade and investment. World trade, which continues to be a major driving force for world economic activity, has grown persistently faster than real output at the world level. Increased integration of markets across countries and rapid growth in many developing and newly industrialised countries has acted as a major stimulus to trade both between and within OECD and non-OECD regions and has resulted in major shifts in geographical and commodity distribution. Technological changes have greatly facilitated the conditions for trade in services, and associated with this expansion there have also been rapid increases in FDI flows and changes in its sectoral and regional composition, reflecting the increasing role of market presence as a complement to international trade.

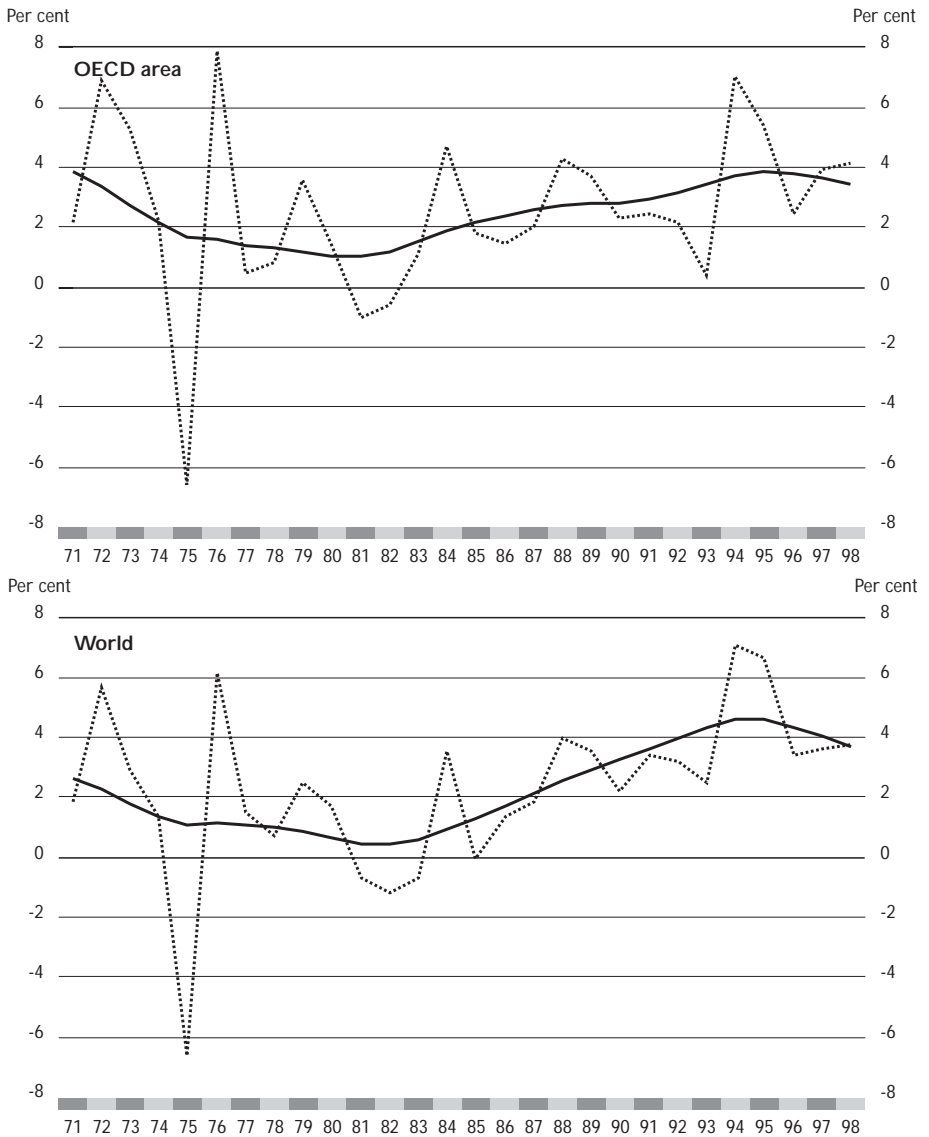
Background developments in trade and investment

Growth in world trade has consistently outstripped that of world output throughout most of the period since the early 1970s. After fluctuating around 1½ in the period until the mid-1980s, the ratio of the rate of growth of world merchandise trade to that of world output has risen steadily to around 4½ in 1995 (Figure 14). OECD countries remain the principal suppliers and the most important markets for the non-OECD, accounting for about 30 per cent of total OECD trade and almost 60 per cent of non-OECD countries trade in 1995 (Figures 15 and 16). Excluding OPEC, the non-OECD region has accounted for a relatively stable 20 to 25 per cent of world trade over the period, although its share of world imports has risen sharply since the early 1990s.

Within this overall picture, the relative importance of different non-OECD economies has changed markedly over time. Following the first oil shock and up until the subsequent fall in oil prices in 1986, OPEC was by far the largest non-OECD exporter and among the largest importers. Since then with the share of the newly-industrialised Asian economies in world trade has risen steadily, from less than 8 per cent in the early 1970s to almost 20 per cent in 1995 (Figure 17).

As a counterpart, Europe has progressively assumed a lesser weight in OECD/non-OECD trade²² while the significance of the United States and Japan as trading partners with the non-OECD particularly in Asia has increased substantially since the mid 1980s (Table 8).²³ The widening role of Asia as both a market and a competitor of OECD countries is also reflected in the changing commodity structure of world trade, with non-OECD exports switching away from primary commodities, in particular oil, towards medium- and high-technology goods, (Figure 18). At the same time, the demand for OECD-produced capital and intermediate manufactured goods has also risen strongly, reflecting the rapid shift towards manufacturing industry in South-East Asia.

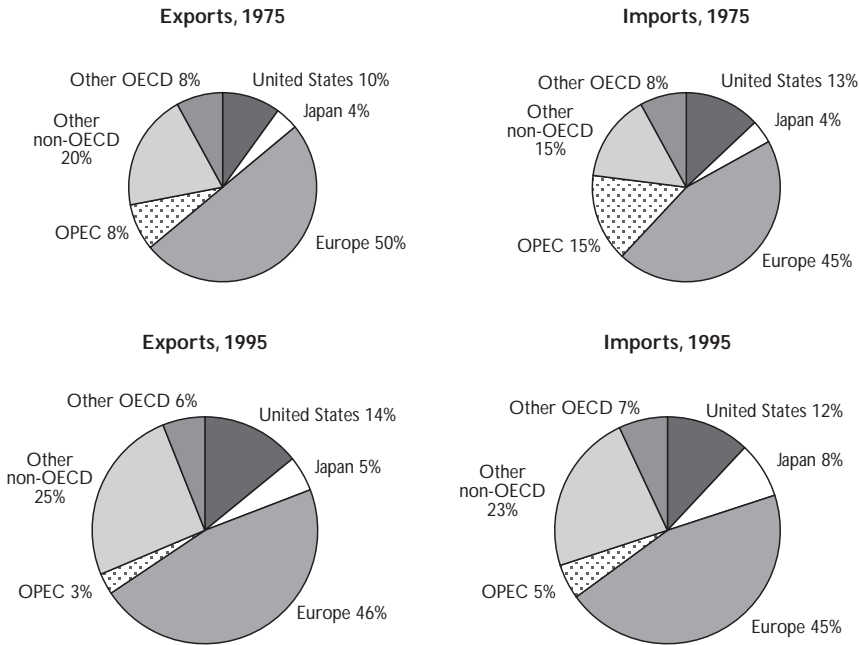
◆ Figure 14. *Relative growth in world trade*¹



1. Calculated as the growth rate of average merchandise exports and imports volumes divided by the growth rate of real output. The bolded line is the trend, calculated using HP-filtered trade and output volumes.

Source: *OECD Economic Outlook 60*, and World Bank (world output).

◆ Figure 15. *Direction of OECD trade*

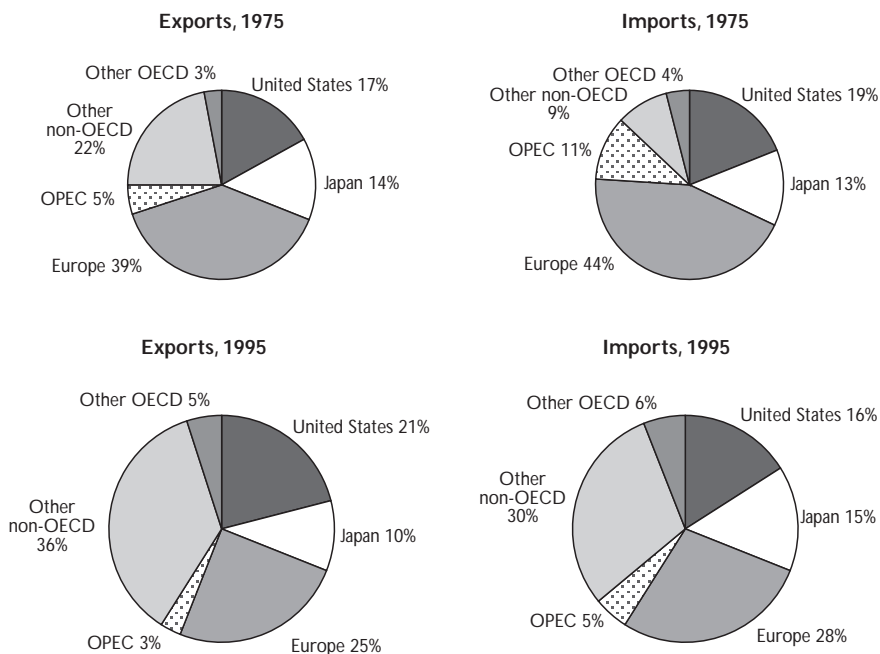


Source: OECD, IMF.

Along with the rise in world trade, intra-regional trade has gained importance both within the OECD area and non-OECD regions, reflecting trade liberalisation, economies of scale and the increasing role of developing neighbouring markets. In North America, intra-trade was boosted in the second-half of the 1960s by the 1965 Autopact and other bilateral agreements between Canada and the United States (Figure 19), but fell subsequently, partly due to the oil-price hikes. Since the mid-1980s, growth of intra-trade strengthened significantly. Largely influenced by the different phases of the European integration, trade between European countries since 1970 has grown faster on average than their trade with other OECD countries (OECD, 1994a).

Since the mid-1970s, non-OECD trade has also been characterised by a substantial increase in the intra-regional trade, with trade between non-OECD countries now accounting for 40 per cent of non-OECD trade, compared with

◆ Figure 16. *Direction of non-OECD trade*

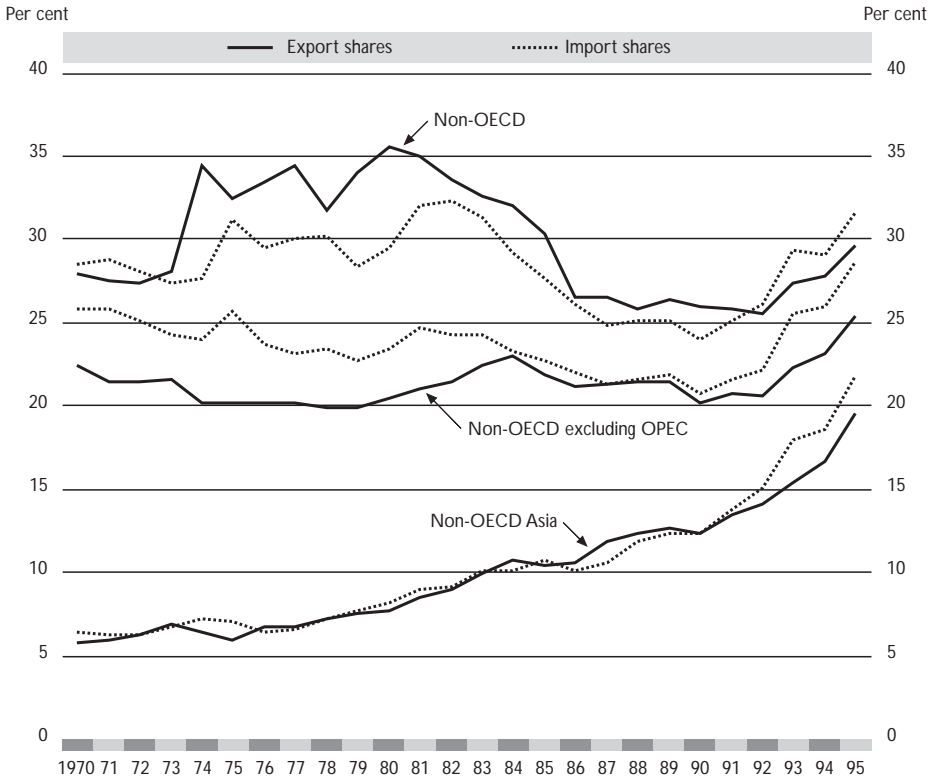


Source: IMF.

23 per cent in the mid-1970s (Tables 9 and 10). Intra-trade shares have risen markedly in Latin America to around 23 per cent of total trade since the mid-1980s. Despite the absence of formal trade agreements, intra-Asian trade has grown rapidly, largely due to the economic development in the region and to increased foreign direct investment, notably since 1985.

Technological changes and financial liberalisation over the last 20 years have greatly improved the conditions for trade in services, which has grown faster than trade in manufactures, and the overall share of invisibles in world trade has risen from around one-quarter in 1975 to more than one-third in 1993 (Table 11). This reflects primarily the rapid growth of investment income and the expansion of financial and other private services, comprising banking, communications, insurance, and other business and professional services.

◆ Figure 17. *The non-OECD's share of world exports and imports*¹



1. Correspond to the respective shares of world imports and exports measured in current US dollars. Excluding Iceland, Portugal and Switzerland.

Source: OECD, Analytical Databank. Data after 1992 are partially estimated by the OECD.

Associated with the expansion of trade in services, the world FDI stock, which has been sustained by a trend towards liberalisation of national laws and investment-related policies, has grown persistently faster than world exports and output (Table 12). With the intensification of competition, particularly in financial services, the services sector has been the largest source of outward flows from major OECD countries during the first half of the 1990s. At the same time, there have been important changes in regional composition, with the share of the United States in world outward flows falling from around 50 per cent in the early

Table 8. **OECD trade with major regions**

Shares in total merchandise trade, per cent

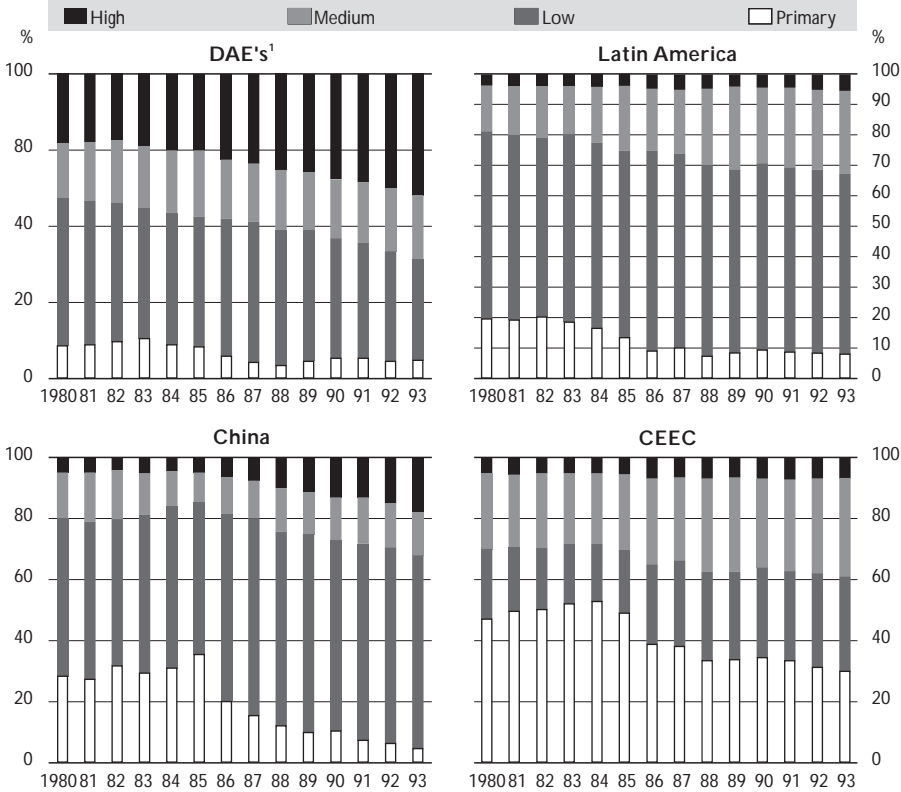
	Exports			Imports		
	United States	Japan	OECD Europe	United States	Japan	OECD Europe
United States						
1970	..	31	8	..	29	10
1980	..	24	5	..	17	8
1990	..	32	7	..	23	7
1993	..	29	7	..	23	8
Other North America						
1970	25	3	2	31	6	2
1980	22	3	1	21	4	1
1990	28	3	1	24	4	1
1993	30	3	1	25	4	1
Japan						
1970	11	..	1	15	..	2
1980	10	..	1	13	..	3
1990	12	..	2	18	..	4
1993	11	..	2	18	..	5
OECD Europe						
1970	32	15	66	28	10	61
1980	29	17	67	22	7	59
1990	28	22	72	22	18	68
1993	23	18	67	20	15	65
Other Asia¹ and Oceania						
1970	11	29	5	11	23	4
1980	15	29	5	13	22	5
1990	18	32	6	21	30	6
1993	21	39	8	24	35	8
Central and South America						
1970	9	4	3	9	6	4
1980	8	5	2	8	3	3
1990	6	2	4	5	3	2
1993	7	3	2	4	3	2
Eastern Europe						
1970	1	2	4	1	3	3
1980	2	3	4	1	1	4
1990	1	1	3	0	2	3
1993	1	1	4	1	1	4
Rest of the World²						
1970	11	15	11	7	23	13
1980	14	19	15	25	45	18
1990	6	7	6	9	21	8
1993	7	7	10	7	18	9

1. Excluding OPEC countries.

2. Including OPEC countries.

Source: OECD (Database NEXT).

◆ Figure 18. *Exports of selected non-OECD countries and regions classified by technological content*

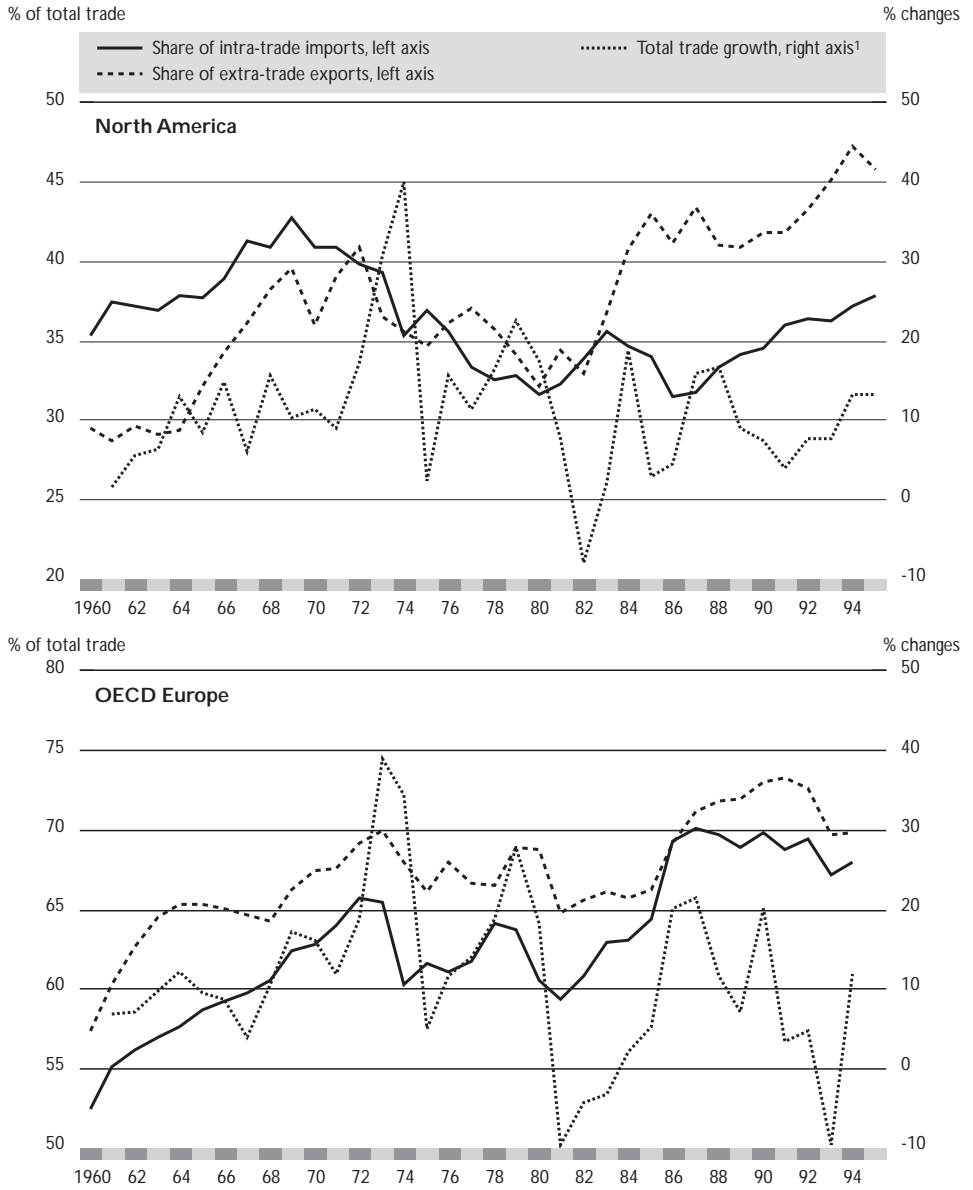


1. DAEs includes Chinese Taipei; Hong Kong, China; Malaysia; Singapore and Thailand.
Source: Chelem.

1970s to around 30 per cent at present, and the shares of other OECD economies rising correspondingly (Figure 20). Nonetheless, the OECD still accounts for about 96 per cent of all outward investment, with much of the remaining 4 per cent originating in Asia and, particularly, the dynamic Asian economies.

The OECD has also been the largest recipient of FDI, accounting for over 60 per cent of inward flows in 1975, with Latin America and Asia accounting for another 12 per cent and 6 per cent, respectively (Figure 21). During the 1980s, the

◆ Figure 19. *Intra-trade in OECD regions*



1. Percentage changes of the average of total imports and exports.
 Source: OECD, *Monthly Statistics of Foreign Trade, Series A*.

Table 9. **Intra-regional trade shares**

Per cent of total trade of each region

	Imports			Exports		
	1983	1988	1993	1983	1988	1993
North America ¹	33.5	32.4	36.9	39.8	42.2	46.4
OECD Europe ²	62.5	68.6	66.6	66.1	70.8	68.9
Oceania ³	10.8	10.1	11.1	11.0	10.1	11.3
Central and South America	12.6	18.3	21.6	12.5	13.2	24.2
South-East Asia ⁴	20.6	25.8	28.7	21.8	27.0	31.6
Other Asia	2.5	2.6	3.0	3.9	1.8	2.8
Central and Eastern Europe ⁵	52.1	46.6	23.4	54.0	49.9	24.3
OPEC	2.0	3.3	3.5	2.0	3.0	2.2
Africa	2.4	3.3	5.3	4.5	5.2	13.1

Note: Whenever possible, missing export values were estimated by the imports of the partner country of the reporting country.

1. United States, Canada and Mexico.
2. Excludes the Czech Republic, Hungary and Poland.
3. Includes Australia and New Zealand.
4. Includes countries in South Asia (e.g. India), East Asia (e.g. Korea, Chinese Taipei) and in South-East Asia (e.g. Hong Kong, China, Singapore, Philippines, China, Malaysia).
5. Includes the Czech Republic, Hungary, Poland and the former Soviet Union members of Asia.

Source: United Nations (COMTRADE Databank).

share of the OECD and Asia in inward flows rose steadily to over 70 per cent and 10 per cent, respectively, whilst the shares of other non-OECD economies, including Central and South America fell in both relative and absolute terms. Since then, there has been a major shift in the distribution of FDI, with inflows to non-OECD countries rising to over 30 per cent in 1993, with the bulk of these flows concentrated in East Asia, particularly China, which now accounts for over 70 per cent of total flows to the region.²⁴ Latin America has also benefited from the recent rise in inflows, in part reflecting extensive privatisation programmes. These developments have coincided with a restoration of confidence in key emerging markets and improved access to international capital markets.

Interactions between trade and investment, productivity and growth

The wider positive implications of FDI for trade, productivity and growth have been explored in a number of recent empirical studies. Market presence through location of foreign affiliates provides privileged access to markets and complements trade, enabling countries to gain from international specialisation and expand supply capacities. Outward flows are recognised to have positive trade-creating effects on both exports and imports of the home country, stemming from the increase in exports of intermediate goods and services to foreign

Table 10. **Trade shares**¹

Per cent of total

	United States			Other North America			Japan			OECD Europe			Other Asia and Oceania			Central and South America			Eastern Europe			Rest of the World		
	1983	1988	1993	1983	1988	1993	1983	1988	1993	1983	1988	1993	1983	1988	1993	1983	1988	1993	1983	1988	1993	1983	1988	1993
Imports																								
United States	..	..	..	26	23	26	16	20	18	21	23	20	17	22	24	7	5	4	1	1	1	12	7	7
Other North America	72	66	70	2	1	2	6	7	6	11	15	11	5	7	7	2	2	2	0	0	0	3	1	1
Japan	20	23	23	5	5	4	..	..	..	8	17	15	27	34	37	3	3	3	1	2	1	36	16	17
OECD Europe	8	7	8	2	1	1	3	5	5	63	69	67	5	6	8	2	2	2	5	4	4	12	5	6
Other Asia ¹ and Oceania	16	16	14	1	2	1	19	21	20	21	21	18	26	32	37	1	1	1	2	2	2	14	6	6
Central and South America	24	25	26	8	5	4	5	7	7	17	26	23	3	4	8	13	18	22	1	1	1	29	12	9
Eastern Europe	3	2	4	0	0	0	1	1	2	41	49	61	2	4	4	2	2	1	44	38	23	7	4	4
Rest of the World	16	15	17	1	2	2	14	12	14	46	44	41	13	16	16	2	3	3	2	2	1	4	6	6
World	12	11	13	6	5	6	8	10	10	41	46	41	11	15	18	3	3	3	4	3	3	14	6	7
Exports																								
United States	..	..	..	25	28	30	12	14	12	30	31	27	14	18	20	7	4	5	0	0	1	11	5	5
Other North America	71	74	80	1	1	2	6	7	5	12	10	7	3	4	4	5	2	2	0	0	0	2	1	1
Japan	33	37	31	3	3	3	..	..	..	19	24	21	27	29	37	2	1	2	0	0	0	16	5	6
OECD Europe	8	9	8	1	2	2	2	3	3	70	75	71	6	6	8	1	1	1	2	1	3	10	4	4
Other Asia ¹ and Oceania	25	26	23	2	2	2	18	17	14	19	21	19	25	29	38	1	1	1	0	0	0	10	4	3
Central and South America	34	30	29	3	4	4	7	8	7	33	36	28	4	7	8	12	11	19	1	1	1	6	4	5
Eastern Europe	2	3	4	0	0	1	2	4	3	65	66	63	5	6	12	1	1	1	20	17	14	5	3	1
Rest of the World	15	19	19	1	1	1	21	18	18	41	43	36	11	12	18	7	3	3	1	1	1	3	3	4
World	17	18	17	4	5	6	8	7	7	46	50	43	11	13	19	3	2	2	2	1	2	9	4	4

1. Exports and imports in 1993 US dollars.

Source: United Nations (COMTRADE).

Table 11. **The composition of world exports**

	\$ billion			Per cent		
	1975	1985	1993	1975	1985	1993
Merchandise	840	1 856	3 629	75.5	70.9	66.2
Invisibles	272	761	1 856	24.5	29.1	33.8
Non-factor services	184	433	1 025	16.6	16.5	18.6
Travel	43	112	295	3.9	4.3	5.4
Transportation	70	149	260	6.3	5.7	4.7
Government	18	36	56	1.6	1.4	1.0
Financial and other services	53	136	414	4.8	5.2	7.5
Investment income	88	328	831	7.9	12.6	15.2
Total	1 112	2 617	5 485	100.0	100.0	100.0

Source: OECD, IMF, IBRD.

Table 12. **World FDI,¹ trade and GDP growth**

1981-1993

Indicator	\$ billion 1993	Average annual growth rate		
		1981-85	1986-90	1991-93
FDI outflows	222	0.8	28.3	5.6
FDI outward stock	2 135	5.4	19.8	7.2
Current gross domestic product	23 276	2.1	10.6	3.3
Exports of goods and non-factor services	4 654	-0.1	14.3	3.5

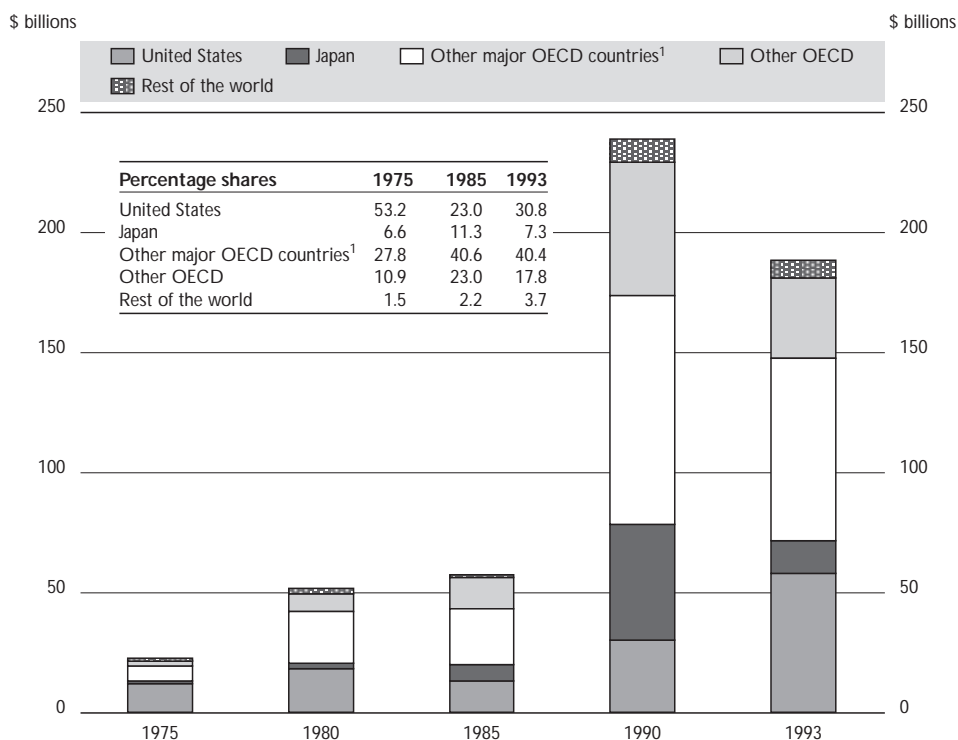
1. FDI including mergers and acquisitions.

Source: UNCTAD.

affiliates and a rise in the imports of final goods. Available evidence points to stronger, positive impacts on exports than imports, implying a positive net effect on the home country trade balance (Fontagne, 1996).

Stimuli to trade and activity also comes from the positive effects of foreign investment on the efficiency performance of the host economy. Strong FDI flows to South East Asia have coincided with significant productivity gains and stronger output growth, reflecting also product diversification and the expansion of export capacities. Foreign affiliates are generally more export-oriented than local firms, therefore contributing to higher shares of exports in total domestic output in many developing countries. De Gregorio (1992a and b) and Borensztein *et al.* (1995) find foreign investment to be one of the main determinants of output growth in many developing countries and more productive than domestic investment.

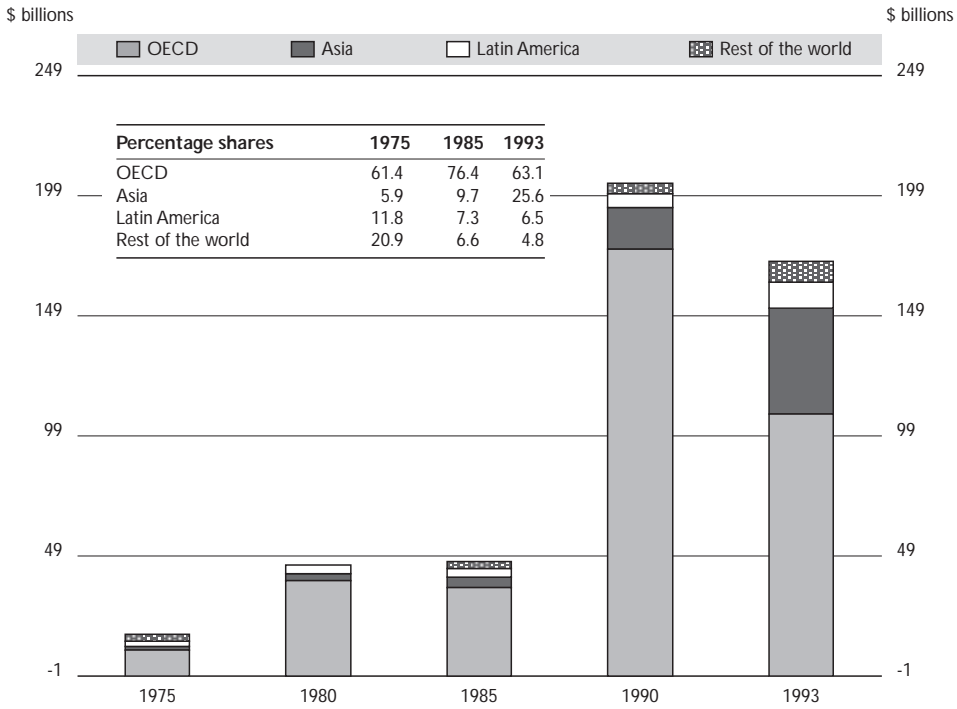
◆ Figure 20. **World outward FDI flows**



1. Other major OECD countries are Canada, France, Germany, Italy and United Kingdom.
Source : IMF.

Other major channels for productivity increases relate to technology transfer and the upgrading of the local labour force. Through foreign trade and investment links, businesses in the non-OECD are able to get easier access to spillovers from foreign R&D activities. Outward-oriented trade and industrial policies have eased the diffusion of technical progress across countries and, in particular, from the OECD to the more dynamic non-OECD economies (Bayoumi *et al.*, 1996). Technical and management skills gained by local workers trained by multi-national corporations are diffused when they are hired by local firms or when they set up their own businesses. Local firms also benefit from market access spillovers, by taking advantage of the diffusion of international experience of foreign affiliates in the development of export activities. Available evidence for Asia and Mexico

◆ Figure 21. *World inward FDI flows*



Source : IMF.

suggests that as a result of such spillovers locally-owned firms located in the proximities of the international firms also tend to export a higher-than-average proportion of total output (Aitken *et al.*, 1994).

FDI also exerts positive effects on productivity through competition. In a recent study on interactions between foreign affiliates and local firms in the Mexican manufacturing industries, Kokko (1996) finds that, by enhancing the degree of competition in the domestic market, the entry of foreign affiliates puts local firms under stronger pressures to become more productive. Such spillovers are likely to be more significant in industries where foreign affiliates are not in a dominant position and therefore compete directly with local firms.

The positive effects on productivity are generally dependent on the capacity of the host country to absorb new technologies, which in turn is closely associated with the skill and education levels of the domestic labour force. Blomström *et al.*

(1992) note that the positive impact of FDI on output growth is likely to be more significant for middle- or high-income economies, while the growth effects of FDI flows for the low-income countries may be less significant. Borensztein *et al.*, (1995) find the same relationship in the context of a comparative study of FDI and human capital.

In a longer perspective, however, outward FDI is likely to exert a number of positive influences on investment in the home country, by increasing the size of the domestic market available to the most innovative firms, and hence stimulating R&D, and through the influence of future profit repatriation and the propensity to invest. Profit repatriation may reduce the future availability of foreign savings in the host country, but the experience of many Asian economies suggests the possible adverse effect on investment is more than offset by the positive effects of the technology transfer on productivity and output growth. To the extent that faster output growth contributes to higher domestic savings, an increasing proportion of investment spending is likely to become self-financed.

Factor productivity growth and policy reforms

A key assumption regarding the outlook for the world economy is the future development of total factor productivity growth. Following recent developments in endogenous growth theory, numerous empirical studies have attempted to link output growth and/or total factor productivity growth with sources which have immediate relevance to policy.²⁵ While there is far from complete agreement as to the key influences on growth, there are nevertheless some results which are common across a range of empirical studies.

A number of recent empirical studies support the view that an open trade policy is associated with higher growth, and that the removal of obstacles to trade can act as a catalyst for income convergence among countries trading together. Sachs and Warner (1995) and Ben-David (1996) find that open economies converge towards their more developed trading partners in terms of GDP per capita, while convergence cannot be found amongst a larger sample of both open and closed economies.

This link is confirmed by several studies which find evidence of an effect from various indicators of trade policy on growth. Thus, identifying the determinants of GDP growth for a world-wide sample of countries between 1965 and 1985, Barro and Sala-i-Martin (1996) find that tariff rates on imports of capital goods and intermediary products, as well as black market premia exchange rates (a proxy for government distortion of markets) have had a negative impact on growth performance. Using an indicator of trade policy orientation, Sachs and Warner (1995) also conclude that closed economies have systematically grown more slowly than open countries, and that the role of trade policy is confirmed once controlled for

other growth factors.²⁶ Bosworth *et al.* (1995) find that direct indicators of trade policies, such as the absence of tariff barriers, help to explain growth performance in the 1980s, both through raising capital accumulation and total factor productivity.

Trade policy is generally thought to positively affect growth performance through at least three channels. Firstly, by allowing an expansion of markets, trade liberalisation permits the specialisation of a country in industries that have scale economies, thereby raising productivity. Increasing the potential market size also raises the prospective returns to a successful innovation, although attempts to identify such scale effects in empirical studies have not been conclusive (Backus *et al.*, 1992). Secondly, as noted earlier, by increasing outside competition, trade liberalisation may lead to X-efficiency gains: management can become more efficient; there are more incentives to training; and rent-seeking behaviour can be reduced, thereby improving the allocation of resources towards more productive activities. Thirdly, trade allows a more rapid diffusion of new products, processes and research output between national economies. Openness to trade provides access to imported inputs which embody new technology directly and by relieving the foreign-exchange constraint through providing export revenues. Coe and Helpman (1995) show that foreign R&D has had beneficial effects on domestic productivity in OECD countries, and that these effects are stronger the more open an economy is to foreign trade. Building on these results, Bayoumi *et al.* (1996) find that increased trade can spur strong productivity improvements stemming from foreign R&D spillovers, and that these spillovers have played an important role for Newly Industrialising Economies over the last 20 years.

Nevertheless, some other studies have cast doubt on the robustness of the link between openness and growth.²⁷ This may be partly because it is difficult to disentangle the effects on growth of trade policies from those of other policies, particularly because trade liberalisation is often accompanied by changes in macroeconomic policies (monetary and fiscal) and other structural policies (such as education policies, labour market, infrastructure). Sachs and Warner (1995) find that open trade has tended to be correlated with other features of what they regard as a healthy economy – *i.e.* macroeconomic stability and reliance on the private sector as the main engine of growth. However, they further argue that it is trade policy which should be regarded as the primary instrument of reform.

The positive effects of trade and FDI on productivity are generally dependent on the country's capacity to adopt new technologies, which in turn are closely associated with the skill and education levels of the domestic labour force, as noted earlier. Baumol *et al.* (1994) suggest that only countries with an adequate level of human capital endowment can take advantage of the modern technology and converge towards their trading partners. This complementarity between trade openness and human capital is also highlighted by Berthélemy

et al. (1996). Over the past 30 years, openness is shown to have increased the speed of convergence of income per capita towards more developed countries both directly, through the sorts of channels described above, and indirectly by allowing them to reap the benefits of a better educated labour force.

There is a wide consensus in economic theory that human capital is an essential determinant of productivity growth. As well as facilitating technological advance and the diffusion of techniques, higher education levels may also improve the mobility of the labour force towards more productive activities, facilitating factor reallocation. Empirical evidence provides considerable support for a role for both the initial stock and the subsequent investment in human capital in fostering faster income growth.²⁸ Educational expenditures by governments have been found to have a strong positive impact, and the rate of return on public education is also found to be high.²⁹ The effects of human capital on growth are most evident at the primary and secondary level in low and higher income developing countries, and at the tertiary level in developed economies.³⁰ High levels of public support for universal primary education are thought to have played an essential role in East-Asian success in particular.³¹

Infrastructure capital contributes to productivity growth mainly by reducing transaction costs for the private sector (improving communication and transport network among others). There is a debate, however, on the size of the pay-offs to infrastructure. Conclusions of high pay-offs by Aschauer (1989) and Munnell (1992) for specific countries have been contested on different grounds, including the difficulty of defining public infrastructure and the high sensitivity of results to the various definitions (Ford and Poret, 1991), as well as the lack of robustness of the results due to trend factors or the possible endogeneity of public infrastructure. On a cross-country basis, Easterly and Rebelo (1993) find that public investments in transport and communication networks are important for promoting growth. Other studies show that public infrastructures reduce the costs of the private sector, and that public and private investment are complementary, although it appears that some countries may have made too much public investment and thus crowded out private investment (Hénin and Ralle, 1994). Dessus and Herrera (1996) confirm the finding that public capital stock has had a positive impact on long-run growth on a set of developing countries, but also find that some countries had an excessive public capital stock at the start of the 1980s.

The financial sector may be a key channel for the efficient allocation of investment. While financial development certainly belongs to the process of economic growth, Barro and Sala-i-Martin (1995) argue that the relation is two-sided and find a significant impact of financial deepening on the growth of per capita income for a world-wide sample of countries. Explicitly taking into account this reciprocal influence, Berthélemy and Varoudakis (1996) confirm that the financial sector has played an important part in the growth process of developing

countries and identify threshold effects as well as strong complementarities between the development of the financial sector and the efficiency of economic policies. However, when confining the analysis to OECD countries, Englander and Gurney (1994) find no effects of financial variables on productivity growth, suggesting that the standard measures of financial deepening may be inadequate for developed economies, or perhaps that the impact of financial systems becomes less important beyond a certain level of economic development.

As discussed earlier, income distribution may also influence productivity growth.³² Although initially, following Kuznets (1955), the conventional wisdom was that causality runs from growth to income distribution, a concern has emerged that the earning distribution and redistributive policies may affect growth. On the one hand, redistributive policies distort economic incentives and may thereby reduce productivity growth (by lowering the return to innovation, for example). On the other hand, redistributive policies may compensate for some market failures, and thus spur growth. Capital market imperfections prevent low-income families from investing in human capital for their children, so that transfer policies may indeed favour productivity growth by raising human capital investment. Birdsall *et al.* (1995) ascribe much of the growth performance of East-Asian countries to the virtuous interaction between strong investment in education, low income inequalities and economic growth. Moreover, low-income inequality may also favour productivity growth directly, by securing sufficient social cohesion, and contributing to political and macroeconomic stability (Alesina and Perotti, 1996).

There is also empirical evidence to suggest that macroeconomic policies affect long-term growth. Easterly and Rebelo (1994) show that a surplus of government budget is consistently correlated with growth and private investment, although they find no evidence that tax rates matter. High and persistent government deficits indeed tend to increase long-term real interest rates (Orr *et al.*, 1995*a* and *b*), and may thereby diminish the incentives for investment and innovation. High and variable inflation can affect growth performance by increasing uncertainty with regard to the expected returns on investment as well as the cost of through a higher risk-premia. However, while inflation is nearly always found to have a negative effect on growth in empirical studies, this result is not always robust (see Edey, 1994, for a summary of recent studies). A possible non-linear relation between inflation and growth may partly explain this latter result. Indeed, Barro (1995) emphasises that the clearest evidence for an adverse effect from inflation comes from the experiences of countries in which inflation exceeds 10 to 20 per cent per annum.

There are strong complementarities between the policies described above, which makes the evaluation of the effects of each one individually quite difficult. For the positive externalities to materialise, a set of policies is needed. Thus, as described above, there may be links between human capital and technological

The quantitative effects of policy reform

This box reviews a range of available estimates of the quantitative effects of key policies and policy reforms on the growth performance in OECD and non-OECD economies, notably through TFP growth.

Policy reforms lead to both **static** gains (*i.e.* once and for all shifts in the level of GDP through more efficient resource allocation) and **dynamic** gains (*i.e.* those permanently affecting the GDP growth rates). Even though such gains apply to both OECD and non-OECD economies, the scope for increased efficiency, through deregulation, privatisation and liberalisation of trade and investment, is much greater in developing countries, where productivity levels are well below those of the OECD. For these economies, the influence of improved levels of education and technology transfer, occurring through trade and investment, are also likely to be most pronounced.

Trade liberalisation

Trade liberalisation can be expected to generate static gains through more efficient resource allocation. The Uruguay Round has already significantly reduced trade barriers but further scope remains for reducing both non-tariff barriers and tariffs – on services and agricultural products in particular. Goldin and van der Mensbrugge suggest that the static gains both from implementation of Uruguay Round and full liberalisation of trade in goods might add about 0.3 percentage point to annual average growth in most OECD economies over the next decade (Table 1).¹ Petersen (1992) finds similar results (equivalent to an

Table 1. **Estimated effects of trade liberalisation**

	Real income gains from trade liberalisation as a percentage of GDP, 10 years after implementation		Corresponding gains in the annual growth rate of real GDP spread over 10 years	
	Uruguay Round	Full liberalisation	Uruguay Round	Full liberalisation
OECD countries				
Europe	1.0	2.4	0.10	0.26
Japan	0.8	2.4	0.09	0.26
United States	0.2	0.3	0.02	0.03
Non-OECD countries				
Latin America ¹	0.6	1.5	0.07	0.17
China	2.5	5.0	0.27	0.54
India	0.5	1.8	0.06	0.20
Low income Asia	0.7	1.5	0.08	0.17
Maghreb	-0.5	-1.9	-0.06	-0.21
Sub-Saharan Africa	-0.2	-1.1	-0.02	-0.12

1. Excludes Mexico.

Source: Goldin and van der Mensbrugge (1992) and OECD estimates.

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(continued)

additional 0.2 percentage points in the GDP growth rate), with larger gains for developing countries, for example for Latin America and the NIEs, which might experience gains of up to 0.4 percentage point in growth rates over the same time span. There are, however, considerable regional variations in such estimates with possible net losses for some food importing countries, mostly in Africa. Other studies, for example by François *et al.* (1994), which take into account the potential gains from scale economies, suggest estimates which are up to twice as large. Moreover, all these studies exclude the potential gains from removing barriers to services and a variety of non-tariff barriers.

Trade liberalisation can also be expected to have dynamic effects on growth. Estimates by Barro and Sala-i-Martin (1995) suggest that a 1 percentage point decrease in average tariff rates on intermediate and capital goods leads to a permanent increase of 0.02 per cent in the GDP per capita growth rate. On this basis, the potential dynamic gains stemming both from the Uruguay Round and further trade liberalisation might add about 0.05 percentage point to growth for OECD countries, and 0.15 percentage point for developing economies.² Trade liberalisation also allows importing countries to benefit more from R&D spillovers and Bayoumi *et al.* (1996) suggest that increasing trade openness by 5 percentage points of GDP would add **0.15** percentage point to TFP growth rates.³

Regulatory reform

Regulatory reform, which has already gained momentum in the OECD area over the past decade, would also reduce the costs and inefficiencies by boosting competition.⁴ The potential gains from the implementation of ambitious, but not unprecedented, reforms in five sectors (electricity, airlines, road transport, telecommunications and distribution) have recently been evaluated and, over a ten-year period, might be expected to add around $\frac{1}{2}$ percentage point to annual average growth in Japan and Europe, but significantly less in the United States (see Table 2). If reforms were to be extended to other sectors – such as

Table 2. **Estimated effects of regulatory reform on five sectors**

	GDP level Per cent deviation from the baseline	GDP growth rate Percentage point per year when spread over 10 years
Europe	4.3	0.5
Japan	5.9	0.6
United States	0.9	0.1

Source: Blondal and Pilat (1977).

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agriculture, public administration, professional services, other transports and manufacturing – the benefits would be expected to be much larger.⁵ Although similar evaluations are not available for developing countries, those least advanced in the process would stand to benefit most.

Other policies

With regard to macroeconomic policies, empirical studies provide consistent evidence of a positive effect of lower inflation on growth (see Edey, 1994, for a survey), although the magnitudes are uncertain. Englander and Gurney (1994) suggest that a decrease of 1 percentage point in inflation rates raises TFP growth by 0.06 percentage point for OECD countries, whilst Barro (1995) reports estimates of about one-half this size for a wider sample of countries. Thus, if OECD countries were to “lock in” current inflation rates of about 2 per cent then (compared to the 1980s average 5 per cent per annum) the gains to TFP growth might amount to 0.1 to 0.2 percentage point per annum. For developing countries, there is strong negative correlations between high inflation and growth and also inflation volatility (Judson and Orphanides, 1996). For Latin American economies, De Gregorio (1992a and b and 1993) suggests that a halving of the inflation rate between 1950 and 1985 – from 34 per cent to 17 per cent – might have increased annual growth rates by up to half a percentage point.

There are a number of transmission mechanisms by which fiscal policy (through the level and structure of taxes and public spending) might be expected to influence long-run growth performance. Barro and Sala-i-Martin (1995) find that growth is negatively correlated with public consumption (excluding defence and education), although it is positively correlated with public spending on education. The former effect implies that a 1 percentage point increase in the public consumption ratio reduces GDP growth rates by as much as 0.1 per cent, although other studies have concluded that such estimates are not robust.⁶

Other structural reform policies, such as those which promote the development of financial markets, are likely to influence growth given the decisive role they play in the mobilisation and allocation of investment resources. Such gains are likely to be large in developing countries, where financial systems are least developed and the opportunity cost of capital is higher.

Finally, a large number of studies, using different kinds of measures of human capital, have demonstrated the importance of human capital for growth (see main text). Cross-section estimates imply a very high impact of education on growth. Barro and Sala-i-Martin (1995) find that an increase of 0.7 years in male secondary schooling raises the growth rate by 1.1 percentage points per year, while an increase of 0.1 year in male higher schooling raises the growth rate by 0.5 percentage point per year. Bosworth *et al.* (1995) find an elasticity of TFP growth to the average years of schooling of almost 0.2. Such estimates seem

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implausibly high but may reflect inherent non-linearities between available measures of education and actual attainment levels. In the developing countries in particular, the scope for catch-up is nonetheless very large.

1. Goldin and van der Mensbrugge (1992) calculate gains in total welfare and not in GDP as such. However, as noted by Tanzi and Zee (1996), any persistent difference between changes in output and those in welfare is unlikely to be sustainable in the long run, so that welfare gains may be good proxies for GDP gains.
2. Import weighted tariff rates on intermediate and capital input are generally lower than those for all goods (before the Uruguay Round, the latter were around 6 per cent on average in developed economies and 16 per cent for developing countries, see OECD, 1995). Assuming tariffs on intermediate and capital goods to be half of the average tariff – a lower bound – the potential dynamic gains obtained from their elimination would add on average 0.06 percentage point to GDP growth in developed economies and 0.16 percentage point in developing economies.
3. The time horizon of their simulation is 2075. Making a straight interpolation of the figures obtained for 2010 and 2030, the deviation of TFP from the baseline for developing countries except NIEs is 3.8 per cent, which implies an additional 0.15 percentage point in TFP growth rate.
4. See Blondal and Pilat (1997) and OECD (1997).
5. The five sectors considered only constitute about 20 to 25 per cent of GDP in the five countries.
6. See Easterly and Rebelo (1993) and Bosworth *et al.* (1995).

innovation, between trade policies and technology, between human capital and income distribution, and so on. Trade openness may also be a condition for deriving the benefits of a better educated labour force (Berthélemy *et al.*, 1996), and, for developing countries, a certain level of financial development may be a precondition for the positive effects of trade openness to occur. This suggests that in order to foster improvements in total factor productivity there is a need for a consistent set of policies founded on open trade, macroeconomic stability, and encouragement for the accumulation of human capital. For a review of evidence of the quantitative significance of policies and policy reforms in these key areas for OECD and non-OECD economies, see the box “The quantitative effects of policy reforms”.

ALTERNATIVE SCENARIOS TO 2020

Given the range of uncertainties about future social and economic developments, a variety of scenarios can be imagined involving very different paths of development for individual economies and regions. Amongst these, the present discussion focuses on two specific cases, corresponding to alternative higher and

lower growth paths for the world economy over the next 25 years. Neither of these are forecasts; their purpose is to provide a framework for analysis of policies and the consequences of, more or less rapid growth and development of the world economy to 2020.

Both scenarios³³ are built on the basis of a growth accounting framework in which a simple production relationship is used to estimate potential GDP, based on different assumptions about employment growth, capital accumulation and factor productivity³⁴ and future policies, in particular, progress in policy reforms (Table 13):

- a **higher-growth** case assumes that the current trend in liberalisation of trade and investment policies continues, accompanied by the deepening of structural reforms, including regulatory reforms and fiscal consolidation;
- a **lower-growth** case assumes a less favourable international environment, with slow progress in trade and investment liberalisation, structural reforms and budgetary control.

Table 13. **Key assumptions underlying high and lower growth scenario**

	High growth	Lower growth
OECD		
Factor productivity (Table 14 and Figure 12)	Steady adjustment by 2010 towards highest rates achieved in the '70s and '80s (averaging 1½ per cent per annum).	Stable or moderately declining according to current trends (averaging 1 per cent per annum).
Labour markets	Structural unemployment declining by up to 5 percentage points in Europe and 1 point in the rest of the OECD by 2010.	Structural unemployment remains at current high levels in Europe; stable elsewhere.
Saving and investment rates (Figure 23)	Rising moderately over the short to medium term, declining slowly thereafter.	Stable over the short to medium term, declining thereafter.
Non-OECD		
Factor productivity (Table 14 and Figure 12)	Steady increases to 2010 (to an average 2¾ per cent per annum), declining moderately thereafter.	Stable or declining over the period (on average 1½ per cent per annum).
Labour markets	Structural unemployment falling in those economies with large informal sectors.	Structural unemployment remains at current levels.
Saving and investment rates (Figure 23)	Rising significantly over much of the period in most regions, except China and Dynamic Asia.	Stable or declining over the period in most regions.

Assumptions for demographic trends, which are common to both scenarios, are based on UN and World Bank projections (Table 14).³⁵ These play a very important role in determining the paths of future output and employment, having direct influence through the growth of the labour force and indirect influence through savings, public spending and associated financial conditions. A key feature is a decline in average population growth in the OECD from 0.9 to 0.5 per cent per annum. This is especially important for Japan and the European Union, where the level of population is likely to fall between 2011 and 2020 (Figure 22). For the non-OECD, population growth falls from an average of 2 to 1½ per cent per annum, with the non-OECD share of total world population rising from 81 per cent in 1995 to over 84 per cent by 2020 (Figure 8). A particularly large increase is expected for Sub-Saharan Africa, with a total population nearing those of India and China.

Lower rates of population growth and mortality also imply a significant demographic transition, including major changes in dependency rates³⁶ (Table 14), which fall as a result of lower birth rates but rise with the effects of population ageing. Dependency rates in the OECD area are expected to fall gradually between 1995 and 2010, but rise thereafter to an average of 55 per cent by 2020. By 2020, most OECD countries will be in the final phase of such a transition in age structure and for Japan, in particular, more than 25 per cent of the population is expected to be over 65 years of age. Most non-OECD countries began such a demographic transition in the 1960s and 1970s, with the Middle East and Africa lagging somewhat.

At the same time, participation rates are expected to increase slightly in the OECD, particularly in Japan, compensating in part for the effects of ageing on the size of the labour force. Participation rates for non-OECD countries are generally lower than for the OECD and are not expected to change significantly. An important exception is for the dynamic Asian economies, where convergence towards OECD rates is expected, as more women enter the labour force.

The higher growth scenario

The high growth scenario is based on a number of favourable assumptions about the domestic and international policy environment:

- prudent monetary and fiscal policies, bearing down on inflation and correcting underlying structural deficits;
- continued market and regulatory reforms, allowing more flexibility at the firm level and more efficient responses to market signals;
- a rapid pace of trade liberalisation and the creation of new markets, leading to scale economies and a more efficient distribution of production world-wide;

Table 14. **Demographic trends to 2020**

	Dependency ratio ¹							Population over 65 as a percentage of total						
	1970	1980	1990	1995	2000	2010	2020	1970	1980	1990	1995	2000	2010	2020
United States	61.4	51.1	52.0	53.1	52.0	49.5	56.1	9.8	11.3	12.5	12.6	12.4	12.9	16.1
Japan	45.1	48.4	43.7	43.6	46.4	55.8	65.1	7.1	9.0	12.0	14.1	16.4	20.5	25.2
European Union	58.5	55.1	48.8	48.7	49.1	49.7	54.6	12.2	13.9	14.5	15.2	16.0	17.6	20.3
Total OECD²	61.4	56.5	51.6	51.2	50.8	50.1	54.1	9.6	10.8	11.6	12.2	12.7	13.8	16.6
Brazil	84.1	71.7	64.4	60.1	55.9	50.3	48.5	3.4	4.0	4.8	5.2	5.7	6.9	9.2
China and Hong Kong, China	79.5	68.1	50.1	48.8	47.8	41.8	46.0	4.3	4.7	5.6	6.1	6.7	7.6	10.5
India	83.0	79.7	65.4	59.5	55.0	48.3	44.1	3.1	3.3	3.9	4.3	4.7	5.8	7.0
Indonesia	78.8	74.2	68.3	66.1	62.3	54.1	46.8	3.7	4.0	4.3	4.6	4.9	5.7	7.1
Russia	52.1	46.8	49.2	49.5	45.5	42.7	48.9	7.7	10.2	10.0	12.1	12.8	13.1	15.6
Other Dynamic Asia	90.8	74.5	63.8	59.7	56.0	49.8	45.5							
Other Asia	..	90.2	81.8	77.4	71.7	59.5	50.6							
Other Latin America	82.5	75.7	70.5	64.4	57.6	47.8	48.1							
Middle East and Northern Africa	..	89.0	85.0	76.8	71.1	63.6	58.9							
Sub Saharan Africa	92.4	95.0	95.0	91.2	92.7	87.0	79.1							
Non-OECD²	70.1	77.1	67.2	64.0	61.6	55.5	53.2							

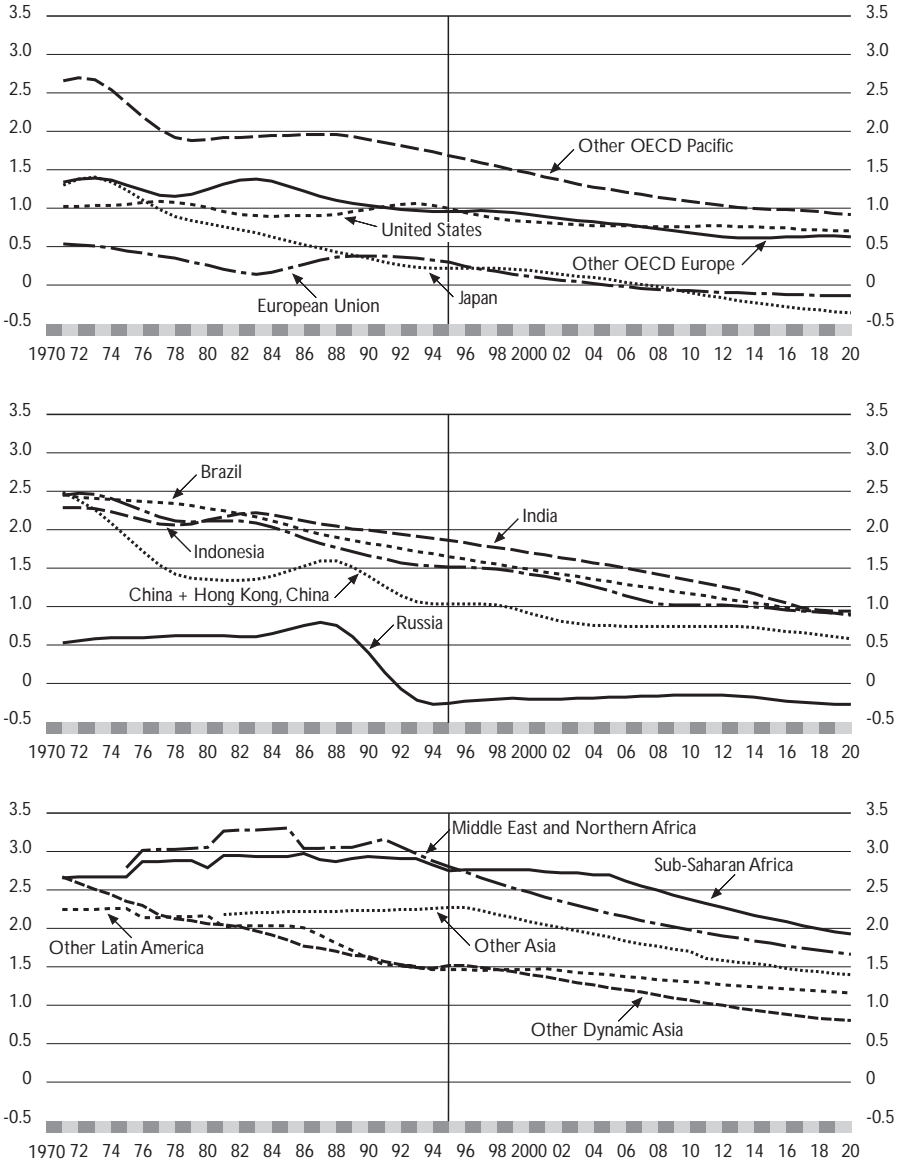
	Labour force participation rate									
	1970	1980	1990	1995	High growth scenario			Low growth scenario		
					2000	2010	2020	2000	2010	2020
United States	65.2	71.0	76.6	77.0	77.2	77.5	77.9	77.2	77.5	77.9
Japan	72.0	71.8	74.2	76.6	79.1	80.8	81.6	79.1	80.8	81.6
European Union	66.1	66.9	67.2	64.2	67.0	67.0	67.0	67.0	67.0	67.0
Total OECD²	64.4	65.7	66.9	65.9	67.1	67.2	67.3	67.1	67.2	67.3
Brazil	60.6	62.6	60.9	60.5	61.3	62.7	63.0	60.8	61.2	61.7
China and Hong Kong, China	92.4	92.0	88.3	88.0	88.6	89.8	92.1	87.0	84.9	82.8
India	69.4	67.0	64.5	63.8	64.1	64.6	65.1	63.2	62.1	60.9
Indonesia	72.2	67.1	63.9	63.0	62.2	60.5	60.0	62.2	60.5	60.0
Russia	..	77.7	76.0	68.0	69.5	69.5	69.5	66.0	67.0	67.0
Other Dynamic Asia	76.9	73.3	71.9	71.2	71.7	72.7	74.2	70.2	69.2	68.2
Other Asia	..	67.4	66.5	67.4	67.6	69.5	72.8	67.4	67.4	67.4
Other Latin America	58.5	57.1	57.5	58.2	59.0	62.4	63.7	58.8	58.8	58.5
Middle East and Northern Africa	..	51.5	50.9	51.5	52.0	52.5	53.0	51.5	51.5	51.5
Sub Saharan Africa	87.2	85.1	81.2	80.5	80.5	81.0	81.0	80.5	80.5	80.5
Non-OECD²	74.1	76.0	73.1	72.4	72.7	73.4	74.4	71.8	70.8	69.9

1. Defined as people with less than 15 or more than 65 years of age to working age population.

2. OECD and Non-OECD averages weighted by population size.

Source: UN, OECD and World Bank.

◆ Figure 22. **World population trends**
Annual growth rates



Source: United Nations, World Bank.

Country classification

The regional definitions used throughout the study are as follows:

OECD

United States

Japan

European Union

Germany, France, Italy, United Kingdom, Austria, Belgium, Denmark, Finland, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden

Other OECD Pacific

Australia, Canada, Mexico, New Zealand, Korea

Other OECD Europe

Czech Republic, Hungary, Iceland, Norway, Poland, Switzerland, Turkey

Non-OECD

Brazil

China and Hong Kong, China

India

Indonesia

Russia

Other Latin America

Includes Caribbean countries

Middle East and North

Africa

Sub-Saharan Africa

Other Dynamic Asia

Chinese Taipei, Malaysia, Philippines, Thailand, Singapore

Other Asia

Rest of the World

Includes Albania, Bulgaria, Romania, the Slovak Republic, the Newly Independent States of the former Soviet Union, the Baltic States and some micro-states in the Pacific and Indian Ocean

- rapid progress in the liberalisation of investment policies and elimination of capital controls, giving stimulus to foreign direct investment and capital flows, permitting wider competition and higher rates of technology transfer;
- a continued high rate of globalisation, enhancing capital productivity through the increase in the flow of technology and investment.

Scenario construction methods

Alternative scenarios for the relevant countries and regions were constructed using a spread-sheet approach, incorporating main elements of the growth projections, as follows:

- (1) $ET = POPT * (1 - UNRMIN) * [PART / (1 + DEPRAT)]$
- (2) $DEP = POPN1564 / POP1564$
- (3) $\Delta SAV / GDP = \Delta(NLG / GDP) - \alpha * \Delta DEP$
- (4) $GNFL = GNFL_{-1} - NLG$
- (5) $INV = KTV - KTV_{-1} * (1 - RSCR) + z * GDPV$
- (6) $CB / GDP = SAV / GDP - (INV * PGDP) / GDP$
- (7) $GDPV = TFP * KTV^a * ET^{(1-a)}$

Where CB is the current account balance, ET total employment, DEP the dependency ratio, GDPV total output, GNFL government net debt, INV total investment, KTV the stock of productive capital, NLG government net lending, PART the participation rate, PGDP the output price index, POP1564 the number of 15-64 year olds, POPN 1564 the number of dependants (0-14 year olds and 65+ year olds), POPT total population, RSCR the rate of scrapping, SAV total savings, TFP total factor productivity and UNRMIN, the structural rate of unemployment.

Equation 1 expresses total employment as total population divided by one plus the dependency-ratio - to get the working age population - times the participation ratio - to arrive at the labour force - times one minus the structural unemployment rate. The dependency ratio is defined by Equation 2, with the relevant demographic assumptions based on UN population projections. Equation 3 relates changes in the savings ratio to changes in the dependency ratio and government net lending.¹ Government debt accumulation is described by Equation 4. Equation 5 expresses total investment in terms of changes in the capital stock (adjusted for scrapping) and housing investment, which is assumed to remain constant as a share of GDP. Equation 6 expresses the external deficit as the difference between total savings and total investment. Equation 7 is a simple two-factor Cobb Douglas relating output to capital, employment and total factor productivity.²

Given this framework, high and lower growth scenarios were constructed using alternative assumptions for the key components, as described in the main text and summarised in Table 13. Unless stated otherwise, key ratio were assumed broadly unchanged or projected on the basis of recent trends. For the

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OECD, capital-output ratios were assumed to fall gradually to ensure that movements in investment rates generally match any decline in savings associated with rising dependency rates. Overall this assumption ensures no major deterioration in OECD current-accounts.³

1. The literature provides a number of studies of the impacts of changes in the dependency ratio on private savings. Most (but not all) find a negative relationship and for the OECD the elasticity of 0.33 used is as the lower end of results reported in recent IMF studies reported by Masson and Tryon (1990) and Masson *et al.* (1995a and b). Changes in government net lending are assumed to be fully reflected in the savings ratio.
2. Factor shares are assumed to be constant at recent average rates.
3. Alternatively, real interest rates in OECD countries might, given savings and fiscal policy assumptions, rise over the period to stimulate savings and moderate investment. Such effects are analysed in more detail in a later section of this study.

Reflecting the broad range of quantitative estimates suggested by the available evidence,³⁷ a key assumption for high growth is that the combination of these factors is sufficient to raise TFP growth rates above current stable or downward historical trends.

After recovering from current cyclical lows by 2001, OECD productivity growth rates are assumed to increase by a further $\frac{1}{4}$ to $\frac{1}{2}$ per cent over the next decade, stabilising thereafter at average rates of around $1\frac{1}{2}$ per cent per annum, close to the highest experienced during the past three decades (Figure 12). For non-OECD countries, TFP would be expected to accelerate most significantly for those countries embarking only recently on a liberalisation process, although for some, TFP growth rates are likely to fall back over the longer term as the effects of structural reforms become less significant. Nonetheless, productivity growth in most of the non-OECD is assumed to remain well above the OECD average, implying a general catching-up of productivity levels. However, though the gap between the OECD and the non-OECD is reduced significantly, only the dynamic Asian economies would attain productivity levels which are remotely comparable to those of the OECD – close to 70 per cent of the OECD average by 2020.

Unemployment rates are assumed to adjust towards underlying structural rates, which given structural reforms in labour and product markets are assumed to fall over the next decade, most significantly so for Europe (to around 5 percentage points) where estimated structural rates are currently highest. Unemployment estimates for the non-OECD are less reliable; the high growth scenario assumes significant reductions for those regions where the informal economy is largest, such as Latin America, India, other Asia, Africa and the Middle East.

For the OECD area, investment rates are assumed to recover in the short term then move broadly in line with savings, implying no major movements in current balances (Figure 23). For OECD countries, the saving rate depends mostly on the effects of ageing and government fiscal positions as well as the elimination of distortions associated with inefficiencies in the tax and financial systems. For Japan, where the ageing process is most advanced, saving rates are assumed to fall between 2001 and 2020. For the European Union, and to a lesser extent, the United States, the positive impact of fiscal consolidation would temporarily offset the effects of ageing, leading to moderate increases in savings until 2010. Thereafter, savings fall back towards present rates, as the effect of ageing becomes more important.

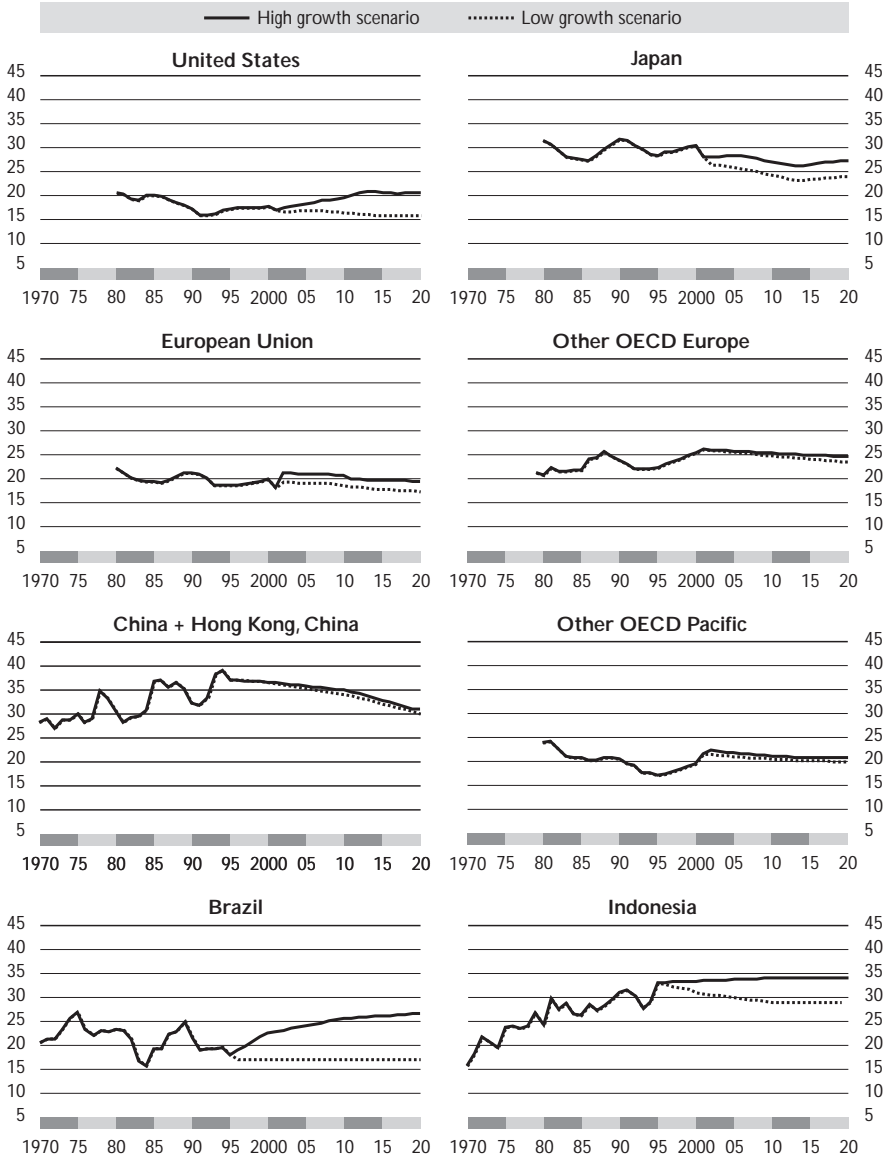
For Latin America and parts of Asia, reductions in government expenditures, which constitute a large source of dissavings, would be an important condition for the realisation of higher investments and growth (Figure 23). For Sub-Saharan Africa, investment rates are assumed to increase mostly as a result of larger foreign direct investment, as economies in the region (South Africa in particular) attract larger capital inflows. China and the dynamic Asian economies would be exceptions; for China, saving rates might be expected to decline as the result of dismantling relatively high interest rate subsidies and also an increase in dependency rates beyond 2012; for the other dynamic Asian economies, higher levels of prosperity are expected to raise the marginal propensity to consume.

On these assumptions, OECD growth rates would rise significantly from those of the early 1990s, to an average 3 per cent per annum between 2001 and 2010 but, declining moderately thereafter to around $2\frac{3}{4}$ cent, largely as a result of demographic factors (Table 15). Non-OECD growth rates follow a similar path, rising to an average $7\frac{1}{4}$ per cent per annum in the 2001-2010 period, before moderating, with rates of growth of population and TFP slowing towards 2020.

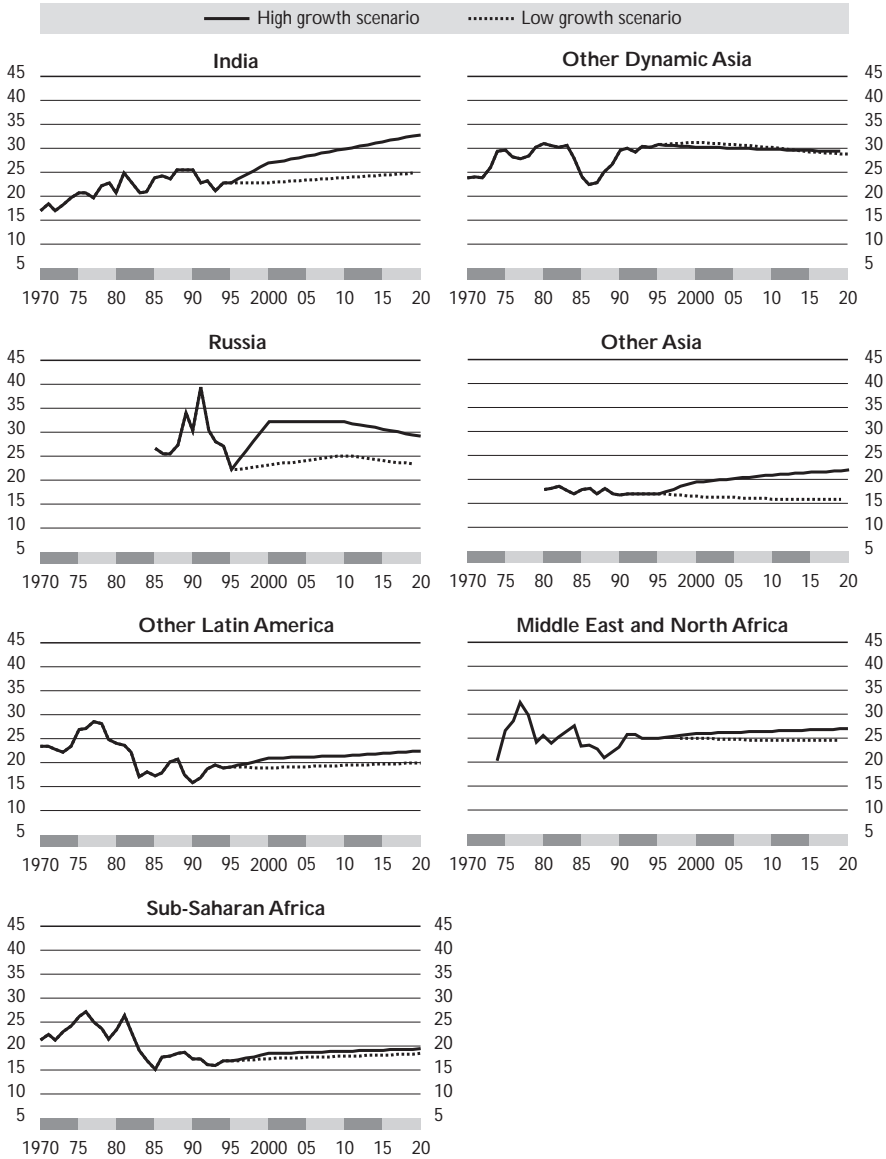
Within the OECD area, the main contributions to growth would come from TFP, followed by capital accumulation (Table 16). For Europe and Japan, the employment contribution falls steadily and eventually turns negative, as the size of the labour force is progressively affected by slower population growth and ageing.³⁸ For the United States and the rest of the OECD, the deceleration in employment growth would be most significant beyond 2010. The contribution of capital would rise slightly over the next decade, before slowing towards 2020, as saving and investment rates decline. For the non-OECD area, TFP growth and capital accumulation would contribute almost equally to growth while the employment contribution is also likely to diminish over time.

With output growing faster than for the OECD, the non-OECD share of world GDP would increase steadily over the period to over 60 per cent in 1992 PPP terms (Table 17, Figure 7). The largest increases would be for China and Hong Kong, China and the dynamic Asian economies, which together would

◆ Figure 23. *Investment rates in high and lower growth scenarios*



◆ Figure 23. (cont.) **Investment rates in high and lower growth scenarios**



Source: OECD.

Table 15. **GDP growth scenarios**
Average annual growth rate in 1992, PPP

	1970-80	1980-90	1990-95	1995-2000		2000-2010		2010-2020	
				High	Low	High	Low	High	Low
United States	3.1	2.9	1.9	2.2	2.2	2.7	2.1	2.6	1.5
Japan	4.4	4.0	1.3	3.3	3.3	2.9	2.0	2.3	1.2
European Union	3.0	2.4	1.8	2.4	2.4	2.8	2.0	2.3	1.3
Other OECD Pacific	5.1	3.5	2.7	4.3	4.3	4.7	4.0	4.3	3.4
Other OECD Europe	2.6	2.8	1.7	3.6	3.6	3.8	3.2	3.8	2.7
Total OECD	3.4	2.9	1.8	2.7	2.7	3.1	2.4	2.8	1.7
Brazil	8.5	1.5	2.5	5.4	3.8	6.1	3.0	5.1	2.8
China and Hong Kong, China	6.6	8.4	10.9	9.3	7.9	8.2	5.3	7.2	4.8
India	3.0	5.8	3.9	6.5	4.4	7.2	4.3	6.6	4.2
Indonesia	7.2	5.6	6.9	7.5	5.9	7.0	4.1	6.7	4.0
Russia	2.4	1.5	-9.4	3.5	1.1	6.0	4.2	6.9	4.0
Other Dynamic Asia	7.9	6.5	7.0	7.7	6.1	7.0	4.8	6.4	4.2
Other Asia	3.9	4.6	5.7	6.5	5.0	6.6	4.3	6.5	4.0
Other Latin America	3.7	0.9	4.2	4.3	3.0	5.9	3.2	5.1	3.1
Middle East and Northern Africa	3.8	0.0	2.7	5.0	2.1	7.1	2.2	6.9	2.2
Sub Saharan Africa	3.8	1.7	1.3	6.0	2.8	7.1	2.8	7.0	2.6
Non-OECD	4.6	3.7	4.7	6.8	5.0	7.2	4.2	6.6	4.0
World	3.7	3.2	2.9	4.4	3.6	5.0	3.2	4.9	2.8

Source: OECD, World Bank.

Table 16. Sources of output growth in high and low case scenarios

	Real GDP growth				Employment growth				Capital growth				TFP growth			
	1990-1995	1995-2000	2000-2010	2010-2020	1990-1995	1995-2000	2000-2010	2010-2020	1990-1995	1995-2000	2000-2010	2010-2020	1990-1995	1995-2000	2000-2010	2010-2020
High growth scenario																
United States	1.9	2.2	2.7	2.6	0.3	0.7	0.7	0.3	1.1	0.9	1.1	1.0	0.5	0.6	0.9	1.3
Japan	1.3	3.3	2.9	2.3	0.2	0.5	-0.2	-0.5	1.5	0.9	1.1	0.7	-0.4	1.9	2.0	2.1
European Union	1.8	2.4	2.8	2.3	0.1	0.4	0.2	-0.1	0.9	0.7	1.0	0.9	0.8	1.3	1.6	1.6
Total OECD	1.8	2.7	3.1	2.8	0.2	0.6	0.4	0.1	1.1	1.0	1.2	1.0	0.5	1.1	1.5	1.7
Brazil	2.5	5.4	6.1	5.1	0.6	0.9	0.9	0.5	1.2	1.4	2.3	2.4	0.7	3.2	3.0	2.1
China and Hong Kong, China	10.9	9.3	8.2	7.2	0.6	0.7	0.7	0.3	4.4	4.4	4.2	3.8	5.9	4.2	3.3	3.1
India	3.9	6.5	7.2	6.6	1.2	1.1	1.2	1.0	1.8	1.7	2.3	2.5	0.9	3.6	3.7	3.0
Indonesia	6.9	7.5	7.0	6.7	0.9	1.0	0.8	0.6	3.5	3.5	3.4	3.4	2.5	3.1	2.8	2.7
Russia ¹	-9.4	3.5	6.0	6.9	-	0.2	0.2	-0.1	-	1.5	2.6	2.6	-	1.8	3.2	4.4
Other dynamic Asia	7.0	7.7	7.0	6.4	1.1	1.3	1.1	0.8	3.1	3.3	3.1	2.8	2.8	3.0	2.9	2.7
Other Asia	5.7	6.5	6.6	6.5	1.3	1.3	1.2	1.0	3.5	3.8	3.9	3.9	0.9	1.4	1.5	1.6
Other Latin America	4.2	4.3	5.9	5.1	1.0	1.2	1.1	0.6	2.3	1.5	2.3	2.8	0.9	1.7	2.4	1.8
Middle East and North Africa	2.7	5.0	7.1	6.9	2.0	1.8	1.4	1.1	0.9	1.7	2.8	3.0	-0.2	1.5	2.9	2.8
Sub-Saharan Africa	1.3	6.0	7.1	7.0	1.4	1.5	1.4	1.2	0.6	2.0	2.8	3.0	-0.7	2.4	2.9	2.8
Non-OECD¹	4.7	6.8	7.2	6.6	1.1	1.1	1.0	0.7	2.5	2.8	3.2	3.2	1.9	3.0	3.0	2.7
Low growth scenario																
United States	1.9	2.2	2.1	1.5	0.3	0.7	0.7	0.3	1.1	0.9	0.9	0.6	0.5	0.6	0.5	0.6
Japan	1.3	3.3	2.0	1.2	0.2	0.5	-0.3	-0.5	1.5	0.9	0.9	0.5	-0.4	1.9	1.4	1.2
European Union	1.8	2.4	2.0	1.3	0.1	0.4	0.0	-0.3	0.9	0.7	0.8	0.5	0.8	1.3	1.2	1.1
Total OECD	1.8	2.7	2.4	1.7	0.2	0.6	0.3	0.0	1.1	1.0	1.0	0.7	0.5	1.1	1.1	1.0
Brazil	2.5	3.8	3.0	2.8	0.6	0.8	0.7	0.5	1.2	1.2	1.2	1.2	0.7	1.8	1.1	1.1
China and Hong Kong, China	10.9	7.9	5.3	4.8	0.6	0.5	0.5	0.1	4.4	4.1	3.1	3.0	5.9	3.4	1.7	1.7
India	3.9	4.4	4.3	4.2	1.2	1.0	1.2	1.0	1.8	1.4	1.4	1.4	0.9	2.1	1.7	1.7
Indonesia	6.9	5.9	4.1	4.0	0.9	0.8	0.7	0.5	3.5	3.0	2.5	2.5	2.5	2.0	1.0	1.0
Russia ¹	-9.4	1.1	4.2	4.0	-	-0.5	0.2	-0.2	-	1.2	2.1	2.1	-	0.4	1.9	2.0
Other dynamic Asia	7.0	6.1	4.8	4.2	1.1	1.0	0.9	0.6	3.1	2.8	2.0	1.7	2.8	2.3	2.0	1.9
Other Asia	5.7	5.0	4.3	4.0	1.3	1.1	1.0	0.8	3.5	3.1	2.6	2.6	0.9	0.8	0.6	0.6
Other Latin America	4.2	3.0	3.2	3.1	1.0	1.1	0.8	0.5	2.3	1.0	1.4	1.7	0.9	0.9	1.0	1.0
Middle East and North Africa	2.7	2.1	2.2	2.2	2.0	1.5	1.3	1.0	0.9	0.5	0.5	0.5	-0.2	0.1	0.4	0.7
Sub-Saharan Africa	1.3	2.8	2.8	2.6	1.4	1.3	1.3	1.1	0.6	1.0	1.0	1.0	-0.7	0.5	0.4	0.4
Non-OECD¹	4.7	5.0	4.2	4.0	1.1	0.9	0.8	0.5	2.5	2.2	2.0	2.1	1.9	1.9	1.3	1.4

1. The non-OECD aggregate for the different components of growth excludes Russia for the period 1990-95 for which a complete data set is unavailable.

Source: OECD, World Bank.

Table 17. **Shares of world GDP in high and low case scenarios**

	in US\$ 1992				in PPP 1992			
	1970	1995	2020 Low	2020 High	1970	1995	2020 Low	2020 High
United States	27.7	26.6	23.0	20.1	24.5	21.9	16.3	12.7
Japan	12.7	14.9	13.0	11.7	7.6	8.3	6.3	5.0
European Union	35.1	31.5	26.6	23.4	25.8	21.5	15.7	12.3
Other OECD Pacific	5.2	6.7	9.2	8.0	5.1	6.3	7.4	5.7
Other OECD Europe	3.2	2.9	3.3	2.9	3.7	3.1	3.0	2.4
Total OECD	83.9	82.7	75.2	66.1	66.7	61.1	48.7	38.1
Brazil	1.3	1.8	2.1	2.8	2.2	2.9	2.9	3.4
China and Hong Kong, China	0.8	2.8	6.0	7.7	2.9	9.3	16.9	19.5
India	0.8	1.1	1.7	2.3	4.2	5.4	7.2	8.7
Indonesia	0.3	0.6	1.0	1.3	0.9	1.9	2.6	3.2
Russia	2.6	1.1	1.4	1.9	3.9	1.6	1.7	2.0
Other Dynamic Asia	0.9	2.4	4.1	5.0	1.4	3.6	5.4	5.8
Other Asia	0.5	0.7	1.1	1.3	2.5	3.4	4.5	5.0
Other Latin America	2.6	2.5	2.9	3.5	4.4	3.8	3.8	4.2
Middle East and North Africa	2.6	2.1	1.9	4.1	4.8	3.6	2.8	5.4
Sub-Saharan Africa	1.4	1.2	1.3	2.6	2.5	2.0	1.8	3.2
Rest of the world	2.4	1.0	1.3	1.4	3.6	1.5	1.6	1.5
Total Non-OECD	16.1	17.3	24.8	33.9	33.3	38.9	51.3	61.9

account for about 25 per cent of world GDP, twice the shares of either the United States or the European Union. Per capita incomes would also converge steadily (Figure 9). Between 1995 and 2020, average per capita incomes would grow by about 70 per cent in the OECD and by 250 per cent in the non-OECD, implying per capita income levels in the non-OECD roughly 30 per cent of the OECD average, (compared with 15 per cent in 1995). Japan would have the highest levels of per capita GDP, marginally overtaking the United States,³⁹ those of the dynamic Asian economies would be only slightly below OECD average, and those for Brazil, the rest of Latin America and China close to those of the less wealthy OECD economies.⁴⁰

Purchasing Power Parities

Cross-country comparisons of real incomes depend on the conversion of income levels measured in domestic currencies to a common currency unit, most frequently the US dollar. However, conversions based on market exchange rates typically tend to understate the purchasing power of incomes in poor countries, where non-tradeable goods are often relatively cheap and reliability is further reduced by the volatility of exchange rates over time, for example due to large capital movements.

A more reliable means of making such comparisons is to convert levels measured in local currencies to a common unit reflecting so-called purchasing power parities (PPPs¹). This approach makes allowance for different levels of domestic prices and cost of living. This paper uses OECD estimates of PPPs for Member countries and those of Summers and Heston in the Penn World Tables (PWT, Version 5.6) for other economies, as measured for the 1992 base year.²

PPP estimates involve surveys of price information for representative goods and services, often by national statistical offices. Such surveys can result in sometimes very disparate estimates, reflecting weak statistical infrastructures in some countries, as well as differences in methodology. For instance, for China per capita income in the early 1990s has been estimated at under US\$2 000 by the PWT, compared with over US\$3 000 suggested by Maddison (1995).

1. A detailed discussion of the relative merits of alternative weighting methods is given by Hill (1986).
2. OECD (1992) *Purchasing Power Parities and Real Expenditures*.

The lower growth scenario

In contrast, the lower growth scenario is essentially based on an extrapolation of current trends.⁴¹ It assumes only modest progress in trade and investment

liberalisation, imposing limits on globalisation and the regional integration process, and reducing the gains from economies of scale and the diffusion of knowledge to the non-OECD economies. Structural reforms are assumed to proceed slowly, contributing perhaps to periodic macroeconomic instability in some regions and much slower productivity growth.

Following short-term cyclical recovery, TFP growth rates for the OECD are assumed to remain close to historical trends beyond 2001, flat or declining slightly over the period in most cases (Figure 12). For most of the non-OECD, the trend would be similar, with TFP growth slowing towards 2020, especially in Asia. Only Russia, and to a lesser extent the Middle East, seem likely to experience rising TFP growth rates, since the potential for efficiency gains in those economies remains very large. Whilst productivity growth in many non-OECD economies would remain above the OECD average, the rate of catching-up would be slower than in the high-growth scenario. Dynamic Asia's output per worker in 2020, still the highest in the non-OECD area, might then correspond to less than 60 per cent of the OECD average.

Capital accumulation, investment and saving rates also remain broadly unchanged for most regions, although for Europe and Japan, some decline would be expected as a result of ageing and for some non-OECD (mostly Asian) countries, as a result of slower output growth (Figure 23). Slower fiscal adjustment in both the OECD and the non-OECD areas would also depress saving and investment rates relative to the high growth case.

On these assumptions, output growth would remain moderate (Table 15). For the OECD area, GDP growth averages $2\frac{1}{2}$ per cent per annum between 2001 and 2010, falling back to an average $1\frac{3}{4}$ per cent as the effects of ageing set in. Non-OECD output would grow by an average of $4\frac{1}{4}$ per cent per annum, considerably slower than in the recent past, and decelerate for some countries throughout the projection period, notably for China and the other dynamic Asian economies.

For the OECD area, TFP growth and capital would contribute more or less equally to growth to 2010 (Table 16), with the contributions of employment growth and capital falling steadily, because of ageing and declining rates of saving and investment over the period. For the non-OECD area, the employment contribution to growth would also fall, with a slower increase in participation rates reinforcing the effects of demographic factors on the labour force. Capital accumulation remains a major contributor to output growth in most of these countries, with TFP growth declining over the period.

With output still growing faster than for the OECD, the non-OECD share of world GDP would increase to around 50 per cent in 1992 PPP terms (Table 17 and Figure 7). However, virtually all this increase would accrue to Asia; shares for Latin America, Russia, Sub-Saharan Africa and Middle East/North Africa, would stagnate

or decrease. China would account for approximately the same share as the United States or the European Union, each with 16-17 per cent of world GDP. Per capita incomes would still tend to converge, but less rapidly than in the high growth case, with OECD levels rising by 50 per cent and the non-OECD by 100 per cent between 1995 and 2020 (Figure 9). Per capita incomes in the non-OECD would then be about 20 per cent of the OECD average, compared with 30 per cent in the high growth case. The United States would have the highest per capita income, slightly above Japan's, while only the dynamic Asian economies would have per capita income levels similar to those of less wealthy OECD countries.

Comparing the different non-OECD convergence rates of the high and lower growth scenarios, it is useful to ask how fast a particular economy or region would need to grow in order to converge to the OECD per capita income levels by 2020. As illustrated by Figure 9 and Table 18, only the dynamic Asian economies would be within "striking" distance by 2020. In fact, given the OECD high growth scenario, the dynamic Asian economies would need to grow by $7\frac{3}{4}$ per cent per annum between 1995 and 2020 to catch-up, only marginally faster than the 7 per cent per annum in the high growth scenario. In the OECD low growth case, however, the dynamic Asian economies would need to grow by little more than 7 per cent.

Other non-OECD countries and regions would need to grow at rates significantly faster than in either scenario to converge at OECD per capita income levels by 2020. For instance, Russia, Brazil and the rest of Latin America would need to grow by 8 to 9 per cent over the next 25 years to catch-up with the OECD, compared with projected rates of 5 to 6 per cent in the high growth scenario. Other regions would need to achieve average growth rates significantly in excess of 10 per cent.

KEY FACTORS AND POLICIES

This final section focuses on specific tensions arising from the scenario analyses and, in particular, those of particular relevance to fiscal policies in a longer-term framework. Specifically it highlights the consequences of ageing populations in the OECD and the effects of fiscal consolidation. This work is preliminary and a more detailed analysis of the structural and macroeconomic consequences of longer-term demographic trends will be made as a contribution to the OECD-wide study presented to OECD Ministers in 1998.

The macroeconomic consequences of ageing populations

The results for both high and lower growth scenarios point clearly to the task of adapting to changing demographic structures as one of the major challenges facing policy-makers in the coming decades. With the important exception of Japan, increases in dependency ratios are expected to occur mainly after 2010,

Table 18. **Annual output growth rate, 1995-2020¹**

	Convergence to OECD per capita income levels		Actual non-OECD scenarios	
	OECD high growth scenario	OECD low growth scenario	High growth	Low growth
Brazil	8.5	7.8	5.6	3.1
China and Hong Kong, China	11.8	11.1	8.0	5.6
India	13.7	12.9	6.8	4.3
Indonesia	11.1	10.3	7.0	4.4
Russia	9.2	8.5	5.9	3.5
Other Dynamic Asia	7.9	7.1	6.9	4.8
Other Asia	12.9	12.1	6.6	4.3
Other Latin America	8.8	8.1	5.3	3.1
Middle East and North Africa	10.9	10.2	6.6	2.1
Sub-Saharan Africa	17.4	16.6	6.8	2.7

1. Annual output growth rate necessary for country or region to converge to average OECD per capita income levels (in PPP 1992) by 2020.

and especially after 2020 (Table 14). Nevertheless, the coming decades provide a window of opportunity to put in place policies which could ease any transition, particularly by anticipating potential problems.

Much work has already been done on the possible macroeconomic consequences of ageing populations, see for example OECD (1995*b*, 1996*b*). The approach most commonly adopted is to assess the *ex ante* pressures on public and private savings and investment based on empirical evidence regarding the sensitivity of these aggregates to past demographic trends. The analysis described here, takes this a stage further, by incorporating such effects in a simple structural model of the world economy⁴² to trace out the possible implications for growth, interest rates, exchange rates and asset accumulation in a consistent manner, while also allowing for the possible feedback effects from these variables on savings and investment balances.⁴³ It must be emphasised that the work presented here is preliminary.

The macroeconomic consequences of ageing populations can be broken down into a number of component effects, which include: reduced labour force growth; increased pressure on public finances particularly from public health expenditure and pensions; possibly reductions in the private savings propensity;⁴⁴ and a possible effect on productivity growth. The first three of these factors are discussed below with reference to the results from model simulations, although the last is not pursued here because to date the empirical evidence is not robust, with even the direction of any effect uncertain.⁴⁵ In each case the “component effect” is analysed in isolation from other effects, with all simulations being conducted relative to a baseline in which the age structure of the population is “assumed” to remain the same as in 1995. These simulations are intended to provide a framework for discussion, and it should be emphasised that the reported numerical results are preliminary and largely indicative of the broad orders of magnitude involved.

The macroeconomic effects of ageing depend not only on the scale of such changes, but also on whether they are concentrated in particular countries or occur more generally. To the extent that it is the former, then adjustment will largely take place through changes in exchange rates and net foreign asset positions. To the extent that it is the latter (which is increasingly the case after 2010) then changes will occur in the level of real interest rates across all countries.

Reduced labour force growth

A rising dependency ratio implies proportionately fewer people of working age, so that growth in labour input, and hence total output, will be temporarily lower compared with a case of unchanged age structure.⁴⁶ Slower growth, in turn, reduces the proportion of GDP which needs to be devoted to investment to

generate the required capital stock (panel A in Table 19). The magnitude of these effects is most pronounced for Japan because the dependency ratio rises fairly sharply: over the twenty years to 2020 potential output growth maybe reduced on average by as much as $\frac{1}{2}$ per cent per annum (and by as much as $\frac{3}{4}$ per cent per annum over the period 2010-15 when the dependency ratio is rising most sharply), with the share of private investment in GDP falling by up to $1\frac{1}{2}$ per cent up until 2010. Up until 2010, the United States is likely to experience a falling dependency ratio and faster growth in labour supply, which will tend to boost output growth temporarily, whereas demographic effects on the European Union are negligible. However, by 2020 the ageing of the population in the United States will tend to reduce growth temporarily by around $\frac{1}{2}$ per cent per annum and by slightly more in the European Union. Slower growth in the labour force will also tend to raise capital intensity and hence there is a tendency for real interest rates, which are directly related to the marginal productivity of capital, to fall.

Effects on private savings

If savings behaviour conforms to the traditional “life-cycle” hypothesis, which in its simplest form postulates that households save until retirement when they dissave, then ageing populations ought to lead to a lower private savings ratio. However, empirical evidence in support of the life-cycle model, both in terms of household survey evidence and time series analysis for individual countries, is mixed (for example Borsch-Supan (1995) provides contradictory evidence). On the other hand a recent empirical study using pooled time-series evidence for 21 industrial countries by Masson *et al.* (1995a) provides empirical support for a negative effect of dependency ratios on private savings rates. This latter study was used to calibrate the model used in the simulations reported here, although the magnitude of the effect (according to which a one percentage point rise in the dependency ratio reduces the private savings rate by 0.15 per cent) is at the lower range of the findings of many earlier studies where such effects have been found.

Allowing for a direct effect from the dependency ratio on the propensity to consume leads to a decline in aggregate savings, so increasing capital scarcity and raising the marginal product of capital and real interest rates (panel B in Table 19). For Japan, real interest rates rise by 20 to 25 basis points, with crowding-out also taking place through an appreciation of the real exchange rate. In both the United States and Europe the rise in real interest rates is initially more muted, although a property of the model is that in long-run steady state, the rise in real interest rates is equalised across all countries with adjustment ultimately taking place through changes in exchange rates and net foreign asset positions. The overall magnitude of these effects is, however, considerably smaller than obtained in the earlier simulation work, where the effect on real interest rate

Table 19. **The effect of demographic changes in the United States¹**

	2000	2005	2010	2015	2020
Dependency ratio (per cent)	-1.10	-2.80	-3.60	-1.10	3.00
A. Labour force effect					
GDP level (per cent)	0.59	1.68	2.35	1.01	-1.47
GDP growth rate (per cent per annum)	0.18	0.21	0.04	-0.37	-0.56
Capital stock level (per cent)	0.29	1.32	2.29	1.69	-0.47
Consumption (per cent of GDP)	-0.30	-0.35	-0.06	0.65	0.95
Government consumption (per cent of GDP)	0.00	0.00	0.00	0.00	0.00
Investment (per cent of GDP)	0.31	0.42	0.16	-0.61	-1.00
Net exports (per cent of GDP)	-0.01	-0.07	-0.10	-0.04	0.05
Net foreign assets (per cent of GDP)	0.15	0.05	-0.37	-0.96	-1.31
Net government debt (per cent of GDP)	-0.15	-0.16	0.05	0.45	0.49
Taxes (per cent of GDP)	-0.06	-0.10	-0.05	0.13	0.25
Real exchange rate (per cent)	-0.36	-0.68	-0.88	-0.72	-0.28
Real interest rate (percentage point)	0.04	0.05	0.01	-0.10	-0.14
B. Consumption effect					
GDP level (per cent)	-0.44	-0.45	-0.45	-0.45	-0.45
GDP growth rate (per cent per annum)	-0.02	0.00	0.00	0.00	0.00
Capital stock level (per cent)	-1.45	-1.51	-1.49	-1.49	-1.49
Consumption (per cent of GDP)	0.30	0.19	0.18	0.16	0.14
Government consumption (per cent of GDP)	0.00	0.00	0.00	0.00	0.00
Investment (per cent of GDP)	-0.25	-0.15	-0.15	-0.15	-0.15
Net exports (per cent of GDP)	-0.05	-0.04	-0.03	-0.01	0.01
Net foreign assets (per cent of GDP)	-0.39	-0.80	-1.20	-1.57	-1.89
Net government debt (per cent of GDP)	0.14	0.14	0.08	0.03	0.00
Taxes (per cent of GDP)	0.06	0.09	0.09	0.08	0.08
Real exchange rate (per cent)	0.26	0.17	0.08	-0.01	-0.12
Real interest rate (per cent point)	0.15	0.15	0.15	0.15	0.15
C. Public finances effect					
GDP level (per cent)	-0.04	-0.04	-0.14	-0.32	-0.56
GDP growth rate (per cent per annum)	-0.01	0.00	-0.02	-0.04	-0.05
Capital stock level (per cent)	-0.13	-0.13	-0.46	-1.06	-1.84
Consumption (per cent of GDP)	-0.08	-0.08	-0.10	-0.29	-0.48
Government consumption (per cent of GDP)	0.00	-0.08	0.06	0.38	0.73
Investment (per cent of GDP)	-0.04	0.00	-0.15	-0.30	-0.43
Net exports (per cent of GDP)	0.12	0.16	0.19	0.21	0.19
Net foreign assets (per cent of GDP)	0.52	1.37	2.52	3.91	5.44
Net government debt (per cent of GDP)	0.01	-0.29	0.29	2.49	6.35
Taxes (per cent of GDP)	0.00	-0.07	0.15	0.64	1.05
Real exchange rate (per cent)	-0.59	-0.83	-0.99	-1.08	-1.02
Real interest rate (per cent point)	0.01	0.01	0.05	0.11	0.19
D. Combined effect					
GDP level (per cent)	0.08	1.16	1.75	0.25	-2.42
GDP growth rate (per cent per annum)	0.16	0.22	0.02	-0.41	-0.61
Capital stock level (per cent)	-1.40	-0.43	0.28	-0.81	-3.58
Consumption (per cent of GDP)	-0.13	-0.25	0.06	0.60	0.69
Government consumption (per cent of GDP)	0.00	-0.08	0.06	0.38	0.73
Investment (per cent of GDP)	0.00	0.26	-0.14	-1.03	-1.53
Net exports (per cent of GDP)	0.13	0.07	0.02	0.05	0.11
Net foreign assets (per cent of GDP)	0.72	1.30	1.58	1.69	1.97
Net government debt (per cent of GDP)	0.01	-0.30	0.42	2.96	6.88
Taxes (per cent of GDP)	0.00	-0.08	0.19	0.86	1.39
Real exchange rate (per cent)	-1.01	-1.38	-1.49	-1.26	-0.74
Real interest rate (per cent point)	0.21	0.23	0.21	0.15	0.18

1. All effects are evaluated relative to the baseline simulation in which the dependency ratio is held constant at its 1995 level.

Table 19. **The effect of demographic changes in Japan¹** (cont.)

	2000	2005	2010	2015	2020
Dependency ratio (per cent)	2.80	6.90	12.20	18.70	21.50
A. Labour force effect					
GDP level (per cent)	-1.60	-4.09	-7.17	-10.76	-12.47
GDP growth rate (per cent per annum)	-0.44	-0.58	-0.74	-0.71	-0.22
Capital stock level (per cent)	-1.18	-3.41	-6.27	-9.77	-12.03
Consumption (per cent of GDP)	0.87	1.29	1.67	1.82	0.92
Government consumption (per cent of GDP)	0.00	0.00	0.00	0.00	0.00
Investment (per cent of GDP)	-0.80	-1.11	-1.41	-1.50	-0.47
Net exports (per cent of GDP)	-0.07	-0.18	-0.26	-0.32	-0.45
Net foreign assets (per cent of GDP)	0.21	-0.12	-0.92	-2.13	-4.37
Net government debt (per cent of GDP)	0.05	0.06	0.06	0.04	-0.08
Taxes (per cent of GDP)	0.02	0.03	0.05	0.05	0.01
Real exchange rate (per cent)	1.05	3.00	5.15	7.03	7.89
Real interest rate (percentage point)	-0.09	-0.13	-0.17	-0.19	-0.12
B. Consumption effect					
GDP level (per cent)	-0.82	-0.82	-0.76	-0.71	-0.67
GDP growth rate (per cent per annum)	-0.03	0.01	0.01	0.01	0.01
Capital stock level (per cent)	-2.81	-2.79	-2.59	-2.41	-2.26
Consumption (per cent of GDP)	1.18	0.93	0.83	0.70	0.54
Government consumption (per cent of GDP)	0.00	0.00	0.00	0.00	0.00
Investment (per cent of GDP)	-0.48	-0.26	-0.23	-0.22	-0.22
Net exports (per cent of GDP)	-0.70	-0.67	-0.6	-0.48	-0.32
Net foreign assets (per cent of GDP)	-3.58	-7.57	-11.90	-16.40	-20.81
Net government debt (per cent of GDP)	0.05	0.05	0.02	0.00	-0.01
Taxes (per cent of GDP)	0.02	0.03	0.03	0.03	0.02
Real exchange rate (per cent)	3.33	3.14	2.78	2.22	1.45
Real interest rate (per cent point)	0.25	0.25	0.24	0.22	0.21
C. Public finances effect					
GDP level (per cent)	0.14	0.05	-0.11	-0.55	-1.14
GDP growth rate (per cent per annum)	0.02	-0.04	-0.04	-0.11	-0.14
Capital stock level (per cent)	0.25	-0.02	-0.58	-1.97	-3.83
Consumption (per cent of GDP)	0.31	0.54	0.50	0.55	0.51
Government consumption (per cent of GDP)	0.00	0.24	0.45	0.85	1.07
Investment (per cent of GDP)	0.16	-0.17	-0.26	-0.73	-1.09
Net exports (per cent of GDP)	-0.47	-0.61	-0.69	-0.67	-0.49
Net foreign assets (per cent of GDP)	-2.17	-5.45	-9.75	-14.75	-19.90
Net government debt (per cent of GDP)	-0.01	2.25	7.70	18.17	34.65
Taxes (per cent of GDP)	0.00	0.58	1.43	2.39	3.17
Real exchange rate (per cent)	2.01	2.68	3.05	2.99	2.28
Real interest rate (per cent point)	-0.04	-0.02	0.03	0.17	0.35
D. Combined effect					
GDP level (per cent)	-2.28	-4.86	-8.04	-12.02	-14.28
GDP growth rate (per cent per annum)	-0.45	-0.61	-0.77	-0.81	-0.35
Capital stock level (per cent)	-3.74	-6.22	-9.44	-14.15	-18.12
Consumption (per cent of GDP)	2.36	2.76	3.00	3.07	1.97
Government consumption (per cent of GDP)	0.00	0.24	0.45	0.85	1.07
Investment (per cent of GDP)	-1.12	-1.54	-1.90	-2.45	-1.78
Net exports (per cent of GDP)	-1.24	-1.46	-1.55	-1.47	-1.26
Net foreign assets (per cent of GDP)	-5.54	-13.14	-22.57	-33.28	-45.08
Net government debt (per cent of GDP)	0.09	2.36	7.78	18.21	34.56
Taxes (per cent of GDP)	0.04	0.64	1.51	2.47	3.20
Real exchange rate (per cent)	6.39	8.82	10.98	12.24	11.62
Real interest rate (per cent point)	0.12	0.10	0.10	0.20	0.44

1. All effects are evaluated relative to the baseline simulation in which the dependency ratio is held constant at its 1995 level.

Table 19. **The effect of demographic changes in Europe¹** (cont.)

	2000	2005	2010	2015	2020
Dependency ratio (per cent)	0.36	0.68	0.98	2.98	5.88
A. Labour force effect					
GDP level (per cent)	-0.21	-0.43	-0.59	-1.71	-3.42
GDP growth rate (per cent per annum)	-0.06	-0.01	-0.09	-0.30	-0.42
Capital stock level (per cent)	-0.15	-0.40	-0.48	-1.18	-2.66
Consumption (per cent of GDP)	0.09	0.05	0.16	0.67	0.95
Government consumption (per cent of GDP)	0.00	0.00	0.00	0.00	0.00
Investment (per cent of GDP)	-0.12	-0.05	-0.10	-0.54	-0.78
Net exports (per cent of GDP)	0.03	0.00	-0.06	-0.13	-0.17
Net foreign assets (per cent of GDP)	0.13	0.26	0.16	-0.17	-0.81
Net government debt (per cent of GDP)	0.01	0.00	0.00	0.04	0.05
Taxes (per cent of GDP)	0.00	0.00	0.00	0.02	0.03
Real exchange rate (per cent)	0.03	0.40	0.90	1.39	1.78
Real interest rate (per cent point)	-0.01	0.00	-0.01	-0.07	-0.10
B. Consumption effect					
GDP level (per cent)	-0.64	-0.65	-0.62	-0.59	-0.57
GDP growth rate (per cent per annum)	-0.03	0.00	0.01	0.00	0.00
Capital stock level (per cent)	-2.11	-2.15	-2.06	-1.97	-1.90
Consumption (per cent of GDP)	0.72	0.56	0.51	0.46	0.39
Government consumption (per cent of GDP)	0.00	0.00	0.00	0.00	0.00
Investment (per cent of GDP)	-0.38	-0.23	-0.20	-0.20	-0.20
Net exports (per cent of GDP)	-0.34	-0.33	-0.31	-0.26	-0.19
Net foreign assets (per cent of GDP)	-1.66	-3.53	-5.61	-7.81	-10.02
Net government debt (per cent of GDP)	0.04	0.04	0.02	0.00	0.00
Taxes (per cent of GDP)	0.02	0.02	0.02	0.02	0.02
Real exchange rate (per cent)	1.60	1.54	1.41	1.18	0.84
Real interest rate (per cent point)	0.20	0.20	0.19	0.18	0.18
C. Public finances effect					
GDP level (per cent)	-0.04	-0.12	-0.21	-0.36	-0.63
GDP growth rate (per cent pa)	-0.01	-0.02	-0.02	-0.03	-0.06
Capital stock level (per cent)	-0.12	-0.40	-0.70	-1.20	-2.09
Consumption (per cent of GDP)	-0.08	-0.12	-0.22	-0.24	-0.22
Government consumption (per cent of GDP)	0.00	0.06	0.10	0.22	0.46
Investment (per cent of GDP)	-0.05	-0.16	-0.17	-0.30	-0.53
Net exports (per cent of GDP)	0.13	0.22	0.29	0.32	0.29
Net foreign assets (per cent of GDP)	0.52	1.56	3.23	5.45	8.05
Net government debt (per cent of GDP)	0.00	0.53	1.50	3.46	7.96
Taxes (per cent of GDP)	0.00	0.14	0.26	0.44	0.94
Real exchange rate (per cent)	-0.56	-0.91	-1.24	-1.40	-1.31
Real interest rate (per cent point)	0.01	0.04	0.06	0.11	0.19
D. Combined effect					
GDP level (per cent)	-0.89	-1.19	-1.40	-2.62	-4.55
GDP growth rate (per cent per annum)	-0.09	-0.03	-0.11	-0.33	-0.48
Capital stock level (per cent)	-2.39	-2.92	-3.17	-4.23	-6.43
Consumption (per cent of GDP)	0.72	0.51	0.49	0.93	1.13
Government consumption (per cent of GDP)	0.00	0.06	0.1	0.22	0.46
Investment (per cent of GDP)	-0.54	-0.42	-0.46	-1.02	-1.46
Net exports (per cent of GDP)	-0.18	-0.15	-0.13	-0.13	-0.13
Net foreign assets (per cent of GDP)	-0.87	-1.64	-2.38	-3.09	-3.83
Net government debt (per cent of GDP)	0.05	0.57	1.54	3.54	8.07
Taxes (per cent of GDP)	0.02	0.17	0.29	0.49	1.02
Real exchange rate (per cent)	1.07	1.16	1.29	1.43	1.54
Real interest rate (per cent point)	0.20	0.23	0.24	0.22	0.26

1. All effects are evaluated relative to the baseline simulation in which the dependency ratio is held constant at its 1995 level.

effects were many times larger. A major difference between results arises because of assumed differences in the sensitivity of savings behaviour to ageing.⁴⁷ This underlines the considerable uncertainty about both the nature and magnitude of the demographic effect on private savings behaviour, but also suggests that the upwards pressure on real interest rates may possibly be considerably understated in the present simulations.

Pressure on public sector finances

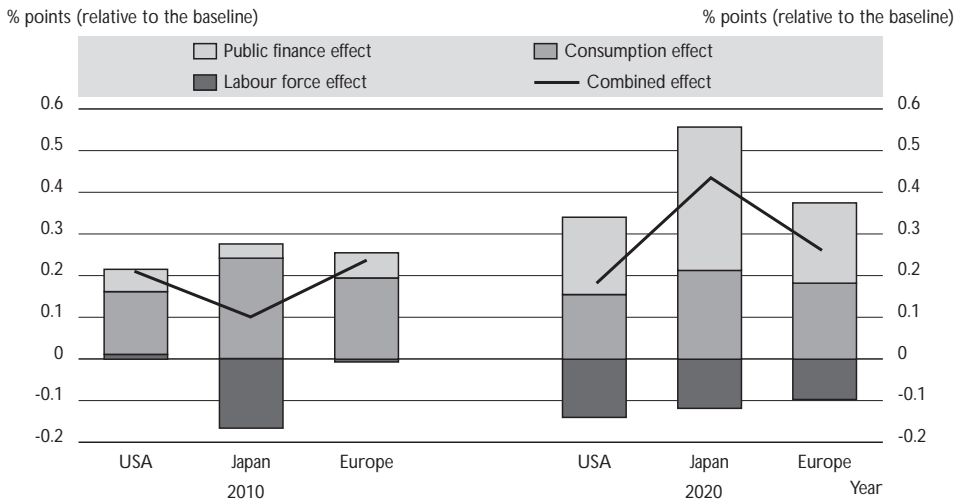
In the absence of fiscal policy reform, or increase in contribution rates, to the largely unfunded OECD public pension systems, a substantial financing requirement will arise as the number of workers per pensioner falls, typically from around 2½ to 1½ by 2030 (OECD, 1996*b*). In addition, per capita health expenditures for those aged 65 and over are on average two-and-a-half to five times that of the rest of the population (OECD, 1996*b*), with these ratios even higher for those aged 75 and above.⁴⁸ For the purposes of the simulations presented here, estimates of the effects of the additional fiscal burden from ageing populations on both pensions and health care are taken from Leibfritz *et al.* (1996). These suggest that, based on the assumption of unchanged policies, the addition to total government net financial liabilities as a direct result of the effect of ageing on health and pension expenditures could amount to over 60 per cent, 12 per cent and 14 per cent of GDP for Japan, the United States and the European Union by 2020.⁴⁹ Moreover by 2030, again on the assumption of unchanged policies, these figures “balloon” to 190 per cent, 44 per cent and 52 per cent of GDP for Japan, United States and the European Union.

The consequences of passively accepting these increased financial liabilities in the form of a higher government debt-to-GDP ratio are considered in the simulation reported in panel C of Table 19.⁵⁰ In Japan where the increased government expenditures are greatest and occur earliest, crowding out initially takes place through an appreciation of the real exchange rate. As the burden on public finances increases across all OECD countries, real interest rates gradually rise: by 2020 the real interest rate has increased by 35 basis points in Japan and 20 basis points in the European Union and the United States, respectively. The main cause of higher real interest rates is that increased government consumption crowds out aggregate saving, so increasing capital scarcity relative to labour and raising the marginal product of capital. However, in the absence of Ricardian equivalence, part of the rise in interest rates also reflects the build-up of government debt. These estimates do *not*, however, incorporate a further possible effect on interest rates which would arise if capital markets place a higher “risk premium” on the debt of those countries with high debt-to-GDP ratios.

The combined shock, suggests that the effect of ageing on savings behaviour and public finances tends to dominate the effect on the labour force, in terms of raising real interest rates and lowering capital intensity. By 2020 the overall increase in real interest rates ranges from 45 basis points in Japan to 20 basis points in the United States, with the largest effect on real interest rates coming from pressure on public finances (Figure 24). Moreover, as noted above, these results do not allow for the possible effect which higher government debt ratios might have on increasing risk premiums. Finally, it is worth repeating that for most OECD countries the most rapid increases in dependency ratios are likely to take place after 2020.

The effect of ageing populations on private savings in OECD countries may be partially offset by a declining dependency ratio in non-OECD countries (Table 14). Masson *et al.* (1995a and b) also find empirical support for an effect of the dependency ratio on developing country savings and calculate that there could be a small positive overall effect on private savings at the world level from future demographic trends. In any event, capital flows between OECD and developing countries have been relatively small in relation to GDP, and savings and investment trends in developing countries have followed each other closely (Reisen, 1995). These historical trends, together with empirical findings showing a

Figure 24. *Pressure on real interest rates from ageing populations*



Source: Authors' estimates.

positive influence from GDP growth on savings and from per capita income suggest that faster growth in the non-OECD is likely to itself generate much of the required increase in savings rather than contribute to any global shortage of capital.

Overall, these results suggest that main pressure tending to reduce aggregate national savings will come from increases in public expenditure on health and pensions, rather than a decline in private savings. Although, with the notable exception of Japan, these changes are not expected to occur until after 2010, there is a clear case for early action to ease any transition.⁵¹

Fiscal consolidation

The deterioration in government fiscal positions is seen as probably the major reason for the rise in world real interest rates during the 1980s (Group of Ten Study, 1995) and may be the greatest potential source of pressure in future. High public sector dissaving can lead to higher real interest rates through a number of channels. Firstly, higher government deficits will tend to reduce overall national saving with the greater scarcity of capital being reflected in a higher rate of return on capital and higher real interest rates. Secondly, there may be a link between the build-up of government debt and real interest rates to the extent that full Ricardian equivalence does not hold. Moreover, with greater integration of world capital markets,⁵² much of the linkage between government deficits and debt and real interest rates may have shifted to the global level. A recent empirical study, Ford and Laxton (1995), suggested that an increase in the OECD debt-to-GDP ratio of one percentage point raised real interest rates by as much as 25 basis points. Finally a deterioration in a country's fiscal position may result in a country-specific risk premium to the extent that it creates financial market expectations of a looser monetary stance and higher future inflation.

A number of cross-country studies have found empirical evidence of an effect from the government's fiscal position on real interest rates: Orr *et al.* (1995) find that an increase in the government deficit by the equivalent of 1 per cent of GDP raises real interest rates by 0.15 percentage points. Alesina *et al.* (1993) find an effect from the debt-to-GDP ratio on real interest rates, once the debt ratio is above 50 per cent. O'Donovan *et al.* (1996) find evidence of a non-linear effect, whereby incremental increases in debt-to-GDP ratio lead to ever-larger increases in risk premia.

Debt-to-GDP ratios have risen substantially across all OECD countries in the past 25 years and are likely to rise further at least in the short-term.⁵³ A matter for policy concern is that, as discussed above, demographic trends are likely to put further upwards pressure on already high levels of debt, this, in turn might exacerbate the inflation risk premia, increase the cost of debt service and so lead

to a vicious circle of higher interest rates, deficits and debt. Under standard neo-classical growth assumptions, lower real interest rates will only permanently raise the long-run *level* of output, through temporarily raising capital accumulation, and not the long-run *growth* rate. However, recent developments in endogenous growth theory place great importance on capital accumulation as the basis for long-term growth, would suggest that lower real interest rates resulting from a permanent reduction in debt might permanently improve growth performance.⁵⁴

The simulation exercise reported in Table 20 considers the possible effects on OECD countries and non-OECD countries, as represented by the group of fast-growing Asian countries, of an ambitious OECD-wide fiscal consolidation programme whereby net debt as a proportion of GDP is reduced to levels prevailing

Table 20. **The effect of OECD fiscal consolidation through government expenditure reduction**

	2000	2010	2020	2030	2040	Eqbm
OECD						
GDP growth rate (% p.a.)	0.06	0.11	-0.06	-0.02	-0.00	0.00
GDP level (%)	-0.01	1.06	0.86	0.43	0.35	0.36
Capital Stock (%)	-0.02	3.58	2.90	1.43	1.16	1.21
Consumption (% of GDP)	0.38	1.18	2.25	2.23	2.14	2.13
Govt. Consumption (% of GDP)	-0.75	-2.25	-2.25	-2.25	-2.25	-2.25
Investment (% of GDP)	0.33	1.03	0.01	0.05	0.14	0.15
Net Exports (% of GDP)	0.04	0.03	-0.01	-0.02	-0.02	-0.03
Net Foreign Assets (% of GDP)	0.14	0.52	0.71	0.75	0.76	0.82
Net Government debt (% of GDP)	-2.17	-13.76	-20.02	-19.91	-19.51	-19.50
Tax rate (% of GDP)	-0.08	-1.32	-2.67	-2.88	-2.82	-2.80
Real exchange rate (%)	-0.63	-0.64	0.12	0.38	0.40	0.48
Real interest rates	0.00	-0.29	-0.24	-0.12	-0.10	-0.10
Non-OECD						
GDP growth rate (% p.a.)	0.05	0.04	-0.03	-0.01	0.00	-0.00
GDP level (%)	0.13	0.75	0.63	0.38	0.32	0.33
Capital Stock (%)	0.42	2.51	2.11	1.26	1.07	1.10
Consumption (% of GDP)	0.46	0.11	-0.30	-0.52	-0.58	-0.67
Govt. Consumption (% of GDP)	0.00	0.00	0.00	0.00	0.00	0.00
Investment (% of GDP)	0.55	0.74	0.02	-0.07	-0.04	-0.07
Net Exports (% of GDP)	-1.01	-0.85	0.28	0.59	0.62	0.74
Net Foreign Assets (% of GDP)	-3.55	-13.39	-18.36	-19.31	-19.78	-21.12
Net Government debt (% of GDP)	-0.00	-0.04	-0.01	0.02	0.01	0.00
Tax rate (% of GDP)	-0.00	-0.02	-0.02	-0.01	-0.01	-0.01
Real exchange rate (%)	0.64	0.64	-0.12	-0.38	-0.40	-0.48
Real interest rates	-0.04	-0.22	-0.19	-0.11	-0.10	-0.10

Note: The simulation shows the effect of a reduction in the government debt to GDP ratio of 20 per cent achieved through reduced current expenditures. The figure in the final column show the effects in the long-run steady-state.

in the mid-1980s. This implies a reduction in public debt for the OECD countries equivalent to about 20 per cent of GDP. The effect of such a fiscal consolidation is examined assuming that the debt reduction is achieved mainly through lower government expenditures, which are permanently reduced by about 2 percentage points of GDP (a magnitude which roughly corresponds to the rise observed since the early-1980s in the OECD area). The reduction in public debt and/or government expenditure (as a proportion of GDP) is introduced gradually over a period of 15 years, after which both ratios are assumed to remain constant at their new levels.

Overall, the results suggest that the gradual decline in the demand for funds would put downward pressures on the world real interest rates, which could fall by about 30 basis points during the phase of debt reduction and by 10 basis points in the long run. The decline in the real interest rate raises the desired capital stock, which leads to permanently higher levels of investment and output in both the OECD and non-OECD regions. In addition to the financial crowding-in on the asset market, there is a transaction crowding-in effect on the product market stemming from a reduction in government expenditures. Overall the level of OECD GDP is raised by about 1 per cent relative to baseline over most of the period, and by $\frac{1}{3}$ per cent in the longer run. The positive stimulus to the level of non-OECD GDP is also quite significant, at around $\frac{3}{4}$ per cent over the period of interest. For the non-OECD, consumers react to the decline in the real interest rate by increasing consumption and de-cumulating savings. Over time, this leads to an increase in their net foreign indebtedness *vis-à-vis* OECD countries which more than offsets the rise in the capital stock and human wealth. As a result, the non-OECD economies experience a small decline in wealth and consumption in the long run despite the rise in the level of output. This is explained by the fact that in the long run, some output must be put aside to service the net external debt and therefore is not available for consumption. This decline in relative wealth is also reflected by a real exchange-rate depreciation against OECD but the size of the depreciation is negligible in the long run.

Although the foreign debt situation of the main non-OECD countries can no longer be regarded as one of debt overhang, a decrease in international interest rates may also have a positive effect on non-OECD countries growth performance by easing the weight of the external debt burden. The positive effects stemming from lower OECD interest rates are likely to be more important in South and Central America and some lower income African and Asian countries which have a large foreign debt and rely more on international capital markets to finance domestic investment than others, where rates of domestic savings are higher. Lower international interest rates might also ease the strain on domestic financial system in countries where it is currently undergoing restructuring (in Latin America and East Europe).

NOTES

1. These included Algeria, Bangladesh, China, Colombia, Egypt, India, Indonesia, Iran, Nigeria, Pakistan, Peru, the Philippines, Saudi Arabia, South Africa and Venezuela, with reference also to Vietnam.
2. The broad guidelines for the Linkages 2 study were set out in the 1995 OECD Ministerial Communiqué [SG/PRESS(95)41] (OECD 1995a).
3. The analysis of sectoral, commodity and industry-specific, environmental and energy aspects of the study are presented in a separate Analytical Report, see OECD (1997a and b).
4. Though the high rates of productivity growth of the 1960s may be regarded more as an exception than the norm, the trend of the last three decades is firmly downward for most of the region.
5. For a detailed review of trend developments in employment and earnings distribution, see "Earnings inequality, low-paid employment and earnings mobility", OECD *Employment Outlook*, July 1996.
6. A comprehensive review of factors and impediments contributing to the trend deterioration in unemployment in the OECD area over the period is given in *The OECD Jobs Study*, 1994.
7. For the United States, these comparisons are made on currently available statistics which do not yet take full account of recent changes in national accounts measurement principles.
8. In charting the evolution of these changes, see, in particular, "Why economic policies change course", OECD, 1988.
9. These changes are of course essentially ones of emphasis and priority settings, since the control of public finances and inflation has always been relatively high on the list of policy objectives of OECD governments.
10. A more detailed discussion of these points is given in "Interactions between structural reform, macroeconomic policy and economic performance", *OECD Economic Outlook* 59, June 1996, and *Macroeconomic Policies and Structural Reform*, OECD, 1996.
11. Some caution is needed in interpreting output data for the former Soviet Union. It is widely believed that official statistics understate the informal economy, which grew rapidly between 1990 and 1995.

12. These cross-country comparisons are made using 1992 purchasing power parities (PPPs). See the box on "Purchasing Power Parities" for more details.
13. In common with a number of other tables and figures referred to in this section, Figure 7 includes both historic and forward-looking comparisons. The latter scenarios are discussed in a later section of the paper.
14. Methodology differs between studies. When education is taken into account explicitly, by separating skilled and unskilled labour (Collins and Bosworth, 1996), TFP growth tends to fall.
15. During 1960-73, Japan's real GDP growth averaged 10 per cent per annum, of which 48 per cent was accounted for by capital, 18 per cent by labour and 34 per cent by total factor productivity (Kuroda *et al.*, 1987, and Jorgensen and Kuroda, 1990).
16. The dependency rates referred to here are measured as the ratio of "non-working age" (below 16 and above 65 years of age) to "working age" population. The very high value for Sub-Saharan Africa reflects the relatively high levels of population below 16 years of age, which in turn reflects high birth rates.
17. Expressed in 1992 PPPs.
18. The centrally planned economies also had very low levels of income inequality in the 1960s and 1970s. The transition process on the other hand, has been accompanied by a polarisation of income distribution.
19. For further discussion on the issue of reforms in China and their economic effects, see Bell, *et al.*, (1993), Perkins (1994), Sachs and Woo (1996), Hu and Khan (1996) and World Bank (1996).
20. There are, however, problems in measuring the fiscal deficit for China. Whereas IMF estimates suggest a consolidated deficit for central and local government of the order of 2½ per cent of GDP, more comprehensive estimates, including central bank financing of the SOEs, are much higher, see Tseng *et al.* (1994), McKinnon (1994) and Wang *et al.* (1993).
21. For a recent wide discussion of the different elements of reform in non-OECD economies, see Rodrik (1996) and Krueger (1993). These authors also provide discussions on the initial costs of reforms, not referred to here.
22. Although the European Association Agreements with the EC have boosted trade with Central and Eastern European countries from a very low level.
23. Over the period, the shares of US and Japanese exports going to and imports coming from non-OECD Asia have risen by 10 per centage points.
24. Overall, Hong Kong, China accounts for two-thirds of China's FDI stock, although figures are affected by round-tripping, of Chinese capital being repatriated through Hong Kong, China. Independent estimates suggest this might account for about a quarter of FDI going to China, corresponding to about \$7 billion of the total \$45 billion going to Asia in 1993.
25. Endogenous growth theory emphasises that economic growth partly results from the behaviour of economic agents, and can thus be influenced by policies, so denying the purely exogenous nature of the technical progress postulated in the standard neo-classical theory.

26. A country was judged to have a “closed” trade policy if it had at least one among the following five characteristics: high non-tariff barriers and average tariff rates; a black-market exchange-rate premium; a socialist economic system; or a state monopoly on major exports. The authors find that between 1970 and 1989, open economies grew by around 2.5 per cent more than the closed economies on average. These indicators have, however, been subject to criticism that they measure more than trade policy alone, that they are rather subjective, and that they tend to exaggerate the differences between countries due to their qualitative nature.
27. Surveying work on whether trade liberalisation has increased productivity, Havrylyshyn (1990) does not find robust evidence, and a recent study of seven Asian economies concludes at best that there is weak evidence that trade liberalisation has spurred total factor productivity growth (Urata, 1994). Based on a series of case studies, Taylor (1991) also concludes that trade liberalisation can lead to costly consumption losses with few benefits in terms of higher GDP growth.
28. See Gemmel (1996), who runs cross-section regressions over 1960-85 averages for a world-wide sample of countries.
29. Barro and Sala-i-Martin (1995) find an annual rate of return on public education of the order of 20 per cent, using instrumental variable techniques to control for simultaneous causation.
30. Explanatory variables used by Gemmel (1996) include the initial stock of human capital (i.e. the share of the labour force with human capital skills), as well as the subsequent accumulation, by level (i.e. primary, secondary and tertiary). Results differ across sub-sample of countries: primary human capital appears to be important in the poorest LDCs, secondary human capital in “intermediate” less developed countries, while tertiary human capital effects are strongest in the OECD countries.
31. According to the World Bank (1993), growing human capital and private domestic investment were the two main engines of growth in East Asia. High shares of national income have been devoted to education; the declining rate of growth of population – partly linked to increased education – allowed expenditure per pupil and thus the quality of education to rise; the allocation of resources mostly towards basic education instead of higher education is also found to have been decisive for the success.
32. On the link between growth, equity and distribution, see OECD *Economic Outlook* 60, December 1996.
33. For more detailed descriptions of the projection methods and country groupings see the boxes “Country classification” and “Scenario construction methods”.
34. The broad methodology used is similar to that for estimating potential output, as described by Giorno *et al.* (1995). Estimates for the medium term draw on recent projections in which the gap between potential and actual output is assumed to be progressively eliminated, productivity growth returns to trend and unemployment rates return to underlying structural levels by 2001. Thereafter, actual and potential output are assumed to coincide, abstracting from possible cyclical movements.
35. UN (1994 and 1996), World Bank (1995).

36. A detailed analysis of these influences is given in a later section of this paper. The dependency rate is measured as the ratio of non-working age population – defined as people with less than 15 or more than 65 years of age – to working-age population.
37. See the box “The quantitative effects of policy reforms”.
38. The effects of ageing on growth are in part a consequence of assuming an unchanged retirement age. If workers remains productive for longer and the retirement age were raised, then the decline in the growth (and eventual level) of the labour force would be partially offset.
39. Even though real output growth rates for the United States would be slightly above Japan's for most of the early 21st century, Japan's per capita income would rise faster, as the population remains relatively static.
40. These comparisons are made on the basis of constant 1992 PPPs. As illustrated in Table 17, the use of alternative market exchange-rate weight implies different shares, reflecting different starting positions, with PPPs giving greater weight to the non-OECD (see also the box “Purchasing Power Parities”).
41. In this respect, the lower growth scenario may be regarded as being one of mild pessimism as opposed to chronic failure.
42. The model used here is a preliminary version of the MINILINK model, an extension of the two-factor (capital and labour) neo-classical growth model, with real interest rates being determined by the marginal productivity of capital. Important features are that asset stocks (the capital stock, net foreign assets and government bond holdings) are modelled consistently with flows. In steady-state equilibrium these flows ensure that the ratio of financial assets to income remains stable, and perfect mobility of capital is assumed so that exchange rates are determined with respect to the uncovered interest parity condition. Consumption is directly related to wealth (defined to include “human wealth” equal to the net present value of future labour income), with the propensity to consume out of wealth related to the dependency ratio. The version of the model considered here incorporates two regions, but is being extended to include three OECD and two non-OECD groupings. For further details, see the Annex “The Minilink model”.
43. Masson and Tryon (1990) adopt a similar approach using the IMF's macroeconomic model of the world economy MULTIMOD.
44. Not all authors agree with this classic “life cycle” hypothesis (see below for details).
45. A more aged workforce can either be less dynamic and innovative and hence have a negative impact on productivity growth, or alternatively relative labour scarcity may act as stimulus to technical progress and hence boost productivity growth. Further study in this area is foreseen in the context of future Secretariat work programme on ageing.
46. The effects on growth are temporary and in the long run it is the levels of labour supply and output which are affected permanently.
47. Masson and Tryon (1990) assumed that a one percentage point rise in the dependency ratio reduces the private savings rate by 1.10 percentage points, an effect many times larger than the estimates identified by Masson *et al.* (1995a and b) incorporated in the present simulation analysis.

48. There is considerable debate on the extent to which ageing actually raises health expenditures. If for example most health expenditures on the "aged" occurs in the months before death, a shift to older populations would not necessarily imply higher expenditures.
49. The latter estimate is an average obtained by combining figures for the largest four European economies, although there are wide divergences from this average, with the figure for Italy being considerably higher, and that for the United Kingdom much lower. Hence the scale of the problem will vary widely across systems within Europe.
50. To avoid a situation where the debt-to-GDP ratio becomes explosive, it is assumed that although the increased primary expenditures are reflected in higher net debt, taxes are raised to cover the additional debt servicing.
51. Specific policy responses were reviewed in work on the implications of ageing presented to OECD Ministers in 1996, see OECD (1996*b*). A second phase of work will be presented to OECD Ministers in 1998.
52. Evidence of increased mobility of international capital comes from the falling correlation between national savings and investment rates.
53. For net debt ratios to be stabilised the primary balance should be equal to the product of the debt ratio and the difference between real interest rates and real GDP growth.
54. For example, Alogoskoufis and Van der Ploeg (1991) describe an endogenous growth model where increases in world government debt have a permanent impact on output growth.

BIBLIOGRAPHY

- AITKEN, B., G.H. HANSSON and A.E. HARRISON (1994), "Spillovers, foreign investment and export behavior", *NBER Working Paper* No. 4967.
- ALESINA, A., M. DE BROECK, A. PRATI and G. TABELLINI (1993), "Default risk on government debt in OECD countries". *Economic Policy: A European Forum*, October: pp. 428-63.
- ALESINA, A. and D. RODRIK (1994), "Distributive politics and economic growth", *Quarterly Journal of Economics* 109, May, pp. 465-90.
- ALESINA, A. and R. PEROTTI (1994), "The political economy of growth: a survey of the recent literature", *The World Bank Economic Review*, Vol. 8, No. 3, September.
- AIOGOSKOUFIS, G., and VAN DER PLOEG (1991), "Debts, deficits and growth in interdependent economies", CEPR discussion paper No. 533.
- ANDERSEN, P. and D. GRUEN (1995), "Macroeconomic policies and growth", in P. Andersen, J. Dwyer and D. Gruen (eds.), *Productivity and Growth*, Reserve Bank of Australia.
- APEC (1995), *1995 APEC Economic Outlook*, November 1996.
- ASCHAUER, D.A. (1989), "Is public expenditure productive?", *Journal of Monetary Economics*, 23(2).
- BACKUS, D., T. KEHOE and P. KEHOE (1992), "In search of scale effects in trade and growth", *Federal Reserve Bank of Minneapolis Staff Report* No. 152.
- BALDWIN, R.E. (1994), "The effect of trade and foreign direct investment on employment and relative wages", *OECD Economic Studies*, No. 23.
- BARRO, R.J. (1995), "Inflation and economic growth", *Bank of England Quarterly Bulletin*, Vol. 35, No. 2, May.
- BARRO, R.J. and J. SALA-I-MARTIN (1995), *Economic Growth*,
- BAUMOL, W., R.R. NELSON and E.N. WOLFF (eds.) (1994), *Convergence of Productivity: Cross-National Studies and Historical Evidence*, Oxford University Press, New York.
- BAYOUMI, T., D. COE AND E. HELPMAN (1996), "R&D spillovers and global growth", *CEPR Discussion Paper* No. 1467, August.
- BELL, M.W., H.E. KHOR, K. KOCHHAR, J. MA, J., S. N'GUIAMBA and R. LALL (1993), "China at the threshold of a market economy", *Occasional Paper* No. 107, IMF, Washington.

- BEN-DAVID, D. (1996), "Trade and convergence among countries", *Journal of International Economics*.
- BERTHÉLEMY, J.C. and A. VAROUDAKIS (1996), *Financial Development Policy and Growth*, "Long-term growth" series, OECD Development Centre, Paris.
- BERTHÉLEMY, J.C., S. DESSUS and A. VAROUDAKIS (1996), "Human capital and growth: the role of trade regime", OECD Development Centre, mimeo, July.
- BIRDSALL, N., D. ROSS and R. SABOT (1995), "Inequality and growth reconsidered: lessons from East Asia", *The World Bank Economic Review*, Vol. 9, No. 3, September.
- BLOMSTRÖM, M. and A. KOKKO (1996), "Multinational corporations and spillovers", *CEPR Discussion Paper*, No. 1365.
- BLOMSTRÖM, M., R.E. LIPSEY and M. ZEJAN (1992), "What explains developing country growth?", *NBER Working Paper* No. 4132.
- BLONDAL, S. and PILAT (1997), "The economic benefits of regulatory reform", *OECD Economic Studies*, No. 28, 1997/1.
- BORENSZTEIN, E., J. GREGORIO, J-W LEE (1995), "How does foreign direct investment affect economic growth?", *NBER Working Paper* No. 5057.
- BORSCH-SUPAN, A. (1995b), "The impact of population ageing on savings, investment and growth in the OECD area", in OECD.
- BOSWORTH, B. (1995b), "Prospects for saving and investment in industrial countries", in OECD.
- BOSWORTH, B., S.M. COLLINS and Y.C. CHEN (1995), "Accounting for differences in economic growth", *Brookings Discussion Papers in International Economics* No. 115, October.
- BRUNO, M., M. RAVALLION and L. SQUIRE (1996), "Equity and growth in developing countries: old and new perspectives on the policy issues", *World Bank Policy Research Working Paper*, No. 1563, January.
- COE, D.T. and E. HELPMAN (1995), "International R&D spillovers", *European Economic Review*, Vol. 39.
- COLLINS, S.M. and B. BOSWORTH (1996), "Economic growth in East Asia: accumulation versus assimilation", *Brookings Papers on Economic Activity*, No. 2.
- CUTLER, D.M., J.M. POTERBA, L.M. SHEINER, and L.H. SUMMERS (1990), "An ageing society: opportunity or challenge?", *Brookings Papers on Economic Activity*, No. 1.
- DE GREGORIO, J. (1993), "Inflation, taxation and log-run growth", *Journal of Monetary Economics*, 31.
- DE GREGORIO, J. (1992a), "The effects of inflation on economic growth: lessons from Latin America", *European Economic Review*, 36.
- DE GREGORIO, J. (1992b), "Economic growth in Latin America", *Journal of Development Economics*, Vol. 39, No. 1, pp. 59-84.

- DESSUS, S. and R. HERRERA (1996), "Le rôle du capital public dans la croissance des pays en voie de développement au cours des années 80", *Document technique* No. 115, Centre de Développement de l'OCDE.
- DOWRICK, S. (1995), "The determinants of long-run growth", in P. Andersen, J. Dwyer and D. Gruen (eds.), *Productivity and Growth*, Reserve Bank of Australia.
- EASTERLY, W. and S. REBELO (1993), "Fiscal policy and economic growth", *Journal of Monetary Economics*, Vol. 32.
- EDEY, M. (1994), "Costs and benefits of moving from low inflation to price stability", *OECD Economic Studies*, Winter.
- EDWARDS, S. (1995), "Why are saving rates so different across countries?: An international comparative analysis", *NBER Working Paper Series*, No. 5097, April.
- EICHENGREEN, B. (1994), "Institutional prerequisites for economic growth: Europe after World War II", *European Economic Review*, No. 38.
- ENGLANDER, A.S. and A. GURNEY (1994), "Medium-term determinants of OECD productivity", *OECD Economic Studies*, No. 22, Spring.
- FARUQEE, H. and A.M. HUSAIN (1995), "Savings trends in Southeast Asia: a cross-country analysis" *IMF Working Papers*, No. WP/95/39, April.
- FELDSTEIN, M. (1994), "The effects of outbound foreign direct investment on the domestic capital stock", *NBER Working Paper*, No. 4668.
- FONTAGNE, L. (1996), "The links between FDI and trade: empirical evidence for US and French industries (1984-1994)", *DSTI/EAS/IND/WP9(96)5*.
- FORD, R. and D. LAXTON (1995), "World public debt and real interest rates", *IMF Working Paper*, WP/95/30, March.
- FORD, R. and P. PORET (1991), "Infrastructure and productivity in the private sector", *OECD Economic Studies*, No. 16., Autumn.
- FRANÇOIS, J.F., B. MCDONALD and H. NORDSTROM (1994), "The Uruguay Round: a global general equilibrium assessment", paper presented at the conference "Challenges and opportunities for East Asian Trade", Canberra, Australia, July 13-14.
- GEMMEL, N. (1996), "Evaluating the impacts of human capital stocks and accumulation on economic growth: some new evidence", *Oxford Bulletin of Economics and Statistics*, Vol. 58, No. 1, February.
- GIORNO, C., P. RICHARDSON, D. ROSEVEARE and P. VAN DEN NOORD (1995), "Potential output, output gaps and structural budget balances", *OECD Economic Studies*, No. 24, 1995/1.
- GOLDIN, I. and D. VAN DER MENSBRUGGHE (1992), "Trade liberalisation: what's at stake?", *OECD Development Centre Policy Brief* No. 5.
- GRAHAM, E.M. (1995), "Foreign direct investment in the world economy", *IMF Working Paper*, WP/95/59.
- GROUP OF TEN STUDY (1995), "Saving, investment and real interest rates", *Deputies' Study*.

- GROSSMAN, G.M. and E. HELPMAN (1992), *Innovation and Growth: Technological Competition in the Global Economy*, MIT Press, Boston.
- GROVES, T., Y. YOUNG, J. McMILLAN, B. NAUGHTON (1996), "Productivity growth in Chinese state-run industry", in D. Fureng, C. Lin and B. Naughton, *China's State-Owned Enterprise Reforms*, London, Macmillan.
- HAVRYLYSHYN, O. (1990), "Trade policy and productivity gains in developing countries", *World Bank Research Observer*, 5, No. 1, January.
- HENIN, P.Y. and P. RALLE (1994), "Les nouvelles théories de la croissance – quelques apports pour la politique économique, *Revue économique*, numéro hors série.
- HIEMENZ, U. and N. FUNKE (1994), "The experience of developing countries with macroeconomic stabilisation and structural adjustment", in Lee and Reisen (eds.) *Development Centre Documents – From Reform to Growth: China and Other Countries in Transition in Asia and Central and Eastern Europe*, OECD Paris.
- HILL, P. (1986), "International price levels and purchasing power parities", *OECD Economic Studies*, No. 6, Spring.
- HU, Z. and KHAN, M.S. (1996), "Why is China growing so fast?", *IMF Working Paper*, No. WP/996/75, July.
- HUFBAUER, G., D. LAKDAWALLA and A. MALANI (1994), "Determinants of direct foreign investment and its connection to trade", *UNCTAD Review*.
- JORGENSEN, D.W. and M. KURODA (1990), "Productivity and international competitiveness in Japan and the United States, 1960-85", in C. Hulton (ed.), *Productivity Growth in Japan and the United States*, University of Chicago Press.
- JUDSON, R. and A. ORPHANIDES (1996), "Inflation, volatility and growth", *Finance and Economics Discussion Series No. 96-19* (Federal Reserve Board).
- KIM, J.I. and LAU L.J. (1994), "The sources of economic growth of the East Asian Newly Industrialized Countries", *Journal of the Japanese and International Economies* 8(3).
- KOKKO, A. (1996), "Productivity spillovers from competition between local firms and foreign affiliates", *Journal of International Development*, Vol. 8, pp. 517-30.
- KRUEGER, A. (1993), *Political Economy of Policy Reform in Developing Countries*, MIT Press, Cambridge.
- KRUGMAN, P. (1995), "The Myth of Asia's Miracle", *Foreign Affairs*, Vol. 73, No. 6.
- KURODA, M., K. YOSHIOKA, M. SHIMIZU (1987), "Economic growth: factor analysis and spillover effects among industrial sectors" in K. Hamada (ed.) *Macro Analysis of the Japanese Economy*, University of Tokyo Press (in Japanese).
- KUZNETS, S. (1955), "Economic growth and income inequality", *American Economic Review*, 45.
- LEE, C.H. and H. REISEN (1994), *Development Centre Documents – From Reform to Growth: China and Other Countries in Transition in Asia and Central and Eastern Europe*, OECD Paris.
- LEIBFRITZ, W., D. ROSEVEARE, D. FORE and E. WURZEL (1995), "Ageing populations, pension systems and government budgets – How do they effect saving?", in OECD (1995).

- LEVINE, R. and S. ZERVOS (1993), "Looking at the facts: what we know about policy and growth from cross-country analysis", *World Bank Policy Research Working Paper* No. 115.
- MADDISON, A. (1995), *Monitoring the World Economy: 1820-1992*, OECD, Paris.
- MANKIW, G. (1995), "The growth of nations", *Brookings Papers on Economic Activity*, Vol. 1.
- MASSON, P.R. and R.W. TRYON (1990), "Macroeconomic effects of projected population ageing", *IMF Working paper*, WP/90/5, January.
- MASSON, P.R., T. BAYOUMI and H. SAMIEI (1995), "International evidence on the determinants of private saving", *IMF Working Papers*, No. WP/95/51, May.
- MASSON, P.R., T. BAYOUMI and H. SAMIEI (1995), "Saving behaviour in industrial and developing countries", *Staff Studies for the World Economic Outlook*.
- McKINNON, R.I. (1991), *Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*, Johns Hopkins University Press.
- McKINNON, R.I. (1994) "Gradual versus rapid liberalisation in socialist economies", *Institute for Contemporary Studies*, San Francisco, 1994.
- MESSERLIN, P.A., (1995), "The impact of trade and capital movements on labour: evidence on the French case", *OECD Economic Studies*, No. 24.
- MORISSET, J. and C. REVOREDO (1995), "Savings and education: a life-cycle model applied to a panel of 74 countries", *World Bank Policy Research Working Paper*, No. 1504, August.
- MUNNEL, A.H. (1992), "Policy watch: infrastructure investment and economic growth", *Journal of Economic Perspectives*, 6(4).
- NADIRI, M.I. (1993), "Innovations and technological spillovers", *NBER Working Papers* No. 4423.
- NEHRU, V., E. SWANSON, A. DUBEY (1993), "A new database on human capital stock, sources, methodology and results", WPS1124, The World Bank, April.
- O'DONOVAN, B., A. ORR and D. RAE (1996), "A world interest rate model", *National Bank of New Zealand Financial Research Paper* No. 7, November.
- OECD (1988) *Why Economic Policies Change Course*, Paris.
- OECD (1992), *Purchasing power parities and real expenditures*, Paris.
- OECD (1994a), "The EC's internal market: implementation and economic effects", *OECD Economic Studies* No. 23, Winter.
- OECD (1994b), *The OECD Jobs Study*, Paris.
- OECD (1995a), OECD Ministerial Communiqué, SG/PRESS(95)41, Paris.
- OECD (1995b), *Future Global Capital Shortages: Real Threat or Pure Fiction?*, Paris.
- OECD (1995c), *The New World Trading System*, Paris.
- OECD (1996a), *Macroeconomic policies and structural reform*, Paris
- OECD (1996b), "Ageing in OECD countries: a critical policy challenge", *Social Policy Studies* No. 20, Paris.
- OECD (1996c), *Economic Survey: Korea*, Paris.

- OECD (1997), "Chapter 1: The Economy – Wide Effects of Regulatory Reform", *The OECD Report on Regulatory Reform – Vol. II: Thematic studies*, pp. 21-190, Paris.
- OECD (1997a), "Towards a new global age: Challenges and opportunities", *Policy Report*, Paris.
- OECD (1997b), "The world in 2020: Towards a new global age", *Analytical Report*, Paris.
- ORR, A., M. EDEY and M. KENNEDY (1995a), "Real long-term interest rates: the evidence from pooled-time-series", *OECD Economic Studies*, No. 25.
- ORR, A., M. EDEY and M. KENNEDY (1995b), "The determinants of real long-term interest rates: 17 country pooled-time-series evidence", *OECD Economics Department Working Paper* No. 155.
- PAGE, J. (1994), "The East Asian miracle: four lessons for development policy", in *NBER Macroeconomics Annual*, S. Fischer and J.J. Rotemberg (eds.), MIT Press, Cambridge, Mass.
- PERKINS, D. (1994), "Completing China's move to the market", *Journal of Economic Perspectives*, Vol. 8, No. 2, pp. 23-46.
- PERSSON, T. and G. TABELLINI (1994), "Is inequality harmful for growth? Theory and evidence", *American Economic Review*, 84, pp. 600-21.
- PETERSEN, C.E. (1992), "Trade conflict and resolution methodologies", *American Economic Review*, Vol. 82, No. 2, May.
- PETRI, P.A. (1993), *The Lessons of East Asia: Common Foundations of East Asian Success*, World Bank.
- REISEN, H. (1995), "Developing country savings and the global capital shortage", in OECD (1995b).
- RODRIG, D. (1994), "King Kong meets Godzilla: the World Bank and the East Asian miracle", *CEPR Discussion Paper Series*, No. 944.
- RODRIG, D. (1996), "Understanding economic policy reform", *Journal of Economic Literature*, Vol. XXXIV, March.
- SACHS, J. and A. WARNER (1995), "Economic reform and the process of global integration", *Brookings Papers on Economic Activity*, Vol. 1.
- SACHS, J. and W.T. WOO (1996), "China's transition experience reexamined", *Transition*, Vol. 7, No. 3-4, The World Bank.
- SCHMIDT-HEBBEL, K., L. SERVÉN, and A. SOLIMANO (1995), *Saving and Investment: paradigms, Puzzles, Policies*, World Bank.
- STIGLITZ, J.E. (1996), "Some lessons from the East Asian miracle", *The World Bank Research Observer*, Vol. 11, No. 2, August, pp. 151-77.
- TANZI, V. and H.H. ZEE (1996), "Fiscal policy and long-run growth", *IMF working Paper*, WP/96/119, October.
- TAYLOR, L. (1991), *Varieties of Stabilization Experience: Towards Sensible Macroeconomics in the Third World*, Clarendon Press, Oxford.
- TSENG, W., H.E. KHOR K. KOCHHAR, D. MIHALJEK and D. BURTON (1994), "Economy reform in China, A new phase", *IMF Occasional Paper* n° 114, Washington 1994.

- UN (1994), *World Population Prospects, 1950-2050*, New York.
- UNCTAD (1995), *World Investment Report 1995*, Geneva.
- URATA, S. (1994), "Trade liberalisation and productivity growth", *Journal of Institute of Developing Economies*, XXXII, No. 4, December.
- WANG, C., HEADY and WOO, W.T. (1993) "Economic reform and fiscal management in Asia", *Asian Development Bank*, February.
- WOO, W.T., W. HAI, J. JIN and G. FAN 1994, "How successful have Chinese enterprise reforms been? Pitfalls in opposite biases and focus", *Journal of Comparative Economics*, No. 18.
- WORLD BANK (1993), *The East Asian Miracle*, Oxford University Press.
- WORLD BANK (1995), *World Population Projections*.
- WORLD BANK (1996), *The Chinese Economy: Fighting Inflation, Deepening Reforms*.
- YOUNG, A. (1995), "The tyranny of numbers: confronting the statistical realities in Asia", *Asian Development Bank*, February.

THE MINILINK MODEL

Minilink is a structural dynamic model being developed at the OECD specifically to examine policy issues that have medium- to long-run implications in the context of OECD and non-OECD linkages. The model's structure is explicitly based on economic theory and designed to achieve a stable long-run equilibrium following a shock. The model is built from principles of optimisation applied to individual agents and economic units, with optimal decisions derived and aggregated under general equilibrium conditions prevailing across markets as well as under private and public inter-temporal budget constraints. A brief description of a preliminary version of the model used in the simulation described in the main text follows with annotated references to equations which are listed at the end.

The basic model comprises two regional blocks calibrated to approximate the OECD and non-OECD.* There are essentially three types of agents in each block: households (consumers), firms and the government. Agents are assumed to interact in two broad markets: goods and financial assets. Each zone is assumed to specialise in the production of a single good, traded as imperfect substitutes. This allows for the relative price between the two goods – or the real exchange rate – to adjust following different types of shocks. Agents are assumed to hold three types of assets – capital, government bonds and net foreign assets – which are assumed to be perfect substitutes on international financial markets. As a result, agents in the two areas face the same real rate of interest, once allowance is made for expected changes in real exchange rates.

THE PRODUCTION SECTOR

The production sector in each zone is assumed to be composed of a large number of firms operating in a perfectly competitive environment. The production technology is characterised by a two-factor (capital and labour) Cobb-Douglas function with exogenous labour-augmenting technical progress (Equation [1]). A

* The model structure is currently being extended to incorporate a wider multi-country coverage.

key feature of the Cobb-Douglas technology is linear homogeneity of output with respect to inputs: in other words, production is characterised by constant returns to scale and, as a consequence, only the optimal ratio of inputs can be determined from profit maximisation conditions (Equation [2]). The absolute level of these inputs and therefore the scale of production cannot be determined by technology alone. In the model, the levels of inputs and production are therefore determined by the availability of labour which is set exogenously.

THE GOVERNMENT SECTOR

The government is assumed to raise taxes on labour income and to purchase consumable goods, but makes no contribution to production or the stock of capital. Since one of the main purposes of the model is to examine the longer-term implications of fiscal policies, the government is allowed to run deficits and cumulate debt, but nevertheless face a budget constraint whereby taxes and/or expenditures need to adjust to maintain a stable debt-to-output ratio in the steady-state equilibrium (Equation [3]).

THE HOUSEHOLD SECTOR

The household sector assumes that consumers, in contrast to the government, make savings and consumption decisions over a finite time horizon. This framework is based on the concept of overlapping generations, but in order to facilitate aggregation follows Blanchard (1985) in assuming that each consumer faces a constant probability of death regardless of age. At each period of time, a new cohort or generation of consumers is born. Also, it is assumed that people from different generations are unrelated and do not make bequests. The combination of these related assumptions – positive birth rate and absence of intergenerational transfers – imply the absence of debt neutrality (Ricardian Equivalence) in the model.

In equilibrium, consumption is a function of the stock of wealth, which comprises human and financial wealth (Equation [6]). The propensity to consume out of wealth depends on the probability of death and the rate of time preference, which can be thought of as adjusting to reflect changes in the dependency ratio. Thus, populations in OECD countries, which are ageing more rapidly, may see their collective rate of time preference rise relative to that of non-OECD countries. Financial wealth is measured as the sum of capital, government bonds and net claims on foreigners (Equation [5]). Human wealth is measured as the present value of future net labour income to all consumers that are currently alive (Equation [4]).

THE EXTERNAL SECTOR

In order to minimise the number of relative prices in the model, it is assumed that only consumers purchase goods both domestically and in the foreign market. As a result, the model is completed with a standard import function in each zone which depends on consumption and on the real exchange rate (Equations [7], [8] and [9]).

EQUILIBRIUM CONDITIONS

There are two key variables in the model that adjust to clear the product and financial markets: the real interest rate and the real exchange rate. The real interest rate adjusts to ensure that the stock of assets at the world level is in equilibrium (*i.e.* that the sum of net foreign assets across the two zones is zero) (Equation [13]). Real interest rates can differ across zones, to the extent that this reflects an expectation of future changes in the exchange rate. Thus, the role of the real exchange rate is to ensure that, within each zone, aggregate demand is equal to aggregate supply. In long-run equilibrium, when the real exchange rate is stable, the real interest rate is equalised across all countries.

THE MAIN RELATIONSHIPS IN A TYPICAL REGIONAL BLOCK

In simulation, the model is first solved for the long-run steady-state which provides the “terminal conditions” for the forward-looking model-consistent (“rational”) expectations variables, the real exchange rate, real interest rates and human wealth, in the dynamic solution. In the long-run steady state it is assumed that real interest rates in all countries are equalised and income and expenditure flow variables as well as all asset stocks stabilise at a constant proportion of GDP. The specification of the steady-state model is detailed below, where the use of lower-case letters denotes that flow and stock variables are expressed as a proportion of GDP.

Production function

Output is determined according to a two-factor Cobb-Douglas production, where technical progress is assumed to be labour-augmenting:

$$Y = (E * ELEF)^\alpha * K^{(1 - \alpha)} \quad [1]$$

Capital-Output ratio

The condition for profit maximisation in the production sector is given by:

$$k = (1 - \alpha) / (R + deprat + risk) \quad [2]$$

Government budget constraint

A tax rate reaction function targets a specific debt-to-GDP ratio in the steady-state:

$$tax = gc + trf + (R - g) * b \quad [3]$$

In the long term, the public debt-to-GDP ratio converges to the exogenously set target ratio.

$$b = \bar{b} \quad [3a]$$

Human wealth is the present value of future net income:

$$hw = \frac{(\alpha - tax + trf + risk * k)}{R + pdeath + n - g} \quad [4]$$

Financial wealth is the sum of capital, bonds and net foreign assets held by the private sector:

$$fw = k + b + nfa \quad [5]$$

Consumption is a constant proportion of total wealth:

$$c = (pdeath + timep) * (hw + fw) * (P / PC) \quad [6]$$

Net exports: are determined so as to maintain a stable net foreign debt (asset) to GDP ratio in the steady state:

$$x - m = -(R - g) * nfa \quad [7]$$

Imports are a function of consumption and the real exchange rate.

$$m = \beta * (c + \gamma \ln(rxr)) \quad [8]$$

Exports are set equal to imports from the foreign block.

$$x = m^f * Y^f / Y \quad [9]$$

Real exchange rate is defined as the relative price of domestic to foreign good. In the steady-state model it is determined so as to ensure consistency between net exports and the net foreign asset position (Equations [7] to [9] above), and in the dynamic model is determined by the uncovered interest parity condition.

$$rxr = P / P^f \quad [10]$$

Consumer prices: are a weighted average of domestic and foreign production prices

$$PC = (1 - w^f) P + w^f P^f \quad [11]$$

Market equilibrium conditions:

Product market equilibrium:

Aggregate demand equals aggregate supply for each individual country and at the world level

$$1 = c \cdot (PC / P) + (deprat + g) \cdot k + gc + x - m \cdot (P^{Pf} / P) \quad [12]$$

World asset stock equilibrium: Sum of net foreign assets across countries equals zero

$$nfa \cdot P \cdot Y = -nfa^f \cdot P^f \cdot Y^f \quad [13]$$

Variable definitions

Stock and flow variables:

<i>k</i> :	capital-output ratio
<i>tax</i> :	tax rate on labour income
<i>gc</i> :	government expenditures as a proportion of output
<i>trf</i> :	government transfers as a proportion of output
<i>b</i> :	government debt as a proportion of output
\bar{b} :	government debt target as a proportion of output
<i>kw</i> :	human wealth as a proportion of output
<i>fw</i> :	financial wealth as a proportion of output
<i>c</i> :	consumption as a proportion of output
<i>nfa</i> :	net foreign assets as a proportion of output
<i>m</i> :	imports as a proportion of output
<i>Y</i> :	level of real output
<i>E</i> :	employment
<i>K</i> :	level of capital
ELEF:	labour-augmenting labour efficiency
<i>f</i>	superscript: refers to a foreign variable

Price variables:

<i>R</i> :	real interest rate
<i>rxr</i> :	real exchange rate
<i>P</i> :	price of domestic good
<i>PC</i> :	consumer price

Fixed parameters:

<i>depart</i> :	rate of capital depreciation
<i>risk</i> :	risk premium on capital
<i>g</i> :	steady-state growth rate of output
<i>n</i> :	steady-state growth rate of labour force
<i>timep</i> :	rate of time preference
<i>pdeath</i> :	probability of death
α :	share of labour in total income