Productivity Trends in Asia Since 1980

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RAPID ECONOMIC GROWTH IN JAPAN in the 1960s made the world aware of the economic strength of the Asian region. In the 1980s, Asia was one of the major sources of world economic growth. The so-called Asian Tigers were well-known examples of the strong economic performance of Asian countries.

However, Krugman (1994) questioned the sustainability of the rapid growth of Asian countries. The main point of his argument was that their growth rates were due to increases in factor inputs and not by the improvement of productivity. He argued that since there is a limit on the continuation of high rates of increase in factor inputs, the fast growth of Asian countries would be short-lived. Ignited by that article, a flurry of papers on productivity in Asian countries appeared. One point that was common to most of the papers was that productivity improvement is the key factor for sustained growth. The Asian financial crisis in 1997 made this point recognized more widely. As a result, most governments are putting emphasis on productivity growth as one of the major goals of economic policies.

The author had participated as a chief expert in an international survey project sponsored by the Asian Productivity Organization (APO) on measuring total factor productivity (TFP) growth among Asian countries in 1998 and 2001 (Asian Productivity Organization, 2001 and 2004). This article is largely based on the findings of those projects.

Economic Performance

Table 1 shows the economic growth rates of 12 Asian countries since 1980. On average, most recorded relatively fast economic growth. The 1980s and the first half of the 1990s were periods of strong economic performance led by the Asian newly industrializing economies (NIEs). Most of the countries recorded growth rates of greater than 5 per cent per year and sometimes close to 10 per cent per year. This was the period when East Asia was a main driver of world economic growth. Iran and the Philippines were exceptions as they went through major disruptive political and social changes.

From the early 1990s, Japan started to stagnate as the bubble burst in the stock and real estate markets. Then the Asian financial crisis in 1997 caused a major disruption in many economies. However, the recovery was also fairly swift in many, as shown by the growth rates for 2000-03. South Korea, Thailand and Vietnam achieved growth rates of greater than 6 per cent per year for this period, although Taiwan and Singapore did not do as well. The lower growth of these two countries was partly due to the low growth of the information and communications technology (ICT) industry.

1 The author would like to thank the editor for helpful comments on the draft of this article. In this article it has not been possible to discuss one of the major Asian economies, namely China, because reliable economic data, especially those needed to conduct productivity analysis, were not available. Email: oguchin@isc.senshu-u.ac.jp.

Table 1

Real Output Trends in Asia, 1980-2002

(averages of annual growth rates in real GDP, per cent)

	1980-84	1985-89	1990-94	1995-99	2000-02	1980-2001
India	3.53	5.33	4.78	6.53	5.40	5.10
Indonesia	6.88	6.04	7.35	1.44	4.04*	5.40
Iran	1.78	-1.18	6.83	3.11	5.23	2.63
Japan	4.22	4.64	1.02	0.87	0.98	2.60
South Korea	6.51	9.39	7.77	5.18	6.26	7.22
Malaysia	6.87	4.20	9.31	5.12	4.44	6.48
Nepal	4.69	5.48	5.43	4.25	2.38	5.04
Philippines	1.87	2.30	1.28	3.96	4.45	2.51
Singapore	7.91	6.03	7.74	6.70	1.09*	7.12
Taiwan	7.47	9.08	6.95	5.87	3.44	7.34
Thailand	5.30	8.60	8.64	1.18	6.39*	5.93
Vietnam**	N.A.	3.61	6.80	7.66	7.01	6.36**

* 2003 is included in the average.

** For Vietnam, data were available only for 1985 to 2000.

Table 2

Labour Productivity Trends in Asia, 1980-2000

(averages of annual growth rates in total economy real GDP per worker, per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	1.52	3.57	2.72	4.51	3.13
Indonesia	3.44	2.91	5.14	-0.15	2.87
Iran	0.43	-3.60	3.98	1.07	0.47
Japan	3.53	3.25	2.02	1.53	2.58
South Korea	4.65	6.09	5.53	5.17	5.36
Malaysia	4.35	1.40	5.77	1.98	3.41
Philippines	-0.98	-0.30	-1.38	1.90	0.14
Singapore	3.56	4.15	4.38	3.56	3.93
Taiwan	3.95	5.53	4.92	4.30	4.67
Thailand	1.24	5.33	7.70	1.18	3.86
Vietnam	N.A.	0.73*	4.30	6.01	2.97**

* The average is for 1986 to 1989.

** The average is for 1986 to 2000.

In summary, most Asian countries did quite well in terms of economic growth in the 1980s and 1990s despite the major disruption caused by the financial crisis in the late 1990s. They are still doing fairly well compared with the rest of the world.

A central question is whether the impressive growth shown in Table 1 was due to increases in the factors of production, namely capital and labour, or by improved total factor productivity. Before we discuss total factor productivity, we look at the growth rates of labour productivity and capital productivity.

Single Factor Productivity

Productivity with respect to one particular factor of production is called single factor productivity. Single factor productivity measures are very widely used productivity indicators for their simplicity and because it is useful to measure how efficiently one particular factor of production is used in the production process. Here we discuss labour productivity and capital productivity.

Labour Productivity[2]

The growth rate of labour productivity, defined as real GDP per worker and based on APO data from national sources, is given in Table 2. Labour productivity in most Asian countries has grown fairly rapidly since 1980. There are a few countries with relatively low growth rates, among them Japan and the Philippines. These are the same countries that recorded relatively low economic growth, as mentioned in the previous section. The countries with high economic growth rates also recorded high growth in labour productivity.

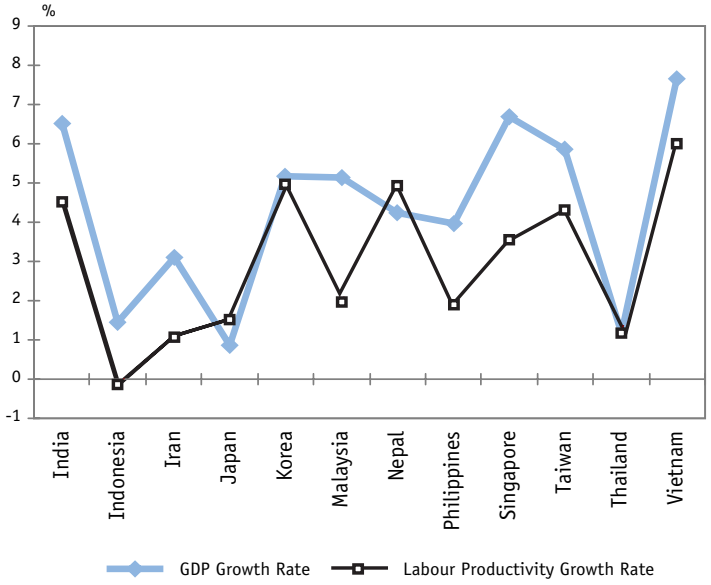
There is a relationship between the GDP growth rate, employment growth rate and labour productivity growth rate, namely:

$$\dot{GDP} = \dot{E} + \dot{LP}$$

where $\dot{GDP}$, $\dot{E}$ and $\dot{LP}$ represent the approximate growth rates of GDP, employment and labour productivity respectively.

Hence there is a rather close relationship between the GDP growth rate and the growth rate of labour productivity. Chart 1 shows the relationship between the average growth rate of GDP and the average growth rate of labour productivity from 1995 to 1999 in selected Asian countries. The difference between the solid line and the broken line is the growth rate of employment.

Chart 1
Average Annual Growth Rate of GDP and Labour Productivity in Selected Asian Countries, 1995-99
(per cent)



Labour Productivity Growth in Europe and the United States

For reference, we present in Table 3 labour productivity growth estimates for selected European countries and the United States. Labour productivity is, as before, defined as GDP in constant local

2 The output per worker growth rate estimates in Table 2 have been calculated by the author from national data sources. The Groningen Growth and Development Centre and the Conference Board maintain a Total Economy Database of output, labour input and productivity data for most countries in the world for the purposes of international comparisons (www.ggdc.net), and these estimates can be compared to those in Table 2 for the four Asian countries for which both sources have data available (Japan, South Korea, Singapore and Taiwan). For the 1980-2000 period, the Groningen estimates show less rapid growth than the estimates in Table 2, at 1.9 versus 2.6 per cent per year in Japan, 4.6 versus 5.4 per cent per year in South Korea, 3.8 versus 3.9 per cent per year in Singapore, and 4.3 versus 4.7 per cent per year in Taiwan. The differences are especially large in Japan in 1980-84 (3.5 per cent per year in Table 2 versus 2.0 per cent per year according to the Groningen data) and Taiwan in 1985-89 (5.5 versus 3.0 per cent per year). These differences can be primarily attributed to differences in the labour input sources used, although further examination would be required to explain them completely. While the Groningen data may be more comparable across countries due to their international focus, this article uses national data sources in order to have data for as large a number of Asian countries as possible.

Table 3
Labour Productivity Trends in the United States and Selected European Countries, 1986-2000
(averages of annual growth rates in total economy real GDP per worker, per cent)

	1986-89	1990-94	1995-99	1986-2000
Germany		2.39*	0.48	1.21
France		1.37*	3.20	1.44
United Kingdom	1.73	2.35	1.56	1.94
United States	1.29	1.36	2.16	1.59

* The average is for 1992 to 1994.

Source: Computed by the author using GDP and Employment data from the International Monetary Fund's *International Financial Statistics 2004*.

Table 4
Capital Stock Trends in Asia, 1980-2000
(averages of annual growth rates, per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	2.92	7.44	6.11	7.71	6.24
Indonesia	8.79	8.50	9.25	8.22	8.48
Iran	4.79	-0.71	1.97	1.89	1.84*
Japan	1.59	2.42	2.50	1.38	1.97
South Korea	11.33	11.20	12.21	8.32	10.76*
Malaysia	12.52	6.10	9.72	8.93	9.12
Philippines	5.83	1.26	3.18	3.61	3.42
Singapore	11.01	7.32	7.19	10.67	8.96*
Taiwan	11.54	9.20	6.86	7.59	8.80*
Thailand	6.26	6.85	11.46	6.37	7.73*
Vietnam	N.A.	-0.34**	2.91	8.37	4.23***

* The year 2000 is not included.

** The average is for 1986 to 1989.

*** The average is for 1986 to 2000.

currency per worker. Comparison with Table 2 shows that most Asian countries outperformed Europe and the United States in terms of labour productivity growth in the 1980s and 1990s.

Capital Productivity

Capital productivity, defined as GDP per unit of capital stock, declined in most Asian countries, in contrast to labour productivity. This is a result of the drive to increase investment, from both domestic and international sources, in many Asian countries. Table 4 gives the growth rate of capital stock for selected countries. The average growth rates of capital stock during the analysis period were higher than those of GDP in most of the countries, indicating a negative rate of growth in capital productivity. Iran, Japan and Vietnam were the exceptions. In these countries, this might suggest that GDP growth was largely brought about by restructuring rather than by investment growth. In other countries, the production system became more capital intensive, either through the implementation of more capital-intensive production methods or due to a shift in production towards more capital-intensive sectors.

Total Factor Productivity

Labour productivity and capital productivity measure the productivity of a single input. However, in the production process all the factors of production are combined together and used simultaneously. As noted in the previous section, single factor productivity figures give only a partial picture of productivity. TFP measures the overall productivity of all productive factors combined in productive activities. The TFP growth rate shows the improvement in the overall efficiency of production. We have used the growth accounting method to estimate TFP growth.[3]

TFP Growth

Table 5 gives estimates of TFP growth in the two-factor framework, that is, where employment and the capital stock are the only factors of production and where real value added is measured as GDP at factor cost. In many of the countries studied, the official estimates of capital stock are not published. For those countries, we have estimated the capital stock series using the perpetual inventory method.[4]

3 For details of the estimation process, see Asian Productivity Organization (2001).

Table 5 shows a wider variation from country to country than there was in labour productivity. All the economies studied except for Indonesia and the Philippines recorded positive TFP growth rates for the period from 1980 to 2000. This is a rather remarkable performance in view of the large economic fluctuations, even with some years of negative economic growth, experienced by some countries. Vietnam recorded the highest growth of 3.3 per cent per year (for 1986 to 2000), followed by India with 2.1 per cent per year. Both economies underwent extensive economic and social reform to become more open and market oriented. On the other hand, the countries that experienced major political changes such as the Philippines, Indonesia, and Iran did poorly, with either negative or low positive growth of TFP.

The difference between TFP growth and GDP growth in 1980-2000 varies greatly across the countries examined. Chart 2 shows the average growth rates of GDP and TFP for this period. Some countries that showed high economic growth, such as Singapore, Taiwan, South Korea, Thailand, and Malaysia, did not achieve very high TFP growth. Singapore is especially noteworthy. It was reported in the 1980s that Singapore's strong economic growth in the late 1980s was not accompanied by significant productivity growth. As a result, the Singaporean government emphasized productivity improvement in its economic policies. In the early 1990s, it recorded relatively rapid TFP growth, but TFP growth faltered again in the latter half of the decade. That was partly due to the Asian financial crisis, but the performance is rather disturbing in the sense that Singapore cannot rely on the growth of inputs for economic growth. This was the point emphasized by Krugman (1994).

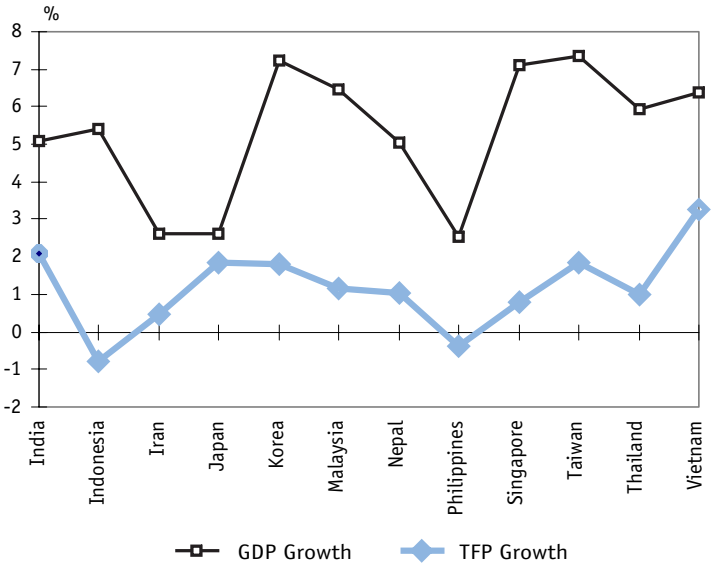
Japan, on the other hand, recorded relatively fast TFP growth despite a rather poor overall economic performance in the 1990s. The high TFP growth may have been a result of poor economic growth. Most firms tried to restructure their organization as well as production processes by eliminating redundancies to cope with the unfavourable economic environment.

Table 5
Total Factor Productivity Trends in Asia, 1980-2000
(averages of annual growth rates, per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	0.58	2.63	2.01	2.90	2.08
Indonesia	-0.32	-0.47	0.82	-3.67	-0.80
Iran	-2.41	-1.25	4.40	1.15	0.47*
Japan	3.18	2.82	0.60	0.75	1.78
South Korea	0.75	2.75	1.73	2.07	1.82
Malaysia	0.74	0.20	3.36	0.32	1.29
Philippines	-2.34	0.49	-1.68	1.03	-0.37
Singapore	-0.29	1.25	2.33	-0.41	0.78*
Taiwan	0.23	2.89	2.77	1.53	1.85*
Thailand	0.37	3.66	2.14	-2.16	1.00*
Vietnam	N.A.	2.02**	4.12	3.22	3.27***

* The year 2000 is not included.
** The average is for 1986 to 1989.
*** The average is for 1986 to 2000.

Chart 2
Average Annual Growth Rates of GDP and TFP in Selected Asian Countries, 1980-2000



4 For details of the estimation process, see Asian Productivity Organization (2001).

Table 6
Relative Contributions of TFP Growth to GDP Growth in Asia, 1980-2000
(per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	16.4	49.4	42.1	44.4	40.8
Indonesia	-4.7	-7.7	11.2	-255.5	-14.8
Iran	-135.7	105.6	64.4	37.1	18.0*
Japan	75.3	60.7	58.6	87.0	70.6
South Korea	11.5	29.3	22.2	39.9	25.3
Malaysia	10.8	4.8	36.1	6.2	17.8
Philippines	-124.9	21.2	-130.6	26.0	-14.7
Singapore	-3.7	20.7	30.1	-6.0	11.0*
Taiwan	3.1	31.8	39.9	26.0	25.2*
Thailand	7.0	42.6	24.8	-183.4	16.9*
Vietnam	N.A.	56.1**	60.6	42.1	51.3***

*The year 2000 is not included.
** The average is for 1986 to 1989.
*** The average is for 1986 to 2000.

Periods of Negative TFP Growth

As we look at the fluctuation of the TFP growth rate of each country over time, it is clear that TFP growth fluctuated more than GDP growth in most countries. Many economies experienced negative TFP growth during some of the sub-periods, while the GDP growth rates were mostly positive. Negative growth of TFP is often related to changes in the socioeconomic environment.

In the early 1980s, Indonesia faced declining oil prices and started to shift the focus of its industrial policy towards non-oil-related manufacturing. Investment started to grow with the accumulated oil revenues, but GDP itself did not grow as much, due partly to the lower price of oil and partly due to the long gestation period for new investment. These factors resulted in negative TFP growth. This condition continued in the latter half of the decade to a lesser degree, but at the end of the decade TFP growth became positive.

The negative TFP growth of Iran in the 1980s was mainly due to the Iran-Iraq war. In the first half of the 1980s in the Philippines, there was also political and social unrest, due in this case to the widespread dissatisfaction with the Marcos government. The government answered by declaring martial law, and there was a political uprising in 1983-85. The political crisis led to an economic crisis, with negative growth of both TFP and GDP. In the latter half of the decade under the Aquino government, the economy recovered, but the government was not stable and soon there was political unrest again. The Philippines also experienced a volcanic eruption during this period, causing further economic disruption. All of these factors in combination caused TFP growth to become negative in this period.

The negative TFP growth of Singapore up to the early 1980s can mostly be explained by rapid growth in investment, including large inflows of FDI. Thus the high economic growth in this period was mainly input driven. Then from the latter half of the 1980s, TFP started to show positive growth. This was partly due to various reforms introduced by the government as well as large investments in the past coming to fruition in the form of more advanced production methods. The negative growth of TFP in the late 1990s in Indonesia, Singapore and Thailand was mainly due to the economic downturn caused by the Asian financial crisis.

Contribution of TFP Growth to GDP Growth

Table 6 shows the contribution of TFP growth to GDP growth in selected countries. The results are similar to our earlier observation that TFP growth in India and Vietnam was significant, in that TFP growth accounted for more than 40 per cent of GDP growth in most periods in these two countries. Vietnam achieved consistently high TFP growth and TFP contributions to GDP growth during 1986 to 2000. This indicates the success of the new economic policies that have been implemented there. At the same

time, it also indicates that under the old regime there was inefficiency and much room for improvement.

India's high TFP growth also started in the mid 1980s and continued to 2000. Among the NIEs, South Korea and Taiwan also had consistently positive and stable contributions from TFP growth. Malaysia experienced large fluctuations, but the averages over five years of the contribution of TFP growth were positive. Thus in most surveyed economies, TFP growth played an important role in overall economic growth. This is counter to the proposition presented by Krugman (1994) in his widely publicized paper "The Myth of Asia's Miracle" in which he argued that Asian economic growth was largely due to growth in productive factors and that technical progress as evidenced by TFP growth contributed little. The difference in the conclusions is partly due to the definition of technical improvement. Krugman included the improvement of the quality of inputs in addition to the increase in quantity in the growth of inputs. In the estimations of TFP growth given in Table 5, the quality improvement of inputs is not taken into consideration. This point is considered below.

Effects of Quality Change in Labour and Capital

As explained above, the growth rate of labour and capital in the above estimation does not consider the quality change in labour and capital. For example, even with the same number of workers, if the proportion of skilled workers in total employment rises, overall productivity should increase. This increase in productivity due to the quality change in labour is included in the above estimates of TFP growth in Table 5 as a part of TFP growth. Below, we separate this effect of the quality change in labour and capital.

Table 7
Labour Quality Trends in Asia, 1980-2000
(averages of annual growth rates, per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	-0.02	-0.15	-0.34	-0.61	-0.29
Indonesia	N.A.	N.A.	2.84	1.64	2.29**
Japan	1.02	0.54	0.50	0.07	0.51
South Korea	3.29	4.23	2.54	1.24	2.83
Malaysia	0.27	0.45	2.19	0.69	1.05
Philippines	1.23	1.53	0.65	1.21	1.14*
Singapore	3.19	0.81	1.80	1.96	1.94*
Taiwan	0.47	0.38	0.35	0.59	0.45*
Vietnam	N.A.	0.78***	0.29	1.95	1.13**

* The year 2000 is not included.
** The average is for 1986 to 2000.
*** The average is for 1986 to 1989.

Quality Change in Labour

Table 7 presents the rate of the quality change in labour. The positive figures for all economies except for India indicate improvement in the quality of labour. Most of the Asian economies made considerable efforts to improve the educational level of the labour force as well as occupational skills. Table 7 shows the results of those efforts.

The figures for some countries are relatively large. South Korea and Indonesia achieved more than 2 per cent growth per year while Singapore's rate was close to 2 per cent per year. These countries achieved rapid economic growth during the period, and the improvement in the quality of labour was one of the causes of this growth.

The Indian case was an exception since measured labour quality growth was negative for the entire period. However, it should be mentioned that the method used to calculate labour quality for India is especially crude and may not capture true trends in labour quality broadly defined. Due to the limited availability of data, this estimation was made comparing the organized (for-

Table 8
Absolute Contributions of Labour Quality Growth to TFP and GDP Growth in Asia, 1980-2000
(percentage points per year)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	0.00	-0.09	-0.20	-0.36	-0.17
Indonesia	N.A.	N.A.	1.10	1.21	1.43**
Japan	0.62	0.31	0.29	0.04	0.96
South Korea	1.93	2.43	1.57	0.76	1.67
Malaysia	0.74	0.20	0.75	0.17	0.24
Philippines	0.62	0.62	0.27	0.52	0.50*
Singapore	1.32	0.35	0.84	0.92	0.85*
Taiwan	0.24	0.20	0.19	0.31	0.24*
Vietnam	N.A.	2.29***	0.17	1.10	0.48**

* The year 2000 is not included.
** The average is for 1986 to 2000.
*** The average is for 1986 to 1989.

Table 9
Capital Quality Trends in Asia, 1980-2000
(averages of annual growth rates, per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	-1.02	-1.02	-0.76	-0.83	-0.90
Iran	-4.16	-2.28	2.40	0.48	-0.89*
Japan	1.93	2.10	0.61	-0.04	1.09
Malaysia	N.A.	-2.71	-2.59	1.79	-0.65
Philippines	1.55	-0.36	0.15	0.44	0.46
Singapore	-0.32	-1.15	0.96	0.02**	-0.13**
Taiwan	0.10	-1.13	-0.08	0.74	-0.09*

* The year 2000 is not included.
** The years 1999 and 2000 are not included.

mal) and unorganized (informal) sectors in India. Thus negative estimates in Table 7 indicate that employment in the less productive unorganized sector increased more rapidly than that in the organized sector, resulting in lower overall average labour productivity. The organized (formal) sector consists of firms that are officially registered.

The quality changes shown in Table 7 can be converted into absolute contributions to TFP growth. The figures in Table 8 represent the portion of TFP growth accounted for by the quality change in labour. Further, the figures in Table 8 also represent the absolute contributions of the quality change in labour to GDP growth rates. A positive value in Table 8 indicates that quality improvement in employed labour helped to raise TFP and GDP growth. For example, 0.24 for Taiwan for the 1980 to 2000 period means that the quality improvement in employed labour pushed up the growth rate of GDP by 0.24 percentage points. In the same sense, of the 1.85 per cent per year TFP growth for Taiwan over this period, 0.24 points was due to the improved quality of labour. Table 8 shows that the contribution of the quality change in labour was fairly large in many countries.

Quality Change in Capital

The rates of quality change in capital are given in Table 9. The quality of capital reflects the user cost of capital, which in turn reflects the depreciation rate. Consequently, capital assets with higher depreciation rates (or shorter lifespans) are given larger weights, or considered of higher quality. For many economies, this estimation was not possible due to the lack of disaggregated capital stock data. The figures in Table 10 present the absolute contributions to TFP growth of the quality change in capital. Many entries in Table 9 are negative. As in the case of labour (Table 7), however, this may be more a consequence of the crudity of the technique used to calculate capital quality than a reflection of true trends in capital quality broadly defined.

It is noteworthy that the absolute contribution of quality change in capital to TFP growth for the period 1980 to 2000 for many economies was negative. This implies that those economies accumulated more capital of longer lifespans than short lifespans. In other words, they invested more in structures than in machinery and equipment.

Effect of Intersectoral Shifts

A shift of employment from a less productive sector to a more productive one improves overall productivity. The same can apply to the allocation of capital. For most of the countries studied, data on labour alone are available. Hence the figures in Table 11 are the effects of changes in the sectoral distribution of labour alone. Table 12 is for India and Japan, and the figures include the effects of changes in the sectoral distribution of both capital and labour. In most countries, the sectors are categorized by industry type such as agriculture, manufacturing, etc. In the case of India, the subsectors are the formal (organized) and informal (unorganized) sectors.

Many figures in Tables 11 and 12 are negative. In particular, India, Japan, and South Korea had negative results throughout the period. This indicates that in those economies the reallocation of inputs across sectors was such that the share in less productive sectors increased. In the case of India, the share of the unorganized sector, which is less productive, increased. In South Korea, employment in the less productive service sector increased. In Japan, the distribution of capital caused negative results. Relatively more investment was made in less productive sectors in Japan. Protection of less productive sectors may have caused this misallocation of capital.

Narrow Definition of TFP Growth

The results in Tables 8 to 12 show that the effects covered in these tables are relatively large in comparison with TFP growth itself. This indicates that refinement of data on factors of production is a crucial process in the estimation of TFP growth. It is often said that we really do not know what TFP growth measures. Estimation of the effects of quality change of inputs on TFP growth is an effort to identify the causes and their effects on TFP growth.

Tables 8 and 10 show the effects of quality changes in labour and capital, respectively. Table 13 shows TFP growth after eliminating the effect of the quality change in labour. For most countries and periods, this has the effect of sub-

Table 10
Absolute Contributions of Capital Quality Growth to TFP and GDP Growth in Asia, 1980-2000
(percentage points per year)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	-0.38	-0.37	-0.30	-0.34	-0.35
Iran	-3.28	-1.80	1.88	0.18	-0.77*
Japan	0.76	0.88	0.25	-0.01	1.10
Malaysia	N.A.	-6.65	-1.68	1.15	-1.78
Philippines	0.74	-0.22	0.09	0.24	0.23
Singapore	-0.15	-0.62	0.53	0.01**	-0.06**
Taiwan	0.05	-0.53	-0.04	0.36	-0.04*

* The year 2000 is not included.
** The years 1999 and 2000 are not included.

Table 11
Absolute Contributions of Intersectoral Shifts in Labour to TFP and GDP Growth in Asia, 1980-2000
percentage points per year

	1980-84	1985-89	1990-94	1995-99	1980-2000
Indonesia	N.A.	-0.18	1.21	1.51	1.76*
South Korea	-1.22	-1.80	-1.44	-0.27	-1.18
Malaysia	0.62	0.09	0.33	-0.04	0.11
Philippines	0.64	0.00	0.07	0.63	0.37**
Singapore	-0.29	1.25	2.33	-0.41	0.78**
Taiwan	0.05	0.11	0.13	0.09	0.10**
Thailand	0.26	0.52	1.43	1.05	0.81**

* The year 1986 is not included.
** The year 2000 is not included.

Table 12
Absolute Contributions of Intersectoral Shifts in Labour and Capital to TFP and GDP Growth in Asia, 1980-2000
(percentage points per year)

	80-84	85-89	90-94	95-99	80-00
India	-0.21	-0.34	-0.39	-0.51	-0.37
Japan	-0.47	-0.46	-0.38	-0.22	-0.38

Table 13
Trends in Total Factor Productivity Net of Changes in Labour Quality in Asia, 1980-2000
(averages of annual growth rates, per cent)

	1980-84	1985-89	1990-94	1995-99	1980-2000
India	0.58	2.73	2.22	3.26	2.25
Indonesia	N.A.	N.A.	-0.28	-4.88	-2.23**
Japan	2.56	2.50	0.31	0.71	1.48
South Korea	-1.18	0.32	0.16	1.30	0.15
Malaysia	N.A.	N.A.	2.61	0.15	0.91
Philippines	-2.96	-0.13	-1.95	0.51	-0.87*
Singapore	-1.61	0.90	1.49	-1.32	-0.07*
Taiwan	-0.01	2.69	2.58	1.22	1.62*
Vietnam	N.A.	-0.26***	3.95	2.12	2.79**

* The year 2000 is not included.
** The average is for 1986 to 2000.
*** The average is for 1986 to 1989.

stantially reducing measured TFP growth, which in many cases becomes negative. In that sense, TFP growth estimated using total employment and capital without consideration of their quality overstates the contribution of TFP growth to GDP growth. When Krugman argued that TFP growth did not play a significant role in Asian growth, he was looking at TFP growth after the effect of the quality change in labour had been removed. That is one reason why the results in Table 5 do not appear to support his argument. However, in Table 13, even after we consider the quality change in labour, the remaining TFP growth is still fairly rapid for Taiwan, South Korea, India, and Vietnam.

When we only have employment data that are classified by education and by industry separately but are not cross-classified by skill level and by sector, it is possible that the division of labour by educational level may coincide with the sectoral categorization. In that case, we should be careful not to "double count" the effect of quality change in factors. It is possible that a large part of estimates in Table 8 coincide with estimates in Tables 11 and 12, except for Japan. For Japan, cross-classified data are used and there is hence no double counting.

Conclusions

Many Asian economies have performed very well in terms of average economic growth since 1980. Asian NIEs led the way, followed by the slightly less industrialized countries. There was a major disruption to this trend by the Asian financial crisis in 1998, but many of the economies recovered fairly quickly.

In some countries economic growth was hindered by political and social instabilities. The Philippines and Indonesia experienced very large fluctuations. On the other hand, Vietnam started to grow considerably after reform.

In the 1980s, the economic growth of many of the surveyed Asian economies was not accompanied by productivity growth, with the exceptions of India and Vietnam. However, productivity growth started to rise in the 1990s and made fairly large contributions to economic growth. Many governments now emphasize the significance of productivity growth to maintain economic growth. Some set clear targets for productivity growth in their economic plans. With more attention and conscientious efforts to improve productivity, it appears that the growth of many Asian economies is now not simply input driven.

References

Asian Productivity Organization (2001) *Measuring Total Factor Productivity: Survey Report*, (Tokyo:Asian Productivity Organization).

Asian Productivity Organization (2004) *Total Factor Productivity Growth: Survey Report*, (Tokyo:Asian Productivity Organization).

Krugman, P. (1994) "The Myth of Asia's Miracle," *Foreign Affairs*, November/December.