

THE BEST OF TIMES, THE WORST OF TIMES: DEVELOPMENTS IN PRODUCTIVITY*

Economic growth has been faster in Hong Kong, and some other East Asian economies, than in the OECD economies in recent decades. This represents a combination of faster labour force growth, more rapid increases in the capital stock and improved quality and use of these resources. As Hong Kong's average income has reached those of the leading economies, some of these sources of growth would be expected to slow somewhat but the maintenance of sound fundamentals, and the boost from links with China, should help Hong Kong continue to enjoy increases in its standard of living.

While the 'goal' of monetary policy is often said to be exchange rate stability or low inflation, these are in a sense intermediate goals and the ultimate objective is greater prosperity. It is undisputed that in the post-war period per capita incomes in Hong Kong and its fellow 'tigers' have risen very quickly. There is more dispute about whether this reflects a 'miraculous' rise in productivity or whether, as Young has claimed in his "Tale of Two Cities" and elsewhere, it is more the result of rapid increases in labour and capital inputs.¹ There is also debate about whether growth in productivity has stalled in the most recent decade.

The following table summarises the relatively uncontroversial facts about economic growth in some East Asian economies and some of the major OECD economies. A feature common to almost all the economies in Table 1 is that economic growth was slower in the decade of the two oil shocks (1973-83) than in the earlier period. Furthermore,

even where economic growth rates recovered in the subsequent period they did not regain their pre-1973 pace.²

It is also notable that the Asian economies, which were considerably poorer than the others at the start of the period covered, grew consistently faster than the three Western economies over the long run. However, the differences in growth rates tended to narrow in the most recent period. This is particularly noticeable in the case of Japan. In the first two subperiods, it grew at similar rates to that shown by the other Asian economies in their fast-growth periods. By the late 1970s Japan had an average income close to that of the European economies and has since grown at rates much more like them.

Labour productivity

To assess labour productivity it is necessary to turn from measures of GDP per person to GDP per worker.³ Table 2 shows growth in real GDP

* This article is primarily the work of John Hawkins, of the Economic Division. The views expressed are those of the author and not necessarily those of the HKMA.

1 For a general study of what they term the "East Asian Miracle" see World Bank (1993). Young's critique was introduced in Young (1992) and further developed in Young (1994). Krugman takes the argument even further to assert that some of the tiger economies did no better than the Soviet Union in his provocative 1994 article.

2 The 'slowness' of growth in the post-1973 period should not be exaggerated. Rather it is the 1950-1973 period that was one of exceptionally fast growth. For example, Maddison (1991) estimates that the average growth rate of real GDP per capita in 16 OECD countries had been 3.8% from 1950-1973, well above the average growth of 0.9% in 1820-1870, 1.4% in 1870-1913 and 1.2% in 1913-1950. In Maddison (1982) he suggests growth over the period 500-1820 had averaged no more than 0.2%. The high growth in the 1950s probably owes much to the delayed application of the myriad of developments during World War II to the civilian economy. By contrast, Maddison suggests that in Europe horse harnesses, windmills and waterwheels were the only significant technological advances between the Augustan era and the 18th century. Similarly, Maddison (1991) suggests there was virtually no improvement in productivity in China from 1400 to 1900.

3 Unless otherwise indicated, the data in this article is taken from version 5.6a of the Penn World Table (PWT). A description of an earlier version of this database is given in Summers & Heston (1991). It goes up to 1990 or 1992 for most series. The GDP, population and labour force data have been updated to 1995 using estimates and forecasts from a variety of sources.

The PWT data is, at least in principle, expressed in *constant prices*. In comparing movements over time in Hong Kong's GDP it is usually more useful to strip out inflation and look at *real* rather than *nominal* GDP by recalculating GDP with *constant prices*. Instead of comparing P_0Q_0 with P_1Q_1 , we compare P_0Q_1 with P_0Q_1 . Note that in doing so, we have chosen one constant set of prices, those of the base year, at which to weight both sets of quantities.

The English novelist L.P. Hartley once said "the past is a different country". In the same way that constant price estimates are constructed to compare contemporary Hong Kong with past Hong Kong, the PWT data set uses constant price estimates to compare contemporary Hong Kong with other economies. Constant price GDP for different economies is calculated by dividing GDP in current national prices by so-called purchasing power indices. These indices are calculated as the ratio of prices in individual countries to those in the *base country* or countries. The constant price estimates used in this paper are the product of the International Comparison Programme, coordinated by the United Nations Statistical Division with support from Eurostat, the OECD, World Bank and ESCAP.

Table 1:
Real per capita GDP: Annual average percentage change

	1965-95	1950-65	1965-73	1973-83	1983-95
Hong Kong	5.7		6.5	5.6	5.2
Singapore	7.3		12.4	5.8	5.4
South Korea	7.5		8.7	6.0	7.8
Thailand	4.9		4.8	3.8	6.0
Japan	4.1	7.9	8.4	2.4	2.9
France	2.3	4.0	4.4	1.5	1.5
UK	2.0	2.4	2.8	1.0	2.3
USA	1.7	1.9	2.7	0.6	2.0

Source: see footnote 3.

Table 2:
Labour productivity: Annual average percentage change

	1965-95	1965-73	1973-83	1983-95
Hong Kong	4.9	5.9	4.3	4.7
Singapore	5.8	10.7	3.6	4.4
South Korea	6.5	8.0	5.1	6.8
Thailand	4.6	4.8	3.4	5.4
Japan	3.9	8.0	2.5	2.5
France	2.0	4.4	1.1	1.2
UK	1.9	2.7	0.6	2.4
USA	1.1	1.9	-0.3	1.7

Source: see footnote 3.

relative to growth in the labour force (ie. the sum of employment plus unemployment).

A comparison with Table 1 shows many similarities; the slowdown in incomes in 1973-83 was associated with a slowdown in labour productivity. The growth rates of labour productivity are almost always lower than that of income, as part of the rise in per capita incomes is due to an increasing proportion of the population entering the workforce. This effect was somewhat more pronounced in the East Asian economies (see Table 4).

The tendency shown in Tables 1 and 2 for poorer countries to grow faster than richer ones has been much discussed in the economics literature. The phenomenon is often referred to as 'convergence', since a sustained pattern may ultimately lead to an equalisation of incomes around the world. A broad reading of this literature gives the impression that there has been convergence among the advanced economies over certain periods but not over others.⁴ Apart from most (but not all) East Asian economies, it has been rare for Third World economies to make

4 For example, Barro & Sala-i-Martin (1995) claim that output per head has converged among OECD countries, between the states in the US and between prefectures in Japan, over long periods but De Long (1988) argues against convergence among the wealthier countries over a similar time period.

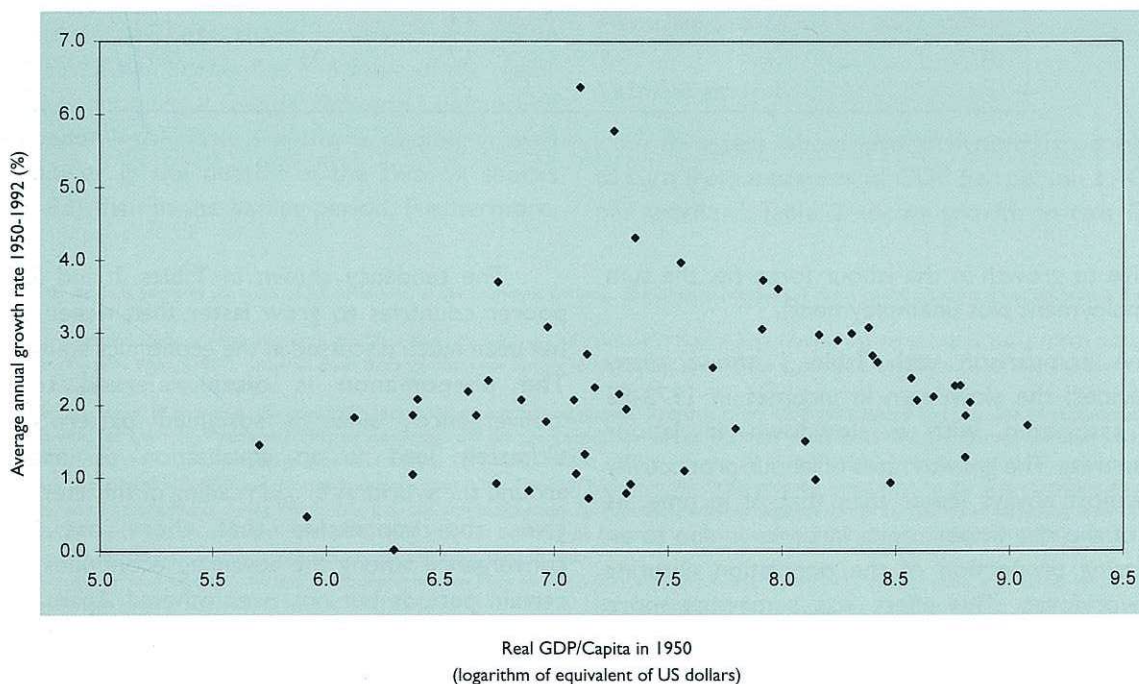
much advance on the First World.⁵ Some poor countries (especially in Africa) actually had a lower level of real output per head at the end of the 1980s than at the start.

However, this failure to observe unequivocal convergence says little about the validity of growth theories. All the theories are really applicable to is potential growth. Wars, gross mismanagement or natural disasters can always lead to poor growth rates regardless of policy settings or what the capital/labour ratio does. As an example, Chart 1 plots growth in real output per worker since 1950 against the 1950 value for a large number of countries. If there was a clear pattern of convergence, the observations would all lie along a downward sloping line. What the graph actually shows is that the true pattern is *potential* convergence; only the better performers lie on such a line. The poor to medium income countries have the *potential* to grow faster and catch up but many fail to do so. However none of the wealthy countries grow at the very fast rates.

A stylised pattern of growth is given in Chart 2. Countries typically struggle to rise above subsistence levels, then build their capital, bring more of their population into the labour force and exploit technological transfer to grow rapidly before slowing down once they reach a certain degree of affluence. This implies that the fastest growing economies will be towards the middle of the income distribution and is therefore consistent with the pattern shown in Chart 1.

Chart 3 shows this pattern being followed by four of the countries examined in this study; Japan is perhaps the clearest example as it starts the period relatively poor and is soon growing quickly but ends it rich and growing slowly. Thailand is an example of an economy that started off poor, took a while to take off, but has since grown rapidly. France was relatively affluent the whole time but shows a gradual slowing in growth. Hong Kong fits the mould in the earlier years but has not slowed as much as Japan or France despite reaching a similar income in the late 1980s.

Chart 1
Real GDP per capita



5 Dowrick (1992a) shows that over 1960-88 the average poor country has grown slower than the average rich country and World Bank (1995) cites an estimate that the average income in rich countries was 11 times that of the poorest in 1870 but is now over 50 times as high. One reason why the evidence for convergence is weaker when the tests move outside the OECD is that barriers to labour and capital mobility may be greater between poor and rich countries than among the rich countries.

Chart 2
Stylised Growth Pattern

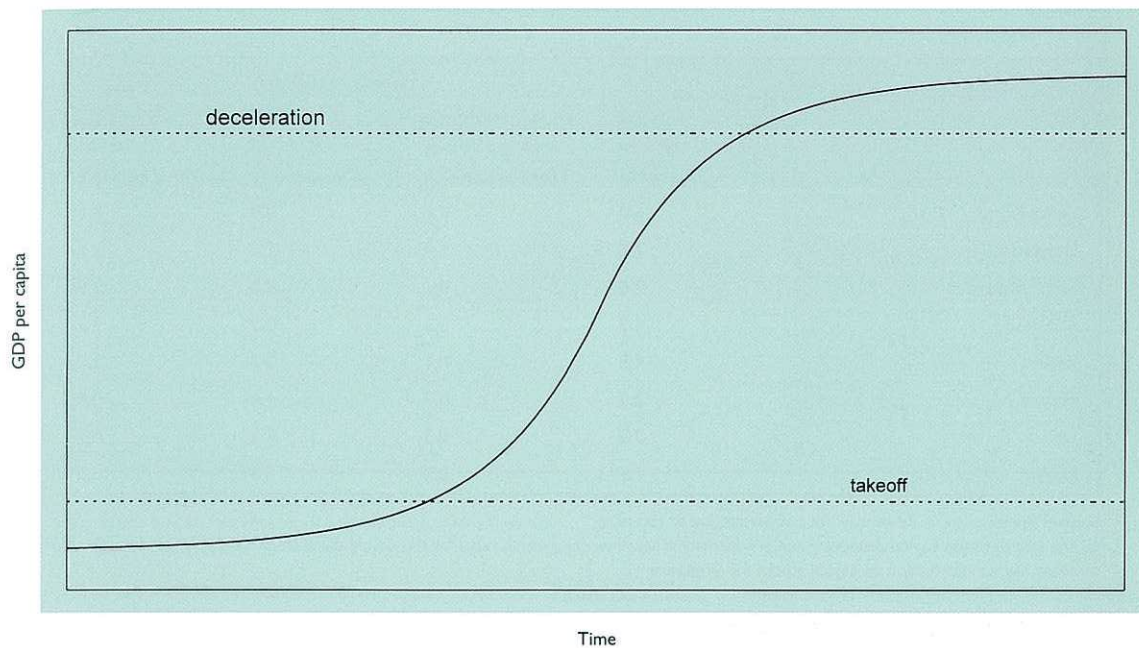


Chart 3
Real GDP per capita

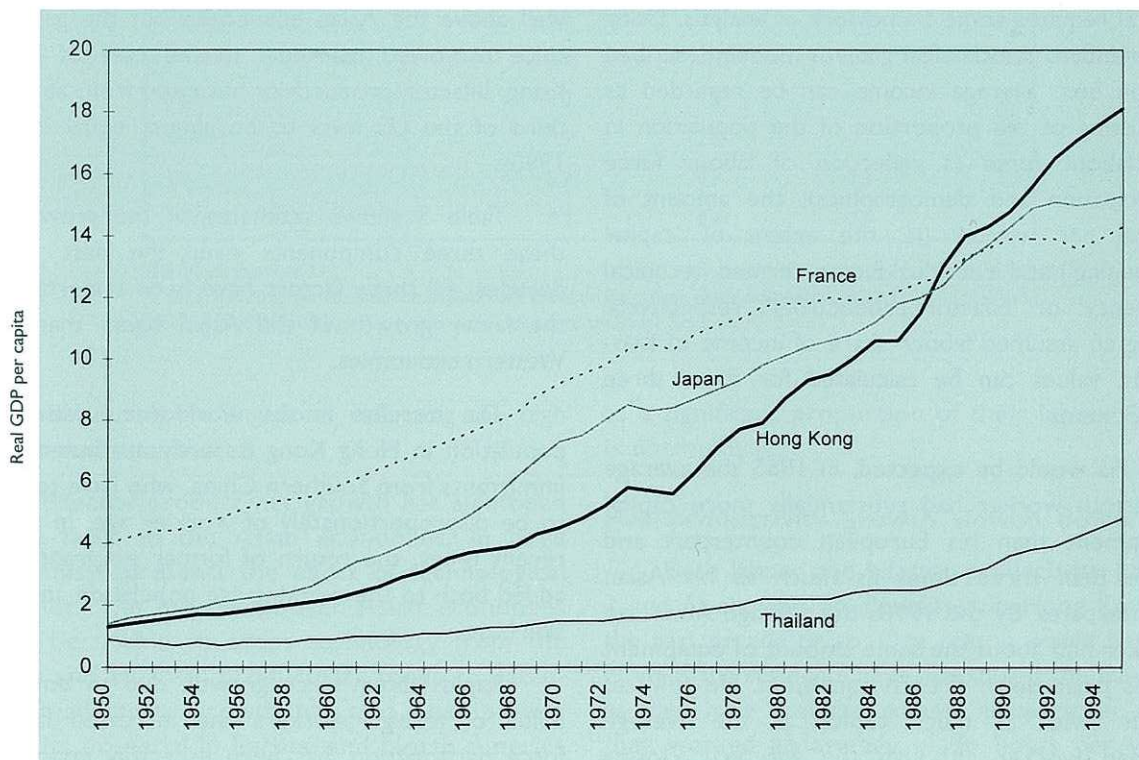


Table 3:
Labour and Capital Input and Bifactor Productivity:
Annual average percentage change: 1965-90

	Real GDP per capita	contributions from		
		Labour Force Participation & Demographics	Capital Deepening	Bifactor Productivity
Hong Kong	6.0	0.8	0.9	4.3
Singapore (a)	7.6	1.4	2.8	3.5
South Korea	7.6	0.7	3.0	3.9
Thailand	4.7	0.3	2.2	2.2
Japan	4.8	0.1	2.7	2.0
France	2.6	0.3	1.4	0.9
UK	2.2	0.3	1.2	0.7
USA	1.8	0.7	0.9	0.2

Source: see footnote 3. Rows may not add across due to rounding.

(a) the split between capital deepening and productivity is based on the growth rates for the capital stock from van Elken (1995) as the PWT database has no information on capital stocks for Singapore.

The role of capital accumulation

In assessing productivity growth in GDP, it must be borne in mind that labour is not the only factor of production. Incorporating the role of capital requires some framework of analysis. Using the standard neoclassical growth model, described in the box, average income can be regarded as consisting of the proportion of the population in the labour force (a reflection of labour force participation and demographics), the amount of capital per worker (ie. the extent of 'capital deepening') and a residual factor, termed 'technical efficiency' or 'bifactor productivity', respectively. Using an assumed labour share of income of two-thirds, values can be calculated for these three components.

As would be expected, in 1965 the average American worker had substantially more capital equipment than his European counterpart and more than three times as much as his Asian counterparts. By the 1990s the average American worker had about the same amount of equipment as his Japanese or French equivalent. He still had about twice as much capital as the average Korean worker although the gap was closing rapidly. The gap had narrowed less with the average Hong Kong worker, probably reflecting

the predominance of the services sector, rather than more capital-intensive heavy industry, in Hong Kong.

Similarly, bifactor productivity in the US was well above the Asian economies but the gap has since narrowed markedly. In the case of Hong Kong, bifactor productivity has risen from about a third of the US level to be almost equal in the 1990s.

Table 3 shows estimates of the growth in these three components over the past three decades. All three factors have been important in the faster growth of the Asian tigers than the Western economies.

The increase in the workforce relative to population in Hong Kong is partly attributable to immigrants from Southern China, who have tended to be disproportionately of working age. In more recent times, the return of former emigrants has added both to the working age population and the skill base.

Rapid labour force growth, due to both an influx of foreign workers and increased labour force participation, has been especially important for Singapore. Notwithstanding this rapid growth in the workforce, capital per worker has also tended

Table 4:
Labour Force Statistics

	annual average % growth 1965-95		% of population aged 15-64 (1993)	Participation rate (a)			
	Population	Labour force		1965 All	1995		
					All	Male	Female
Hong Kong	1.8	2.6	71	56	69	86	50
Singapore	1.5	3.0	81	53	69	84	53
South Korea	1.5	2.4	65	53	59	76	41
Thailand	2.3	2.6	86	50	76	86	67
Japan	0.8	1.0	73	67	69	84	53
France	0.6	0.8	68	62	70	83	57
UK	0.2	0.3	74	65	75	91	59
USA	1.0	1.6	76	60	73	86	60

Sources: Population and labour force growth – see footnote 3. Other data from World Bank (1986, 1995) and ILO (1995).

(a) labour force as percentage of population aged 15-64 years.

Table 5:
Bifactor productivity: Annual average percentage change

	1965-90	1965-73	1973-83	1983-90
Hong Kong	4.3	4.5	3.9	4.9
Singapore (a)	3.5	6.8	1.3	3.1
South Korea	3.9	3.9	2.8	5.6
Thailand	2.2	1.5	1.5	4.2
Japan	2.0	3.8	0.4	2.1
France	0.9	2.0	-0.1	1.2
UK	0.7	0.9	-0.3	1.9
USA	0.2	0.4	-0.9	1.4

Source: see footnote 3.

(a) the productivity growth rates for Singapore are based on the growth of the capital stock in van Elken (1995) as the PWT database has no information on capital stocks for Singapore.

to grow rapidly in Singapore, reflecting the high investment rates there.⁶

Bifactor productivity growth has also been more rapid in the Asian economies. In large part this represents the effect of technological transfer. The initially poorer Asian economies have been able to adapt technology from the West and so their productivity tends to catch-up. Productivity growth has also been slower than its potential in Europe and North America

as a significant proportion of their labour force is unemployed.

Has productivity growth slowed down?

Both labour and bifactor productivity (tables 2 and 5) showed no slowdown in Hong Kong in the past decade or so. One reason would be that Hong Kong residents have not sought the easy life as they have acquired greater affluence; in 1993 they worked an average of 46 hours per week

⁶ Investment averaged around a third of GDP in Singapore from 1965-1990, compared to around a fifth in the UK and the US.

while the French worked 39 hours. The tremendous structural change in the Hong Kong economy is probably a more important factor; the low value added elements of manufacturing are now undertaken in Southern China rather than Hong Kong. The measure of labour used in this paper measures only the number of persons not their quality. The improvements in education in Hong Kong, and the general high education standards and valuable experience of returning emigrants, will therefore also have helped maintain the growth rate of productivity.

By contrast, on both measures productivity growth has slowed markedly in Japan as they have achieved greater affluence. Rigidities in the economy may also have slowed productivity growth there.

It is not meaningful to calculate productivity estimates over a much shorter time frame. The results would be very sensitive to the business cycle as firms tend to hoard workers. An economy in recession will therefore appear to have very low productivity growth while one just coming out of a recession would appear to have very rapid growth. Similarly investment projects do not earn immediate returns. An economy with a major investment project, such as Hong Kong's airport and related works, would appear to have slower productivity during its construction and faster thereafter. Results over short time periods are also more sensitive to other data problems which tend to be averaged out over a longer time period.

Some caveats on measurement

While the broad trends shown by the above calculations are likely to be a fair representation of the respective economies, not too much should be read into small differences between the various growth rates. The comparisons can only be as good as the national GDP data underlying them

and these are known to miss some of the 'underground economy' and are subject to statistical discrepancies.⁷

Furthermore, it is generally believed that productivity growth is better measured for goods than services. For the latter, quality improvements are harder to assess and in some cases statistical agencies value output from measures of inputs, building in no growth in productivity.⁸ As Hong Kong (and to a slightly lesser extent Singapore) has made a larger and more rapid move from manufacturing to services than other economies, its productivity growth performance would be particularly understated by this factor.

Causes of productivity growth

There is a vast economic literature on the causes of economic growth. A brief summary is given in the box and the bibliography contains some suggested readings. In general though, the consensus seems to be that having a high savings rate to enable strong investment without excessive reliance on foreign funding, good education widely available, openness to trade and ideas, and a stable and non-militaristic government providing a steady macroeconomic and financial environment without excessive regulation or extreme differences in incomes are important factors in providing a benign environment for strong growth in productivity. Hong Kong has had these for a long while and is likely to continue to have them. While productivity growth in domestic industries is unlikely to be as rapid in the following decades as in previous decades as much of the potential for 'catch-up' has been exhausted, it should nevertheless, especially when combined with the ongoing benefits of closer links with the Chinese workforce and markets, be sufficiently strong to enable strong ongoing growth in the standard of living of Hong Kong residents. ☞

7 Further approximation is introduced in converting national estimates to an internationally consistent set of prices, with even those who compile such international comparisons conceding a likely margin of error of 5-10 per cent; some calculations are also sensitive to the base country used. See Kravis and Lipsey (1990) and Dowrick and Quiggan (1993). One indicator of the uncertainty of the estimates is the variety in GDP per capita rankings. For an example, see Macfarlane (1994).

8 As an indication of the order of magnitude of this effect, Darby (1992) argues that the increasing share of the services sector, particularly the high-tech area, will have increased the downward bias in GDP, perhaps cutting the real GDP growth rate in the U.S. by 0.6 percentage points during the 1980s.

Box : Theories of Productivity Growth

Most discussions of economic growth are still based on the neoclassical model developed by Swan (1956) and Solow (1956). In its most common form it assumes output is a function of labour and capital. There are constant returns to scale and diminishing marginal returns to any one factor. The most commonly used production function is the Cobb-Douglas, where K is capital, L is labour and A is technical progress. The value of α is equal to labour's share of national income, generally taken to be about two-thirds.

$$Y = A \cdot L^\alpha K^{(1-\alpha)} \quad (1)$$

In competitive markets each factor would receive a return equal to its marginal product so the total earnings of capital and labour equal the value of output.⁹

The capital stock grows by investment less a constant rate of depreciation. If investment is a constant proportion of output, then by some stage new investment will only be sufficient to cover the depreciation on the growing capital stock. Output, investment and the capital stock would then all grow at the same rate and per capita output will be steady. It is this aspect of the theory that gives rise to the eventual convergence of incomes across countries, at least for those with similar investment rates, referred to above.

Once capital estimates are available it is possible to construct estimates of the growth in 'technical progress' or 'bi-factor productivity', the ' A ' in the Swan-Solow model. This measures how efficiently the two factors of capital and labour are being used. A useful way of cutting up real income growth is to take logs of (1) and divide both sides by population;

$$\ln(Y/P) = \ln L/P + (1 - \alpha) \ln(K/L) + \ln A \quad (2)$$

This identity is the basis of the calculations presented in table 3.

Whereas the neoclassical model assumed diminishing returns, some new models building on Romer (1986) allow for increasing returns and endogenise the process of technical progress. As Dowrick (1992b, p14) puts it "education and training, research and development, and investment in new machines and equipment are now acknowledged to be potentially important elements in promoting long-run growth – fairly obvious to the lay person, yet greeted in the recent economics literature as a new insight."

Knowledge consists of two basic kinds. The first is general education, where the literature surveyed by Psacharopoulos (1985) suggests very high real returns to education; a ten percentage point rise in the primary and secondary school enrollment ratio would raise per capita income growth by 0.3 per cent per year, according to World Bank (1993). The second is 'learning by doing'; participation in the production process itself leads to improvements in the quality of labour, with high technology production activities probably offering the greatest externalities.

Technological improvement does not just come from path-breaking research. It may reflect incremental procedural improvements on the factory floor. (This is sometimes cited as the difference between Britain and Japan.) In terms of equation (1), this makes A itself a function of K . Graphs in Howe (1993) suggest that, across the OECD countries, there has been a positive correlation between bifactor productivity growth and capital deepening.

Treating all capital as the same may not be correct. De Long and Summers (1991) have argued that *equipment* investment is the crucial factor behind growth in productivity in both developing and advanced countries. De Long (1992) cites Argentina as an example of a country that had achieved strong growth in output but failed to undertake much investment in machinery (as Peron restricted imports of capital goods and thereby raised their prices) and so output growth slowed markedly. It may not just be private investment that is important. Aschauer (1989) notes that productivity growth has

⁹ As when $dY/dL = \alpha Y/L = w$ and $dY/dK = (1 - \alpha)Y/K = \pi$; $Lw + K\pi = Y$.

been higher in those G-7 countries with higher *public* investment, a conclusion supported by some econometric work such as World Bank (1993) and Knight et al (1993).

This work on the importance of investment raises the question of what drives investment. As an empirical regularity, countries with high investment tend to have high savings, implying that international capital markets are not perfectly competitive. This is generally taken to imply that savings allow greater investment but the direction of causation is not totally clear as higher income growth tends to lead to higher saving as households acquire resources faster than they increase consumption.

Trade is generally seen as helpful for growth in studies such as Knight et al (1993) and Greenaway and Sapsford (1994). Exports tend to require world best practice while imports challenge domestic firms to achieve excellence. One likely reason why 1950-1973 was a 'golden age' for economic growth was that it was a period when tariff reductions spurred a rapid growth in world trade (at twice the pace prevailing subsequently and more than eight times the pace that had prevailed over the previous forty years). It is also consistent with growth being stronger in the relatively free trade era prior to WWI than in the period between the Wars.¹⁰

The role of financial intermediaries in promoting economic growth had been stressed by Schumpeter (1911, p74), who accorded the banker the status of "a phenomenon of development ... the ephor of the exchange economy" and more recently by North (1989) and Lowe (1992). Avoiding excessive regulation of the financial system should assist it in directing savings to investments yielding the highest return. Tests by King and Levine (1993, p719) conclude "financial development is a good predictor of long-run growth". However, as Andersen (1993) warns, too rapid deregulation without the necessary development of adequate supervision may hamper growth.

The relationship between inflation and productivity is contentious. In cross-section graphs most of the action occurs off camera. The countries which experienced very high inflation (Germany and Austria after World War I, Argentina and Nicaragua in the 1980s, the former Soviet Union in the 1990s) experienced large absolute falls in output. However, Barro's (1995) study for the Bank of England found no significant effect on economic growth from inflation rates less than 15%. Furthermore, many studies finding an inverse relation between inflation and growth are dominated by the OPEC oil supply shock, which simultaneously lowered growth and raised inflation.

There are of course many other factors relevant to growth which may get less attention as they are hard to quantify or embed in theory. Knowledge needs to be diffused across society and widely applied. This is most likely in countries which are 'open' in more than a narrow trade sense; those countries used to varieties of opinion and change. Glasnost complements perestroika.

Kenneth Clark (1969, pp3-4) argued that the enemy of civilisation was "fear – fear of war, fear of invasion, fear of plague and famine, that make it simply not worthwhile constructing things, or planting trees or even planning next year's crops. And fear of the supernatural, which means that you don't question anything or change anything". Much the same can be said of economic progress. Maddison (1995, p104), in explaining the technological lead the West established from around the Renaissance gives great weight to "the recognition of human capacity to transform the forces of nature through rational investigation and experiment". He also mentions institutional features such as freedom to purchase and sell property, a clear legal system, predictable taxation, development of trusted financial institutions and relatively easy access to nearby countries as factors which encouraged innovation and the spread of ideas. Political stability and democracy tend to encourage these conditions.

"The economic history of the Asian Pacific Rim appears to offer evidence... that equality may foster growth", according to Williamson (1988), as egalitarian societies tend to invest more in human capital. Kennedy (1987) warns of the risks to economies from imperial overreach and Quiggan (1987) and Bayoumi et al (1993) conclude that cuts in military spending would raise real incomes in the medium term.

10 As far back as J.S. Mill (1848, ch 17) it had been suggested that "a country that produces for a larger market than its own can introduce a more extended division of labour, can make greater use of machinery, and is more likely to make inventions and improvements in the process of production".

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