

# Chapter 7

## Origins of Growth

*I h've been rich and I h've been poor. Rich is better.*  
Sophie Tucker

*The bourgeoisie, during its rule of scarce one hundred years, has created more massive and more colossal productive forces than have all preceding generations together.*

*Communist Manifesto*  
Karl Marx & Friedrich Engels

*The source [of modern economic growth] is the secular, rationalistic, and materialistic trend of intellectual thought that evolved from the Renaissance and Reformation — that in rejecting the authority of the medieval Church, humanity ultimately took up a new “religion of knowledge,” whose churches are the schools and universities of the world, whose priests are its teachers, and whose creed is belief in science and the power of rational inquiry, and in the ultimate capacity of humanity to shape its own destiny.*

Richard A Easterlin

Promoting economic growth will foster progress, a connection the last chapter documented. Nevertheless, as Chapters 1 and 6 substantiated, sufficient reasons exist to doubt whether there is always a one-to-one relationship. People may prefer a simpler life, a less complex world, or a society imbued with piety. As discussed previously, more goods do not necessarily guarantee greater happiness or more satisfaction with life. On the other hand, it is true that the rich live more healthy and longer lives than the poor; the wealthy can exercise more options and have greater freedom to live as they choose; an educated and rich society usually affords political and social freedoms unavailable in impoverished countries. Critics of economic growth fail to recognize that poor people generally yearn to become rich; they too desire these benefits of wealth.

Growth benefits even the most affluent countries. Economic prosperity makes it easier for more of us to make choices about the way we live our lives. Moreover, even though most citizens of the rich industrial countries enjoy unprecedented luxury, many residents of such wealthy nations feel deprived and live much less well than their more affluent neighbors. Even those Americans who are modestly well-off — rich by the standards of much of the world — would prefer more leisure and a greater command of resources. Thus growth continues to aid progress even in the richest of countries.

In addition public dissatisfaction waxes when real earnings fail to maintain their expected rise. As I write, most of the technologically advanced countries have been suffering from declining or stagnating incomes. Public opinion polls show considerable unhappiness with political leaders, the economy, and society generally. Although this malaise has not created civil unrest, long recessions can breed political disturbances. The Great Depression brought the world major unrest in established democracies, Hitler and the Holocaust, conflagration in Europe, and war in the Far East.

Certainly for Third World states the route to progress lies in economic advancement. Economists have identified several paths to boost incomes in poor nations. These countries can import the technology of more advanced states; they can shift resources out of agriculture; and they can reduce their trade barriers, which in the long run will bring in more advanced goods and technologies and will limit domestic inefficiencies. These policies can improve the average standards of living notably.

For the advanced nations of the world, growth comes from improvements in technology, which in turn stems from a greater knowledge of science and a better understanding of the world around us. Economist Paul Romer offers (1990: S72) a helpful definition of technological change: “improvement in the instructions for mixing together raw materials.” The reader should understand that by “raw materials” Romer means all the elements that go into fabricating any good or service. As Peter Murrell, an economist at University of Maryland, described technological improvements as (1992: 37): “The notion of innovation should conjure up not only the invention of the blast furnace or the semiconductor, but also the development of multi-divisional corporations and fast-food franchising.”

With *The Wealth of Nations*, written over two centuries ago, Adam Smith pioneered the study and analysis of economic advancement. That treatise represented the first systematic explication of the factors that contribute to growth. Since that time, scholars have continued to explore the question of growth. At times, other contemporary exigencies such as persistent unemployment, monopoly, and the structure and level of taxation have diverted economists’ attention, but fundamental to their concerns have been efforts to comprehend and unravel what factors contribute to growth and *The Wealth of Nations*.

This chapter will focus on the elements that account for rising earnings of a population: the starting level of income, the education of the populous, the country’s trade policy, the type and stability of its government, national policies on taxation, state spending, industrial policies, and immigration. Although economists have devoted considerable effort to sorting out the influence of a wide number of factors on economic performance, they have failed to account for the very rapid growth by some Asian states

and declining incomes in other regions. We economists must admit there is much we do not know about this subject. To at least partially exculpate economists, the reader should be aware that fashioning exact empirical measures of factors which researchers believe have major roles in influencing economic progress is impossible and that economists are, therefore, forced to employ very rough approximations. In this chapter, I will winnow the statistical findings for those that seem most robust — the results that can be reproduced reliably under varying models, tests, and data sets. The only way to seek the truth is to find reproducible results.

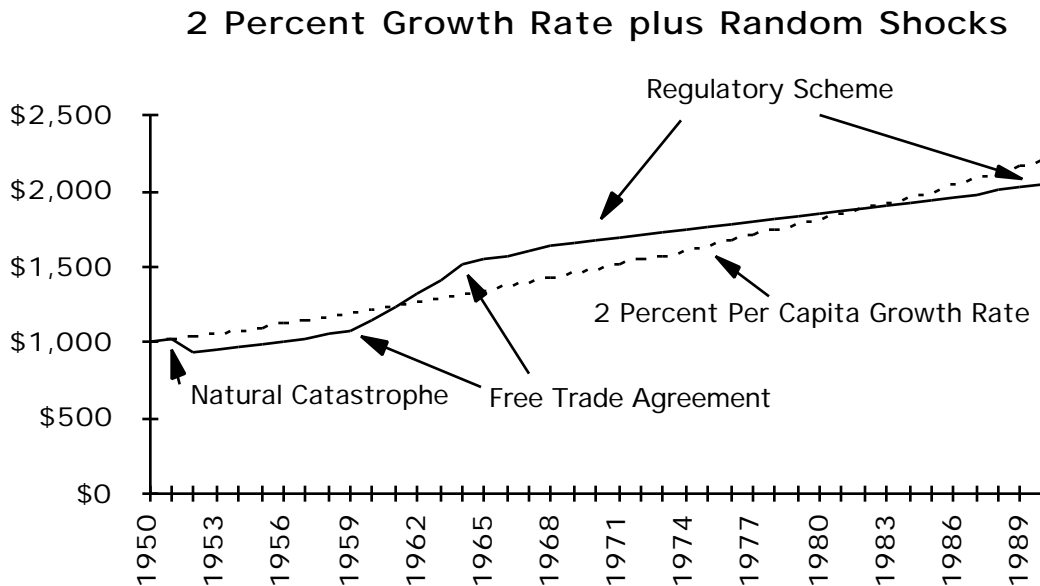
Of all the factors involved in the wealthy industrialized countries' growth, technological development contributes the most. Governments are aware of its importance but find it difficult to control or manipulate. Nobel prize winner Robert Solow (1956) and University of Chicago economist Robert Lucas (1988) have formulated mathematical models of economic growth, which deduce that technological progress and technological progress alone explains the rate of per capita income change. Those models signify that public policies can affect growth only if they alter the rate of technological change. Governments can foster the innovation that incorporates technological change best by insuring property rights — especially through patents and copyrights — facilitating research and development, and maintaining a strong free market system that will allow individuals to experiment. Besides setting the proper stage for experimentation, civil authorities can do little to boost innovation, foster invention, create new ideas, and originate fresh methods, all of which lie behind economic change and progress. Bureaucrats are inherently conservative, a point stressed in an earlier chapter, and even if they attempt to innovate, the monolithic nature of the state militates against widespread experimentation. A free market in contrast, calls on the creativity of the entire population.

In explicating growth, it is critical to grasp the distinction between a *one-time shift in the level of income* and the *rate of change in income* — the growth rate. For example, a jump in the exchange rate for a currency means that individuals holding that money can now purchase more from abroad than was possible prior to the increase in the value of their cash. They can also continue to consume the same amount of domestically produced goods, hence they are richer — their real income has risen, but the growth rate of their economy remains unaffected.

Diagram 7-1 below depicts in hypothetical terms the difference between the rate of growth and shocks that boost or depress income. Sometimes, of course, the shifts take a few years to work their way through the system. The dotted line portrays a constant growth at a 2 percent annual rate of average income. This diagram ignores the business cycle and many random events that would lead measured income to fluctuate quarter by quarter. In

1952, by hypothesis, an *extraordinarily* large natural disaster pared real income by 10 percent so that real per capita income fell effectively by 8 percent — a 10 percent fall from an earthquake or hurricane plus a normal 2 percent growth.\* Then in 1960, the government signed a free trade agreement that boosted income over the next 5 years by a total of 25 percent.\*\* Income per person increases 7 percent per year — 5 percent from the agreement and 2 percent normal growth — until 1965, when it resumes its underlying 2 percent rate of growth. Finally in 1969, the state imposes a regulatory scheme that deters innovation — perhaps by subjecting all new processes and products to government approval — and thereby halves the underlying economic growth rate from two to one percent per year.

**Diagram 7-1**



The income changes postulated in the diagram are significantly greater than any likely to occur in the real world, but they clarify the diagram.

Many policies or random events have the effect of raising or lowering the earnings of a country; it is much harder to alter the rate at which income grows. Let me clarify the distinction this way: the conceptual difference between growth rates and levels of income is analogous to the distinction between inflation, the rate of change in prices, and a one-time

\* This reduction is probably several orders of magnitude larger than any ever experienced. The 1992 hurricane Andrew, which was the most costly disaster in history, possibly reduced national income in the United States by less than 2 one-thousandths of one percent.

\*\* The Council of Economic Advisers forecast that the U.S.–Canadian Free Trade Agreement would increase real income in the United States by about 2 percent after a decade of adjustment.

shift in the price level. The imposition of a sales tax, for example, boosts prices to consumers, but leaves unaffected the rate at which prices climb over time. Most events that raise (or lower) income require a period to adjust before earnings reach their new level. Over that time, the measured rate of growth will reflect the on-going adjustment and will appear higher (or lower) than the underlying growth rate.

The distinction is crucial in understanding policy's effect on economic performance. Robert Lucas, for example, asserts (1988) that the Solow formulation implies that cuts in taxes designed to augment savings cannot boost the long run path of growth, even if they successfully up the savings rate. They may alter the real income of taxpayers and perhaps the economy, but the underlying growth rate will remain unchanged. Other theoretical models, however, do relate the rate of growth to savings and investment. I will discuss the influence of tax policies below.

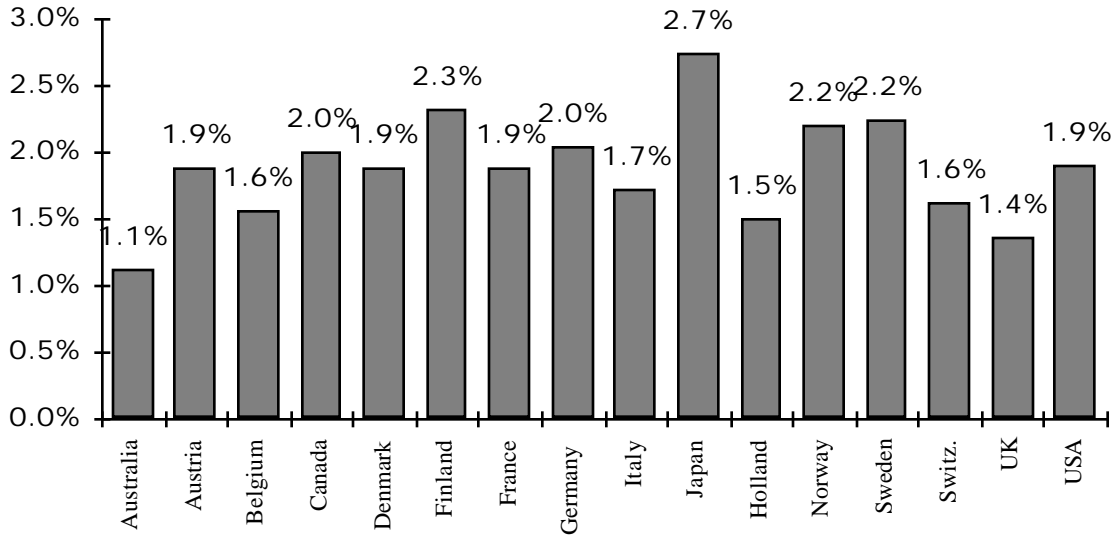
Growth reflects an ongoing process that produces more goods and services per unit of input — labor, raw materials, energy, capital. In other words, rising incomes emanate directly from advancing productivity. Mounting earnings originate from constantly improving technology that allows more products to be manufactured with less labor, capital or raw materials. I want to stress that technological progress is critical to boosting productivity and thus incomes. Moreover, as this chapter contends the rate of growth of knowledge in its broadest sense underlies technological change and represents the most significant factor behind income growth. However, a number of government policies can influence incomes. By opening up to the world market or expanding the range of trade, for example, countries and firms can utilize existing technology more efficiently and bring about periods of strong economic improvements. Trade and specialization as delineated by Adam Smith can lead to greater wealth.

### **The Economic Record**

Between 1870 and 1990, as shown in Chapter 6, real income per person grew at a rate of 1.9 percent per year. Today on average the income of every man woman and child in the United States is over 9 times what it was 120 years ago. Or to phrase it another way, over this period, income per capita has doubled every 37 years. Workers today produce 6.5 times the output of a worker at the turn of the century.

**Chart 7-1**

**Growth 1870 to 1989**



Source: Maddison (1982) and *Statistical Abstract* 1992

This remarkable advance, unique in recorded history, has been closely matched by most other industrialized nations. As the chart above shows, per capita income escalated the fastest in Japan, the poorest at the start of the period, and the slowest in Australia, which enjoyed one of the highest standards of living in the second half of the nineteenth century. Before the nineteenth century, people’s living standards inched up almost imperceptible. In the eighteenth century in virtually all of these nations, people lived little better than their forefathers a thousand years before.

**Factors Accounting for Growth**

A vast number of economists have studied the elements contributing to improved productivity. Brookings Institution economist Edward Denison has conducted the most careful analysis of the factors that have forged the twentieth century advance. In *Trends in American Economic Growth, 1929-1982*, he lays out the sources of American development with the precision of a pathologist performing an autopsy. For the entire period, he attributes (1985: 30) 27 percent of the rise in living standards to better education of the worker, 55 percent to advances in knowledge, 16 percent to improved resources allocation by the shift of excess labor from agriculture, 20 percent to additional capital, and 18 percent to economies of scale. Slowing growth was environmental, safety, and health regulation (a 3 percent reduction), limits on the acreage of land available (also subtracted 3 percent), and

certain miscellaneous factors which together lowered economic progress by 17 percent. The growth in the labor force also reduced output per person by some 12 percent.

Although the effect of regulation appears small, it is concentrated in the last fifteen years of this 53 year period and thus has a larger impact on growth in recent years. Over the period 1967 to 1982, Denison calculates that environmental controls subtracted about 10 percent from improvements in productivity and workplace safety rules another 3 percent. He makes no estimates of the influence of energy and financial regulation or the impact of the rising level of litigation on economic performance.

This scholarly study concludes that improvements in knowledge were by far the dominant factor in accounting for burgeoning productivity, while education was the second most important contributor. As Denison puts it (28): “Advancing knowledge of ways to produce at low cost is the biggest and most basic reason for the persistent long-term growth of output per unit of input.” He also finds that the contribution of this variable has mounted steadily over time, which explains the continuing escalation in growth rates. Although his careful work finds that regulation reduced economic gains only marginally, I believe, as the next chapter will show, that he is underestimating the drag from government controls.

Advanced countries must innovate to grow; they must uncover fresh ideas, manufacture novel products, and invent original technique to boost productivity. If the United States is to maintain its preeminence in personal income, America, as the technological leader in many fields, must bolster its research and development. Denison found that in the U.S. the unfolding of human knowledge accounts for a growing portion of material progress. Americans, however, must understand that they have no monopoly on smart, educated people and that other countries temporarily less well-off than the U.S. can easily copy the most advanced technologies. Moreover, states that simply adopt existing techniques and equipment can do so faster than the most advanced countries can invent new science. If less advanced countries embrace policies favoring the import of advanced technologies, they will typically grow faster than the United States. Nevertheless, while the standard of living in other nations may converge on North American consumption, it is unlikely that the real income of people in any other nation will exceed significantly American levels. This prediction, however, relies on the U.S. government preserving a free competitive society and the educational system turning out the researchers necessary to maintain America’s lead.

Even countries enjoying the most advanced technology, including the United States, copy ideas and innovations, finding them an important source of gain. No nation has a monopoly on creative notions. In the increasingly porous global economy, trade and

imitation play major roles in the spread of technology. Moreover, most if not all invention originates from copying existing techniques and adapting them to new circumstances or uses.

Drawing from their study of American technological leadership in the post-war period, economists Richard R. Nelson and Gavin Wright (1992) trace the productivity of workers in the United States to its ascendancy in science and advanced technical knowledge. At least until 1970, American labor has been some 30 to 50 percent more productive than employees in other industrialized countries. Professors Nelson and Wright deduce that during the quarter-century following World War II, American companies were significantly ahead in developing, exploiting, and marketing leading-edge technologies.

They also contend that a pre-war productivity advantage grounded on the large economies of scale from serving the vast North American market and on an abundance of cheap natural resources spawned the U.S. lead in technology. After the war, a variety of factors, including a huge expansion in the numbers attending college, an explosion in corporate spending on research and development — about half funded by the federal government — and a rapidly growing university-based research system, enabled the United States to become dominant in the most advanced fields. Business employment of scientists and engineers multiplied six-fold in the sixteen years after the war (1952). One-quarter of a century after 1945, the United States was spending on R & D *more than twice* the combined outlays of Germany, Japan, United Kingdom, and France!

In principle knowledge is easy to acquire, but the spread of technology is neither automatic nor necessarily cheap. Implementing new techniques and operating new machinery — making it work in the factory — often requires hands-on experience. For all the relevant people to learn to work together takes a good bit of trial and error. Simply mastering a textbook or a journal article reporting a research finding is only the beginning of the transfer of new skills and techniques. Otherwise countries could quickly copy the leaders and achieve equal productivity. Casual observation attests that the spread of technology is more difficult.

Within a country, as well as internationally, knowledge and expertise can be quite localized. The know-how of *Silicon Valley*, for example, reveals the real gains from locating near others with special skills. The combination of talents within a compact area may give firms situated there an edge for certain specialized operations. This concentration of industry has occurred many times in the past. The collection of the steel mills near Pittsburgh, the consolidation of automobile manufacturers around Detroit, and the centralization of the garment industry in a narrow area of New York City are all examples of the benefits that come from an industry being concentrated in one locale. As Robert



Lucas (1988: 39) asks, “What can people be paying Manhattan or downtown Chicago rents *for*, if not for being near other people?” I might add, “other people in the same or related fields.” Localization is economical not only because it facilitates the spread and use of technology, but because a skilled labor force relevant to the process locates in the area and suppliers of essential equipment, materials, and expertise grow up around the assemblage.

Technology is constantly evolving. Since industry leaders are in a favored position to understand the potentials, the strengths and the problems facing the industry and to pioneer in solutions and in developing new products, they enjoy a major advantage over newcomers. Once an industry becomes regionalized, local firms and their specialists take on a leadership role, endowing that area with an edge for long periods.

Although the increased internationalization of markets and of firms has fostered the spread of technology, concentration of expertise and specialization is still the norm. Countries and parts of countries develop centers for the manufacture of specific products. Notwithstanding the early post-war American domination in virtually all “high-tech” fields, however, the U.S. superiority in *all* advanced sectors is over. The several GATT rounds have reduced barriers to trade and made the world more of a common market, providing for the first time scale economies to businesses outside the North American continent comparable to those Americans have long enjoyed. The more open world market, together with reduced transportation costs, has also lowered raw material costs for companies in countries with few natural resources, eliminating the second advantage to which Nelson and Wright attribute America’s pre-war dominance.

The nature of science itself has furthered the spread of technology, for research results have always flowed easily across borders. As industry has become more science-based, the difficulty for any one nation or company to secure a long term advantage in technology has mushroomed. Almost instantaneously, electronic-mail, FAXs, and pre-prints broadcast experimental breakthroughs around the globe. Skilled manpower moves between companies and countries. For example, General Motors recently brought the head of their European division — a Spaniard — back to Detroit to help run the company; Volkswagen promptly outbid GM and induced him to move to Germany.

With other advanced countries spending as much on R & D as the United States, with foreign companies employing an increasing number of scientists and engineers, and with the opening of world markets, America’s lead has been eroding. European and Japanese science, their technology and their workers’ productivity are converging on North American standards. At the same time, globalization drives major U.S., European, and Japanese companies to build or buy facilities in all parts of the world, creating international corporations with branches in all major economies.

Since economic growth results from advances in knowledge and technology and since knowledge and skills can be copied, imported, or purchased, a question that haunts economists is, “Why Isn’t the Whole World Developed?” (Easterlin 1981). If we assume that the populace of all nations have roughly equal native abilities and if we assume that knowledge is freely transferable, then the technology and capital that generate economic growth and prosperity should be readily available to all. Certainly in a world where capital can freely move and poor Third World countries can send their young men and women to universities in the technological advanced world, there would seem to be no bar preventing any peoples from becoming rich. Thus it is puzzling that so many states have stagnated in recent decades and made such little progress in catching up.

Economic growth derives basically from the mushrooming technology that allows more goods and services to be fashioned with fewer inputs. According to Stanford economists Michael Boskin and Lawrence Lau (1992) at least half of all progress by the most advanced countries comes from new techniques, processes and procedures. Consequently the answer to Easterlin’s question about why all countries aren’t developed lies in his observation (1981: 4) that: “the question of explaining differential technological change among nations in the modern period is a matter chiefly of explaining the limited diffusion of a common technology.”

As indicated earlier, improved opportunities for economies of scale can also boost measured economic growth. The larger number of potential customers, the more manufacturers can specialize, spread their overhead across more output, and reap greater benefits from research and development. Extensive markets allow a few firms to specialize in niche manufacturing that would be unavailable with few potential customers. Science and technology have steadily reduced the costs of transportation and communication thus expanding the regions within which firms could effectively trade and thereby according a steady enlargement in economies of large scale production. In the nineteenth century, the explosion in population of North America did just that and explains a good part of the rapid escalation of incomes in the United States during the last century. During the post-Second World War period, the reduction of trade barriers again amplified potential economies of manufacturing and boosted world incomes further.

### **Convergence and Education**

The logic of the previous section implies that nations starting at lower income levels should grow faster than those that are richest. Poorer countries are typically less technologically developed. Such states can adopt more advanced procedures, machinery and processes which should lead to rapid improvements in income. The most advanced countries generate rising earnings only by inventing new technology, a necessarily

measured process that is not well understood. Less developed states can expand simply by copying that which has already been developed. The latter is clearly quicker to accomplish and should lead to a rapid rate of growth. A number of Asian states have in fact launched themselves on a breakneck growth path, importing knowledge and technology and exporting increasingly sophisticated goods. Economists call this tendency of poor countries to catch up with more advanced states “convergence” and have widely debated its existence.

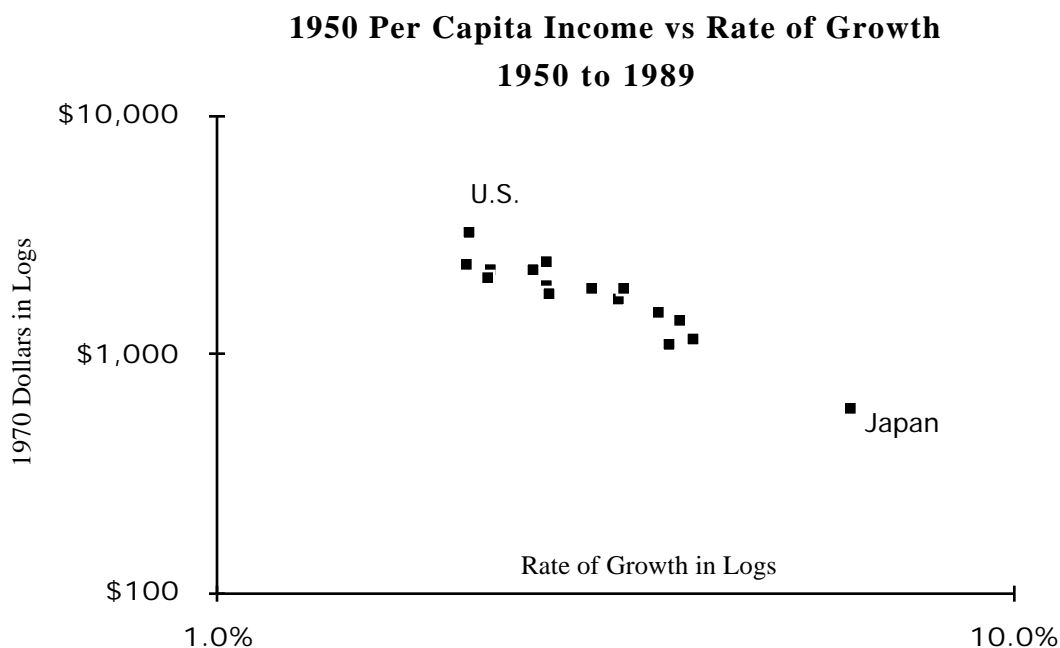
Convergence of economies is a driving force explaining much of the various rates of growth in the post-war period. Chart 7-2 plots the real rate of growth per person between 1950 and 1989 (in logarithms) against the average per capita real income in 1950 for 16 major industrialized countries (also in logarithms).<sup>\*</sup> As can be seen there is a very close relationship: average incomes in 1950 account for almost 90 percent of all the variation in income expansion. These results are consistent with the arguments above and with Robert Lucas’s (1988) theorizing: assuming that the level of 1950 earnings reflects the level of technology embodied in the country’s economy, the theory predicts that low income states should prosper the most. This impressive correlation may, however, largely reflect a bias in the data. Those countries most heavily damaged during the Second World War, such as Germany, Japan and the United Kingdom, were likely to grow rapidly to recover their previous standards of living, biasing the results towards convergence. Nevertheless, even if Japan and the United States, the two extreme observations, are excluded, the remaining data still display convergence, although it explains less of the variance.

The data underlying Chart 7-2 indicate that countries which in 1950 were poorer by 10 percent grew faster than their better-off peers by about 6 percent. The United States by far the richest in that early post-war period, partly attributable to its being unscathed by the fighting and partly due to its being the best-off going into the conflict, suffered one of the lowest rates of expansion. Even so, per capita income in the U.S. over this period climbed slightly faster than this simple relationship would have predicted. One interpretation for this extra growth is that within America, not all firms employ the most modern technology at any point in time and that industry, therefore, is constantly catching up with the most advanced techniques. This finding is consistent with the Lucas theory.

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<sup>\*</sup> The countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, United Kingdom, and the United States.

Chart 7-2



Source: Maddison (1982) and *Statistical Abstract*, 1992.

Using the data on economic growth for 16 industrialized countries prepared by Angus Maddison (1982), Princeton economist William Baumol finds (1986) that advances in productivity per capita from 1870 to 1979 are correlated inversely with level of individual income at the start of the period. He also notes that his one variable — average income — “explains” virtually all (88 percent) of the variation between nations in their subsequent rates of expansion. What is striking about Baumol’s results and Chart 7-2 is that a single variable — initial income — can account for almost all the differences in economic performance in both periods. Taxation rates make no difference for the 1950 to 1989 period; whether a country is democratic in 1870 fails to affect growth for Baumol’s period.

On the other hand, when Professor Baumol employs for the post-war period a much larger sample of countries, including many of the Third World, he detects no relationship between income in the earliest year and future growth (1079). Other studies examining a more heterogeneous and larger group of states reveal no simple relationship between earnings at the start of the period and improvements in living standards (Bernard and Durlauf 1991). As Lucas points out, scientific knowledge is available to all of

mankind, but not all states contain people who will and can exploit the available technology.

Another economist, J. Bradford De Long from Harvard University, has criticized (1988) Baumol's findings on the grounds that Maddison's data represented only those countries that were rich in 1979 and, therefore, excluded those which may have stagnated between 1870 and 1979. De Long evaluates a sample of 22 countries that were rich *in 1870*, all of which had bright prospects for continued growth. To Baumol's list he added Spain, Ireland, Chile, Portugal, Argentina, New Zealand and East Germany. Using a somewhat more sophisticated statistical technique than Baumol, De Long discerns (1145) no "significant inverse relationship between initial income and subsequent growth." However, those nations that were democratic between 1950 to 1980, did tend to converge over the 109 years (1146); for those that enjoyed elected governments in 1870, he found no such relationship.

Reworking his earlier paper, Professor Baumol, writing with a New York University colleague, Edward N. Wolff, agreed (1988) that their original data had biased the conclusion but presented additional figures and analysis showing that while relatively poor countries failed to grow faster, for the most advanced states convergence occurred. Over the period 1830 to 1913, among some 19 European countries for which a movement towards equal per capita incomes began after 1860, they found that the most wealthy eight converged first. By late in the century average incomes among the top 10 countries were equalizing. For a large group of 72 countries in the post-war period, these authors also observed that average earnings of the richest 29 economies converged, while the poorest 20 experienced divergence, that is, among that group there was a tendency for incomes per capita to become more disparate — some nations stagnating while others boomed. They summarize their results by reporting (1156-59):

for perhaps the top 15 countries convergence has been marked and unambiguous ... All countries together, excluding LDCs [Less Developed Countries], have also shown some convergence. Yet, larger samples do not display convergence, in part because of the heterogeneous performance of the LDCs and failure of South American countries to live up to their growth promise.

Employing a much more extensive data set covering 98 countries (Summers and Heston 1988), Robert Barro, a widely respected Harvard economist, reports (1991) that schooling and per capita income in 1960, when coupled with measures of government spending on non-defense–non-military programs, the political stability of the state, and a measure of distortions in prices of investment goods, accounts for over half the variation in economic performance. Professor Barro concludes that nations with real GDP per capita in

1960 lower than average by \$1,000 (1980 dollars) enjoyed three-quarters of one percent superior growth rates. His measure of human capital, that is, school enrollment rates, explains about 5 percentage points in the variation of growth rates for this large sample. As Barro points out, a number of the Asian economies that have done so well in the post-war period, in 1960 enrolled an exceptionally high proportion (for their income level) of their population in schools. On the other hand, the average African country had a much smaller ratio of the its school age population attending classes than was typical for a country with its level of income. This study also discovers no correlation between the student–teacher ratio and economic growth, substantiating the contention that class size has little bearing on educational attainment.

Professor Barro has examined a large number of other variables that might influence advances in economic well-being. He finds that government spending on all activities, except for education and defense which Barro classifies as more like investment than consumption, retards growth. In other words, Barro claims the larger the government, the slower per capita income goes up. On the other hand, Ross Levine from the World Bank and David Renelt of Harvard University writing in *The American Economic Review*, have attacked (1992: 953) this result claiming that it fails to stand up if other variables are included in the analysis. Their work uses a somewhat shorter period, however. In addition, like John Londregan and Keith Poole, discussed in Chapter 6, Barro does discover a correlation between revolutions and assassinations with economic performance, but again Levine and Renelt disclose that if other variables are included in the analysis, no relationship is evident. In summary, Robert Barro concludes that income growth is negatively associated with initial income (convergence) and a measure of market distortions and positively coupled with education (human capital) and political stability. His work strongly supports the convergence hypothesis and the importance of education. Barro's other findings are more controversial and are less robust when the statistical analysis is varied.

Most studies of growth go back to the initial theoretical exposition by Robert Solow (1956), who postulated that output is a function of capital, labor, and the level of technological progress. His exposition concludes that the level of per capita income depends on savings and population growth, both of which he takes as determined by non-economic forces. The higher the level of savings, the higher personal income; the greater the population growth, the poorer the country. Since technology is a given in his model, Solow's classic work predicts a tendency towards convergence; all states should ultimately be able to install the same basic technology.

In recent years, the economics' literature has brimmed with papers substantiating convergence (Barro 1991; Barro and Sala-i-Martin 1992; Baumol 1986), failing to discover convergence (Bernard and Durlauf 1991; Durlauf 1991) or providing evidence for what has been called local convergence (Durlauf and Johnson 1992; Blomström, Lipsey and Zejan 1992), that is, convergence within a basic set of countries which share some crucial attributes. Once the level of education or literacy is taken into account, other studies such as those by Professors Steven Durlauf and Paul Johnson (1992) and economists Gregory Mankiw, David Romer and David Weil (1992) also find that average incomes tend to equate across countries.

If education is adjusted for, virtually all studies of growth of less developed countries demonstrate that the degree of backwardness of a country in an earlier period is strongly correlated with growth in the subsequent period. Economists Magnus Blomström, Robert Lipsey and Mario Zejan (1992) also show that foreign investment, which reflects the openness of the country to the outside world, has a strong impact on economic performance.

Professor Sebastian Edwards, a UCLA economist, has investigated the role of foreign trade of underdeveloped countries in fostering growth. He hypothesizes that nations that import and export more are in a better position to absorb and utilize the technology of the more advanced world. Unfortunately quantifying a satisfactory measure of the openness of a country to foreign trade is virtually impossible. Employing admittedly crude measures of the freedom to import, he discovers (1991) support for his theory: countries that are more open do grow faster. He also confirms the convergence hypothesis but theorizes that low initial incomes reflect low levels of technology and hence greater potential for improving the knowledge base. In addition, Edwards uncovers a weak but positive relationship between education, particularly improvements in the proportion of the population attending secondary schools, and economic advancement.

Support for the importance of schooling comes as well from R. A. Easterlin writing in *The Journal of Economic History* (1981) who explains growth in terms of the spread of education to the masses. Attempts to educate only the elite, as in the nineteenth century Ottoman Empire and in India of this century, failed to boost average incomes. In contrast, the earliest countries to adopt the industrial revolution and to achieve sustained economic growth — the United States, Germany, France, and the United Kingdom — were also the first countries in the modern world to offer mass education. It was largely a matter of self interest. If men and women were going to man factories and offices, they needed to be taught to read and write and do a little arithmetic. This basic principle still applies.

To absorb the technology of industrial countries, Third World states must educate their citizens so that they can employ that knowledge. Moreover, to be effective in training people to exploit technology, such learning must be secular and rationalistic since technology is based on logical principles. Countries, where schooling has been in the hands of the clergy, such as Spain in the last century and much of Latin America outside of Argentina, have enjoyed little growth.

The laggard performance of much of the Muslim world, probably stems from the meager education offered, which typically passes through the filters of the clerics. The hostility of Arab countries towards the West may reflect a tension between the desire to improve their lagging economies and an insistence on a Moslem education that stresses religion, rather than modern science. The rulers of these countries sense rationalistic education as threatening their cultural and religious values. In that they are probably correct. Professor Easterlin foresees the end product as (1981: 16), “a monocultural world, East and West ... for the personality traits that are formed in the process of modern economic growth ultimately prevail over cultural and ideological differences.”

Third World countries in the end have little choice but to foster growth through mass schooling. As long as they fail to equip their population with a secular education, their economies will remain poor and backward and their society will thus feel threatened by more advanced states. Together with economic power goes military strength. To secure their borders and to strengthen their economies, the leaders of their armed forces will ultimately demand better schooling. Their citizens will also press for modernization so that they too can enjoy the luxuries that they see outsiders savoring.

Mass education has often been instituted after a revolution that overthrew a monarchy or an autocratic ruler. Although the worldwide tendency towards egalitarianism has promoted education, the converse has also been true: schooling has advanced the idea of equality. Learning about contemporary civilization unleashes revolutionary forces — the concepts of equal rights and science based technology. “A little education is a dangerous thing:” it stimulates demands for more schooling so that the children will be able to enjoy a modern life style; it also brings a cry for civil rights, justice and democracy.

Besides education and convergence, economists have evaluated the influence of other variables on economic performance. A thorough review of the empirical research on growth by Ross Levine and David Renelt, mentioned above, determined (1992) that most of the evidence linking rising incomes with other elements was not statistically strong. This lack of robustness in the findings means that the reported correlations could be traceable to chance or to interactions with other variables and that little confidence can be placed in the conclusions of most of the analyzed studies. Levine and Renelt’s results, based on



evidence for 101 countries for the period 1960 to 1989,\* showed that investment (as a percent of GDP) was the variable that was most closely and consistently correlated with economic growth. Like Barro, they did establish that physical investment is positively correlated with investment in human capital, although the relationship was not always robust. Even though knowing that investment plays such a key role is helpful, it still leaves policy makers without much guidance. Investment is a product of the economic system and needs to be explained by historical factors, sociological determinants, or governmental policies. Although many politicians allege that their nostrums will boost spending on new equipment and on research and development, no one has yet substantiated a relationship between state policies and investment.

In addition to the influence of physical investment on productivity, Levine and Renelt unearthed qualified support for the convergence theory — once education was taken into account. Adjusting for the rate of attendance at secondary school in 1960, the poorer the country in 1960, the greater the rate of growth over the next 29 years. Although demographic expansion is uncorrelated with changes in per capita income, education, as measured by secondary school enrollment rate in 1960, is related to earnings growth. Those countries that stressed schooling grew the fastest. Once more this adds weight to the findings, reported above, on the importance of education and human capital in promoting the advancement of mankind. A more educated population can take advantage of improvements in technology to increase productivity.

In effect, Levine and Renelt conclude that two independent factors — convergence and human capital — largely explain differences in economic performance. Together with physical investment and population expansion, these economists show that the two variables account for nearly half of the variation in growth rates among the 101 countries. Low incomes by themselves, however, do not guarantee future rapid increases in earnings. Education is essential for without a skilled work-force modern technology cannot be incorporated in the system.

Convergence has led to incomes in the world becoming somewhat more equal. In 1960, the 26 industrialized countries with one-fifth of the world's people earned 68 percent of the world's output (Summers and Heston 1991, 359). By 1988, their share had declined to a little over 60 percent. Over the same period, the slice of global income garnered by the 39 countries with the lowest incomes, representing 59 percent of the world's population, had climbed from 17 percent (1960) to 21 percent (1988), a substantive — a nearly 25

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\* For some countries and some variables the period was shorter. Data did not exist for all 101 countries for all variables.

percent increase in the proportion of world income — if undramatic move towards the more advanced countries. Asia, with 61 percent of the world's population, has enjoyed a boom that has boosted its share of world output from 25 percent in 1960 to 36 percent in 1988.

### **Government Policies, Trade and Free Markets**

Adam Smith emphasized openness to trade, freedom from government restraints, and private markets as the factors that would increase wealth. Others, in particular Robert Barro (1991), John Helliwell (1992), and Gerald Scully (1988), have unveiled statistical evidence that political and social factors, such as freedom, political stability, and democracy, are related to growth.

In their survey of the factors that are reliably connected to productivity gains, Levine and Renelt revealed (1992) that trade and export and import distortions were closely and consistently related to investment but failed to have a consistently strong association with economic growth. On the other hand, if investment is dropped from the equation, then measures of trade are strongly and significantly related to advances in income. If trade facilitates the spread of technology and investment is necessary to employ the new knowledge as Boskin and Lau claim (1992), these correlations are logical.

After studying the evidence from the 1960s and 1970s, Anne Krueger of Duke University's department of economics has concluded (1981) that export oriented policies, even though they may involve subsidies, distort allocations less than import substitution policies and result in higher rates of growth. She asserts that shifting from import substitution to an export orientation can add two to three percentage points to growth rates. The short term cost of making this policy change is on the order of one to two percent of GNP for a year and one-half, but the present value of the future gain may mount to 15 percent. Unfortunately, making the policy change is very difficult politically. A sizable number of finance ministers have lost their jobs in the first eighteen months of attempting reform (note 20: 101). For example, timid Polish politicians fired Leszek Balerowicz, father of "shock therapy" policies, which generated the only positive growth in Eastern Europe to date.

Three factors apparently explain the superiority of export oriented policies to import substitution. First, although export policies may result in some subsidies, given government budget constraints and balance of payments limits, taxpayer aid and consequent price distortions must be small. In contrast, import substitution policies allow local monopolies to develop while imposing no limits on the resulting price misallocations. Second, to compete in the global market, export companies are forced to be efficient, while import sheltered firms can produce shoddy products and charge excessively for inefficient services. Brazil, for example, prohibited the import of personal computers and

consequently suffered from locally-constructed, high-priced, poorly-made and underpowered desktop machines. In addition, exporters can take advantage of economies of scale while firms confined to the domestic market may be limited to inefficient sizes. Finally, an economy that is open to the world is better exposed to new technologies. As Nobel Laureate Kenneth Arrow points out (1969), the international diffusion of knowledge is hampered because personal contacts — the primary channel for the transmission of information — are much less common between countries than within nations. International traders and investors can spread knowledge and technology to and from local businesses. Importers will bring in goods that embody advanced techniques; foreign investors will frequently build plants employing newer technologies.

Although a policy of gradual reform will impose smaller costs, Krueger contends that it also raises sharply the possibility of failure. Vested interests will have time to sabotage a change to a more open economy. Moreover, to invest in export facilities, business must have faith that the program will work. To the extent that they fear that eliminating protection and fostering exports will be short lived and that the previous protectionist regime will be resumed, they will not invest in the facilities needed to compete abroad. A perception that the reform will last will heighten its chances of success.

Government spending, government consumption, government spending on non-defense and non-education, as well as the size of deficits have very weak relationships with economic progress. While a few studies, such as Barro's, have found correlations, simply adding other variables to the analysis illustrates that the relation is neither strong nor consistent (Levine and Renelt 1992). In other words, the size of the government apparently matters little in terms of economic performance. In some econometric work, measures of civil liberties and measures of wars and revolutions are significantly correlated with economic expansion, but once again the inclusion of other plausible variables attests that these political variables are not robustly related to growth of income. Monetary policy also fails to show a strong relationship with rising standards of living.

Immigration, however, offers another and perhaps more dependable source of knowledge, enterprise, and innovation. As Robert Lucas has demonstrated (1988), the 'brain drain' is understandable — highly educated people will be more productive surrounded by other knowledgeable individuals. For somewhat different reasons, Nobel Laureate Gary Becker, economists Kevin Murphy and Robert Tamura (1990) have substantiated that rich countries with a highly skilled labor force can be attractive to talented and well-trained individuals from poor countries. It is intuitively obvious that a Ph.D. in physics, chemistry or almost any field is virtually useless in many untutored parts of the

world. Surrounded with educated colleagues who can use their talents, such skilled immigrants can enhance the scientific base of advanced economies.

Even poorly educated immigrants can promote economic growth. Such people are usually more ambitious than the average or they would never have attempted to migrate. Once they find themselves in a more developed country, they can free the better educated to concentrate on more productive activities while they do the menial chores. Thus they can wash test tubes, watch the kids, or take care of the garden, allowing researchers to specialize on conducting experiments, while putting their children through college and graduate school so that they, in turn, may become scientists.

Education is vital. That is the fundamental policy conclusion to be drawn from economists' studies of growth. The other major factors effecting productivity improvements are investment and foreign trade. Governments can opt for free trade, some protection or economic autonomy. Since foreign trade affects investment, perhaps by embodying technology, governments should encourage exports and imports. Politicians wishing to foster greater growth should also favor investments in new technology. Without an educated population, however, a nation will almost surely remain poor and backward; education and an open, private enterprise economy will enable poor countries to enjoy high rates of growth that will make it possible for their population ultimately to catch up with those that are more advanced.

### **Malthusian Traps**

Thomas Malthus, an early English economist, writing in 1798 questioned whether economic growth could ever raise the standard of living of the masses. In his *An Essay on the Principle of Population*, he advanced his famous proposition that the "population increases in a geometrical, food in an arithmetical ratio." The implications were that the populous was doomed to remain mired in poverty. If incomes mounted above subsistence levels, families would beget more children intensifying pressure on the food supply. Eventually real earnings would fall back to bare maintenance.

Since he wrote, Western Europe has proven him wrong as the standard of living of all has risen sharply and the birth rate has declined not gone up. Yet many prophets of doom still foresee a Malthusian catastrophe in much of the Third World. Although environmentalists have been the most vocal announcing continued destitution for much of the more backward portions of the planet, a number of respectable economists have theorized that some countries are caught in a poverty trap.

Economists Gary Becker, Kevin Murphy and Robert Tamura (1990) have put forward a rather pessimistic view of growth for Third World nations. They assert that various economies can attain multiple equalibria, including a high fertility, low human

capital, low income trap. They contend that chance and history may determine whether a country stagnates or leaps to prosperity. These economists maintain that the more educated the population, the higher the return to further investments in human capital. Consequently, only once a certain amount of human capital has been accumulated will the return on further investment in education exceed the cost of such investment. In other words, until the population of a nation has achieved a certain minimum level of education, the additional benefits of schooling are less than its costs. Thus poor regions with uneducated people cannot afford to build the schools, hire the teachers, and transfer young people from work to learning since the expenses will exceed any future improvements in living standards. As a consequence they are condemned to remain unlettered and poverty-stricken.

A highly educated country requires that the government or the parents school children well so that they can become productive members of the labor force. Since education is expensive, parents economize by reducing the number of children. This phenomenon has been demonstrated worldwide; that is, high income societies experience low fertility rates. Since, under this model, poor countries offer a poor return on human capital, those that do become educated tend to migrate to nations where knowledge and high levels of skill are more valued — hence the brain drain.

The Becker *et. al* model decrees that chance, historical circumstance and large shocks account for nations moving out of the low-income/low-human capital trap into a scenario of high income/high human capital growth. Europe's growth they explain by contenting that economic and social relations on the continent were unstable — nations were jockeying with nations; royalty, the nobility and the bourgeoisie were struggling for mastery — compared to a more constant China where the emperor and the bureaucracy coexisted in relative harmony. On the other hand, their theory fails to account for the success of Japan, Hong Kong, Taiwan, South Korea, and Singapore. Moreover, within a highly educated country, such as the United States, there are often pockets of people who are apparently stuck in the low-income/low-human capital bind. Why they are unable to move out of it and acquire the education necessary to earn high incomes remains a mystery.

Even within the context of the Becker *et. al* model, governments could foster education and oblige their population to become literate. Although initially this would depress real earnings, presumably, at some point the investment in education would garner returns that exceeded the costs and would launch the nation on a growth path. Thus there would seem to be no reason for any nation to be mired forever in low-income/low-human capital poverty.

Nineteenth century England and Europe proved Malthus wrong. Today Korea, Taiwan, Hong Kong, and Singapore, all of which enjoy birth rates below reproduction

levels, are also the four fastest growing economies in the world. Their success appears to belie the Becker *et al* model. Other Asian countries are beginning to imitate their policies and are experiencing significantly faster advances in per capita income. Malthusian traps may exist in principle but history proves that countries can grow fast enough so that the cost of raising a child comes to exceed the benefits from having many children. As a result, women concentrate their fecundity on a few well educated offspring.

### **Political and Social Factors Affecting Growth**

Much harder to measure than economic variables are the political and social factors that may affect the rate of growth. The chapter on democracy discussed the absence of a strong relationship between elected governments and rising standards of living. Intuitively it appears probably that freedom is related to economic development, but the evidence is weak and contradictory. I believe, however, for reasons set out in Chapter 6, that liberty would facilitate the adoption of new technology thus furthering growth.

Probably more significant than democracy and political freedom, as Hong Kong shows, are strong property rights, coupled with an honest judiciary and civil service, plus an effective commercial code. Without the ability to capture the return on their investments, few will risk their assets to increase output. If property can be taken at will, then becoming rich invites expropriation. At best, this means that investors will seek quick returns in forms difficult to confiscate.

The comatose, lethargic, or spiritless economic evolution of communist countries as well as those that have moved strongly in the socialist direction demonstrate the importance of property rights and maintaining a free market economy. A market economy, which can respond to new technologies, new opportunities and to new demands from consumers, is vital to quickening economic advance. An open trading system encourages the spread of technology. As a consequence, we can conclude that the higher the proportion of exports to national income the quicker the economy will respond to innovations elsewhere. World trade also permits firms to seize the maximum advantage from economies of scale. It is unsurprising, therefore, to find that many countries that have embraced trade as a tool for advancement have achieved phenomenal rates of economic growth.

Many Third World countries have been described as kleptocracies: the rulers steal everything not welded down. Such countries cannot grow rapidly since few investors will risk their own funds in projects which invite expropriation. The growing presence of a “Mafia” that shakes down legitimate business in Russia and other ex-communist states hinders the development of an entrepreneurial class and of risk taking. The successor states to the former Soviet Union are also facing another difficult problem: will the reforms last? Past experience impairs faith in the present and the future. Will courts protect their

investments from unscrupulous bureaucrats? Will the hard-liners mount a counter-revolution that nationalizes all they have built? The memory of the Kulaks whom Stalin had murdered because they were successful farmers cannot be erased.

An honest judiciary and civil service are crucial to the running of a market economy. A few years ago, on a visit to Indonesia, I was told that national judges bid for the right to try cases on the basis of the expected bribes. American firms, prohibited by U.S. law from paying bribes, had difficulty in enforcing contracts — the other side could easily outbid the companies unable to bribe. Naturally this situation discourages investment from the United States and other countries with similar scruples.

### **Taxation**

Economists have examined the effect of taxes on personal income employing a variety of tax concepts: total tax revenues; total government spending, which may be a better measure than revenues of government's claim on the economy; average and marginal tax rates; and changes in these rates. If one examines the post-war history of the United States, for most of that period, federal receipts, through periods of strong growth and periods of weak performance, have averaged a little under one-fifth of GNP. The level of tax revenues is apparently uncorrelated with the rate of growth in average income. Economists Levine and Renelt (1992) examining over a hundred countries failed to find any robust association of taxation as measured by government revenues with economic performance. Many economists and observers believe that it is low tax *rates*, rather than tax receipts, that produce faster growth.

Politicians and some economists have hypothesized that changes in tax rates by altering savings might influence economic growth. In 1956, Robert Solow showed theoretically, as Robert Lucas stressed later (1988: 12), however, that changes in the savings rate would leave unaffected the rate of growth. Increases or decreases in savings might shift the standard of living up or down temporarily but would have no influence on the long run rate of income change. On the basis of this model Lucas predicted that changes in tax structure intended to make savings more attractive will leave economic progress unaffected. Other theoretical expositions (King and Rebelo 1990; Barro 1991) have yielded models that show changes in tax rates or levels of taxation do lead to increases or decreases in the rate of economic growth.

Unfortunately economists have uncovered no data demonstrating that lower *rates* are any more successful than lower tax revenues in boosting incomes. Robert Barro did find that government spending on consumption — total outlays minus spending on such items as education and defense — was inversely related to the rate of growth. Government

spending on consumption, however, is a poor proxy for tax revenues, since it excludes many items for which governments need money, and it is even a worse proxy for tax rates.

Although a few examples are insufficient to prove or disprove a case, the reader should note that Switzerland and the United States enjoy some of the lowest tax rates of any OECD countries, yet have produced two of the lowest growth rates in the post-war era. West Germany and the Netherlands have labored under much heavier tax rates, yet have sustained a much more robust rate of growth. Hong Kong enjoys very low taxes, while Singapore, including its mandatory social security levy, suffers from much higher imposts. Both have grown vigorously in the period since 1960.

There is evidence, although not statistically compelling, that changes in rates can induce notable effects on economic activity. If the government raises or lowers tax rates it can alter substantially the return from investments, especially on the margin. For example, when President John Kennedy convinced congress in 1963 to cut the top marginal levy from the existing 91 percent to 77 percent for 1964 and to 70 percent for subsequent years, the return on earning an additional dollar for the rich went from 9 percent to 30 percent or an increase of 333 percent. The effect of lower rates was to boost tax revenues paid by the rich as they moved their capital out of tax shelters and into enterprises that were more lucrative and more productive for the economy. Not only did the tax cut raise more revenue from the wealthy, but it was followed by the longest economic expansion in U.S. history.

Several other episodes of major tax rate changes support the proposition that they produce significant economic effects. During the 1920s, the United States government cut its top marginal tax rates from a high of 77 percent in 1918 to 58 percent in 1922, 46 percent in 1924, 25 percent between 1925 to 1928, and finally to 24 percent in 1929. While those cuts were occurring, Americans reveled in the roaring twenties with economic growth rates not seen again until the 1960s. By comparison over the same period most of Western Europe maintained the high levies from World War I, enduring, probably as a consequence, only slow or no development.

Trying to reduce the budget deficit, President Herbert Hoover convinced Congress to boost the top marginal tax rate from 25 percent in 1931 to 63 percent in 1932. This effectively cut the return on the marginal dollar for the wealthy (those earning over \$300,000) from 75 percent to 37 percent — roughly in half. Not only did income reported decline by some 49 percent as a consequence, but the percent of all assessments paid by the very rich fell from 24 percent to 18 percent (James Gwartney and Richard Stroup 1982). Many analysts believe that this tax increase, together with the infamous Hawley–Smoot tariff and the action of the Federal Reserve to protect the U.S. gold stock, pushed the United States into the Great Depression.



A half a century later, Ronald Reagan drove two major tax acts through Congress, lowering the top marginal rate first from 70 percent to 50 and then down to 28 percent. The effect was to generate the second longest expansion in history (second only to the 1960s boom). As a result of these tax cuts, the amount paid to the Internal Revenue Service by the wealthiest rose as a share of all income tax revenues.

All of these income tax rate markdowns enhanced the after-tax return on investments significantly. As a consequence outlays for plant and equipment, research and development, and new products rose sharply, especially in those business sectors which received the greatest tax advantages. Increased investment led to a spurt in economic activity, raising annual rates of growth well above normal levels. Unfortunately these results could only be temporary. As investment climbed it drove down returns until the after-tax return on capital fell to the level that existed before the tax reform. Effectively the economy moved to a higher income level and then resumed its “natural” rate of growth. Even though, slashing levies failed to boost permanently the rate of growth, they did bring large benefits to the American economy and to taxpayers. The share of the assessments paid by the rich went up with each cut in rates; total U.S. income mounted sharply; unemployment fell to levels that most economists had not believed sustainable with reasonable price stability.

Tax rate reductions give a one time benefit to the economy, raising income to new levels, but then the economy reverts to its established expansion path. Conversely boosts in levies diminish economic activity for a period, lowering real incomes, but the economy will eventually adjust and restore normal growth. As shown by the United States, which boomed in the 1960s while laboring under top marginal tax rates of 70 percent, and Sweden, which actually imposed assessments of over 100 percent on very wealthy individuals, while experiencing moderate growth, high tax rates by themselves will not seriously curtail, at least initially, the rate of increase in individual incomes. At some level, however, high rates may eventually strangle the economy, but the statistical evidence to date is that such levies have only a very modest effect on economic performance. Nevertheless, changes in assessments can have strong short-term impacts on the output of goods and services.

Although high taxes, after taxpayers and business have adjusted, have no apparent effect on economic growth, it is probable that they enervate a country over time. Even though the effect is hard to demonstrate, the example of Sweden may prove instructive. Until the early 1960s when the state hiked rates sharply, Sweden enjoyed relatively low levies. In 1960 tax receipts as a percent of GDP were actually equal to those of the United States (Stein 1991: 4). After the government hoisted rates in the 1960s and 1970s, Swedish

workers probably maintained for awhile their willingness to work industriously; but over time, as they began to realize that extra work brought few rewards, a tendency towards slackness inevitably evolved. Undoubtedly it was a gradual process reflecting the interaction of workers as they perceived gradually that their colleagues and society no longer considered taking time off as unacceptable.

Swedish economist Peter Stein reports (1991) that Swedes work fewer hours a year than employees in any other major country. The average Swedish worker claims to be sick for 26 days in 1988 (sick pay replaces 75 to 90 percent of income lost), a considerably greater time ill than reported in other countries (Stein 1991: 19; Ekonomifakta 1991: 10). Doctors, who were subject to 80 percent tax rates in the early 1980s and are still subject to 72 percent rates plus valued-added levies of 25 percent on top of a 40 percent payroll impost, toil only 1,600 hours per year compared to 2,800 for U.S. physicians. As Stein notes (19), “It pay doctors to stay home and paint their own houses rather than spend their time practicing medicine and hire painters.”

The erosion of the work ethic has been most pronounced in the once communist countries. The old East-Bloc saying went: “They pretend to pay us and we pretend to work.” Prior to the fall of the Berlin Wall, former East Germany held the reputation as the most successful non-market economy, probably stemming from the traditional German devotion to the job. The integration of East and West Germany has rendered it strikingly apparent that many of the former communist comrades have lost their work ethic and perform poorly.

Thus the failure of high taxes to influence growth may be only temporary and may mask a long-term problem. Over time such rates may enervate a society, curtailing risk taking and hard work. The cutback in after-tax profitability of investment will delay the adoption of new technology, retarding economic advancement. Living standards will be lower and rates of growth anemic.

### **Industrial Policies**

Since technological change lies at the heart of improvements in productivity, many governments find it tempting to support directly firms that are developing or installing advanced technologies. Those countries have tried to foster certain industries and companies through government subsidies, tax breaks, research expenditures and favorable government purchases as well as by providing protection from foreign competition. Certain economists including Lester Thurow (1984) and Robert Reich, Secretary of Labor in the Clinton Administration, have claimed that such industrial policies are necessary if the United States is to compete in the modern world. Advocates of government aid to business point to Japan, Taiwan, Korea, and Europe as places where such policies have worked.

Most of the literature (Keatley 1993; Zinsmeister 1993; Cohen and Noll 1991) on this subject has shown that governments often waste taxpayer funds on projects that fail. Certain types of projects are, however, worthwhile: state investments in basic or generic research often expand the base of knowledge. This may eventually lead to new technologies that further progress worldwide, although the benefits of the research cannot be confined to the host country. Word of basic scientific breakthroughs circulates almost instantaneously around the globe. Taxpayer spending to further state purposes, such as military research, has shown successes in the past. Commercial aircraft design, the development of computers, and the semiconductor industry all originated from Defense Department projects.

On the other hand, when politicians believe they can produce commercially viable projects with taxpayer's money, the result is typically a failure. Under Jimmy Carter the government wasted billions on the Synfuels program to discover commercially viable energy sources. Ronald Reagan allocated federal taxpayer money to engineer a rocket plane to zip from New York to Tokyo in a few hours. No such aircraft has taken off from the drawing board. Earlier as a reaction to the Europeans development of the *Concorde*, Presidents Kennedy, Johnson, and Nixon bankrolled an American supersonic airplane. Had this plane emerged, it, like the *Concorde*, would have been too expensive to operate profitably and could only have been sold with huge taxpayer subsidies.

More important than these isolated fiascoes is the political "mindset." Politicians tend to favor existing firms and industries, especially those with large concentrated employment, over start-up advanced technology companies. Bailing out Chrysler is more popular than spending on biotech. Employees of saved companies are grateful for support; those who would have benefited from new drugs are unaware of their loss.

Although the Japanese government may have helped establish its semiconductor industry, its Ministry of International Trade and Industry, MITI, failed in its Fifth Generation Computer Project to produce thinking computers. It has wasted a great deal of resources on high-definition television only to see the U.S. private sector move to a more advanced technology. During the Reagan and Bush Administrations private U.S. companies, arguing that Tokyo's system would dominate the world, lobbied for taxpayer moneys to design and manufacture picture-perfect television. The government resisted their requests; the industry went ahead on its own and has made great progress in developing a better system than the Japanese one.

Early in its history, MITI recommended merging Japanese auto companies into one, two, or no more than three manufacturers in order to prevent excessive competition. Fortunately for the Japanese and the American consumer, the auto companies refused. In

order to save foreign currencies for “more useful projects,” the Ministry strove to prevent Sony from purchasing the rights to produce transistors from Western Electric (Zinsmeister 1993). Even a Japanese government agency, giving MITI the benefit of the doubt (Keatley 1993), admits that, “Tokyo seems to have picked ‘winners’ and ‘losers’ in about equal numbers.”

Europe has failed often in its promotion of selected industries. The *Concorde* is a technological triumph and an economic disaster. Only a handful of planes were built at vast cost and were then sold to state owned airlines forced to buy them to validate government subsidies. The Common Market spent billions on a semi-conductor consortium, JESSI, designed to compete with U.S. and Japanese industry (Rodgers 1993). Government bureaucrats allocated the production of the DRAM (dynamic random access chip) to Siemens and the SRAM (strategic random access chip) to Phillips; both have subsequently withdrawn from that business.

### **Summary and Conclusions**

Economic growth is vital to progress. Two factors stand out in promoting it: convergence and education. Like your genes that one must accept, so must a country accept its existing level of development. The curse of being poor means that education may establish the nation on the path of vigorous growth. Although Gary Becker and his co-authors maintain that countries can suffer from a “Malthusian” equilibrium of low levels of education and high fertility rates that will trap them forever in poverty, I would contend that if a government invests heavily in human capital, a nation can achieve rising incomes that will bring them prosperity. The good news is that by educating their populous, a poor country can grow faster than those that are rich and can ultimately catch up or at least make significant progress towards that goal.

Growth comes from innovation and technology. In the modern world, these changes arise from either adapting existing knowledge from more advanced nations or from creating new knowledge using research and development. For the advanced countries of the world, economic advancement stems mainly from science. These countries have educated populations capable of absorbing and exploiting this knowledge. However, if a government taxes its citizens excessively or implements policies that slow the development and adoption of new technology, it may restrict improvements in productivity. As has been amply demonstrated, non-market economies lack flexibility; they are unable to exploit new procedures, techniques and equipment; stagnation results.

Third World countries do have the luxury of being able to copy technology from more advanced countries. To utilize this information properly, they must educate their population. A highly skilled and schooled people will be able to adapt modern techniques

easily to their situation, provided the government refrains from excessively burdening enterprises. The experience of the Philippines and Indonesia, both of which suffer from high levels of corruption, state monopolies, and the stifling of competition confirms that education of a backward population in itself will not always be sufficient to generate growth. Despite substantial obstacles, both these countries are making progress in opening up their economies. They too can join other Asian “tigers” and enjoy vigorous growth.

Over the next century we can expect that much of the Third World will achieve a strong growth rate — higher than that of the developed countries. This will lead to a gradual convergence of their economies with those of the West. Education and open trade will be the engine of this economic “miracle.” The next chapter will outline the perils of government interference in the economy through regulation or government ownership of enterprises. That “too much” government can strangle an economy goes without question, but how much is “too much” has no simple answer.