Divergence, Big Time

Lant Pritchett

Divergence in relative productivity levels and living standards is the dominant feature of modern economic history. In the last century, incomes in the ''less developed'' (or euphemistically, the ''developing'') countries have fallen far behind those in the ''developed'' countries, both proportionately and absolutely. I estimate that from 1870 to 1990 the ratio of per capita incomes between the richest and the poorest countries increased by roughly a factor of five and that the difference in income between the richest country and all others has increased by an order of magnitude.[1] This divergence is the result of the very different patterns in the long-run economic performance of two sets of countries.

One set of countries—call them the ''developed'' or the ''advanced capitalist'' (Maddison, 1995) or the ''high income OECD'' (World Bank, 1995)—is easily, if awkwardly, identified as European countries and their offshoots plus Japan. Since 1870, the long-run growth rates of these countries have been rapid (by previous historical standards), their growth rates have been remarkably similar, and the poorer members of the group grew sufficiently faster to produce considerable convergence in absolute income levels. The other set of countries, called the ''developing'' or ''less developed'' or ''nonindustrialized,'' can be easily, if still awkwardly, defined only as ''the other set of countries,'' as they have nothing else in common. The growth rates of this set of countries have been, on average, slower than the richer countries, producing divergence in

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[1] To put it another way, the standard deviation of (natural log) GDP per capita across all countries has increased between 60 percent and 100 percent since 1870, in spite of the convergence amongst the richest.

■ *Lant Pritchett is Senior Economist, World Bank, Washington, D.C.*

relative incomes. But amongst this set of countries there have been strikingly different patterns of growth: both across countries, with some converging rapidly on the leaders while others stagnate; and over time, with a mixed record of takeoffs, stalls and nose dives.

The next section of this paper documents the pattern of income growth and convergence within the set of developed economies. This discussion is greatly aided by the existence of data, whose lack makes the discussion in the next section of the growth rates for the developing countries tricky, but as I argue, not impossible. Finally, I offer some implications for historical growth rates in developing countries and some thoughts on the process of convergence.

Convergence in Growth Rates of Developed Countries

Some aspects of modern historical growth apply principally, if not exclusively, to the ''advanced capitalist'' countries. By ''modern,'' I mean the period since 1870. To be honest, the date is chosen primarily because there are nearly complete national income accounts data for all of the now-developed economies since 1870. Maddison (1983, 1991, 1995) has assembled estimates from various national and academic sources and has pieced them together into time series that are comparable across countries. An argument can be made that 1870 marks a plausible date for a modern economic period in any case, as it is near an important transition in several countries: for example, the end of the U.S. Civil War in 1865; the Franco-Prussian War in 1870–71, immediately followed by the unification of Germany; and Japan's Meiji Restoration in 1868. Perhaps not coincidentally, Rostow (1990) dates the beginning of the ''drive to technological maturity'' of the United States, France and Germany to around that date, although he argues that this stage began earlier in Great Britain.[2]

Table 1 displays the historical data for 17 presently high-income industrialized countries, which Maddison (1995) defines as the ''advanced capitalist'' countries. The first column of Table 1 shows the per capita level of income for each country in 1870, expressed in 1985 dollars. The last three columns of Table 1 show the average per annum growth rate of real per capita income in these countries over three time periods: 1870–1960, 1960–1980 and 1980–1994. These dates are not meant to date any explicit shifts in growth rates, but they do capture the fact that there was a golden period of growth that began some time after World War II and ended sometime before the 1980s.

Three facts jump out from Table 1. First, there is strong convergence in per capita incomes within this set of countries. For example, the poorest six countries in 1870 had five of the six fastest national growth rates for the time period 1870–

[2] For an alternative view, Maddison (1991) argues the period 1820–1870 was similar economically to the 1870–1913 period.

Table 1

Average Per Annum Growth Rates of GDP Per Capita in the Presently High-Income Industrialized Countries, 1870–1989

Country	Level in 1870 (1985 P$)	Per annum growth rates		
		1870–1960	*1960–80*	*1980–94*
Average	1757	1.54	3.19	1.51
Std dev. of growth rates		.33	1.1	.51
Australia	3192	.90	2.43	1.22
Great Britain	2740	1.08	2.02	1.31
New Zealand	2615	1.24	1.39	1.28
Belgium	2216	1.05	3.70	1.52
Netherlands	2216	1.25	2.90	1.29
USA	2063	1.70	2.48	1.52
Switzerland	1823	1.94	2.07	.84
Denmark	1618	1.66	2.77	1.99
Germany	1606	1.66	3.03	1.56
Austria	1574	1.40	3.81	1.58
France	1560	1.56	3.53	1.31
Sweden	1397	1.85	2.74	.81
Canada	1360	1.85	3.32	.86
Italy	1231	1.54	4.16	1.62
Norway	1094	1.81	3.78	2.08
Finland	929	1.91	3.77	1.09
Japan	622	1.86	6.28	2.87

Source: Maddison, 1995.
Notes: Data is adjusted from 1990 to 1985 *P*$ by the U.S. GDP deflator, by a method described later in this article. Per annum growth rates are calculated using endpoints.

1960; conversely, the richest five countries in 1870 recorded the five slowest growth rates from 1870 to 1960.[3] As is well known, this convergence has not happened at a uniform rate. There is as much convergence in the 34 years between 1960 and 1994 as in the 90 years from 1870 to 1960. Even within this earlier period, there are periods of stronger convergence pre-1914 and weaker convergence from 1914 to 1950.

Second, even though the poorer countries grew faster than the richer countries did, the narrow range of the growth rates over the 1870-1960 period is striking. The United States, the richest country in 1960, had grown at 1.7 percent per annum since 1870, while the overall average was 1.54. Only one country, Australia, grew either a half a percentage point higher or lower than the average, and the standard deviation of the growth rates was only .33. Evans (1994) formally tests the hypothesis

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[3] The typical measure of income dispersion, the standard deviation of (natural log) incomes, fell from .41 in 1870 to .27 in 1960 to only .11 in 1994.

that growth rates among 13 European and offshoot countries (not Japan) were equal, and he is unable to reject it at standard levels of statistical significance.

Third, while the long run hides substantial variations, at least since 1870 there has been no obvious acceleration of overall growth rates over time. As Charles Jones (1995) has pointed out, there is remarkable stability in the growth rates in the United States. For instance, if I predict per capita income in the United States in 1994 based only on a simple time trend regression of (natural log) GDP per capita estimated with data from 1870 to 1929, this prediction made for 65 years ahead is off by only 10 percent.[4] Although this predictive accuracy is not true for every country, it is true that the average growth rate of these 17 countries in the most recent period between 1980 and 1994 is almost exactly the same as that of the 1870–1960 period. However, this long-run stability does mask modest swings in the growth rates over time, as growth was considerably more rapid in the period between 1950 to 1980, especially outside the United States, than either in earlier periods or since 1980.

These three facts are true of the sample of countries that Maddison defines as the ''advanced capitalist'' countries. However, the discussion of convergence and long-run growth has always been plagued by the fact that the sample of countries for which historical economic data exists (and has been assembled into convenient and comparable format) is severely nonrepresentative. Among a sample of now ''advanced capitalist'' countries something like convergence (or at least nondivergence) is almost tautological, a point made early on by De Long (1988). Defining the set of countries as those that are the richest *now* almost guarantees the finding of historical convergence, as either countries are rich now and were rich historically, in which case they all have had roughly the same growth rate (like nearly all of Europe) or countries are rich now and were poor historically (like Japan) and hence grew faster and show convergence. However, examples of divergence, like countries that grew much more slowly and went from relative riches to poverty (like Argentina) or countries that were poor and grew so slowly as to become relatively poorer (like India), are not included in the samples of ''now developed'' countries that tend to find convergence.

Calculating a Lower Bound For Per Capita GDP

This selectivity problem raises a difficult issue in trying to estimate the possible magnitude of convergence or divergence of the incomes since 1870. There is no

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[4] Jones (1995) uses this basic fact of the constancy of growth to good effect in creating a compelling argument that the steadiness of U.S. growth implies that endogenous growth models that make growth a function of nonstationary variables, such as the level of R&D spending or the level of education of the labor force, are likely incorrect as they imply an accelerating growth rate (unless several variables working in opposite directions just happen to offset each other). These issues are also discussed in his paper in this issue.

historical data for many of the less developed economies, and what data does exist has enormous problems with comparability and reliability. One alternative to searching for historical data is simply to place a reasonable lower bound on what GDP per capita could have been in 1870 in any country. Using this lower bound and estimates of recent incomes, one can draw reliable conclusions about the historical growth rates and divergence in cross-national distribution of income levels.

There is little doubt life was nasty, brutish and short in many countries in 1870. But even deprivation has its limit, and some per capita incomes must imply standards of living that are unsustainably and implausibly low. After making conservative use of a wide variety of different methods and approaches, I conclude that $250 (expressed in 1985 purchasing power equivalents) is the lowest GDP per capita could have been in 1870. This figure can be defended on three grounds: first, no one has ever observed consistently lower living standards at any time or place in history; second, this level is well below extreme poverty lines actually set in impoverished countries and is inconsistent with plausible levels of nutritional intake; and third, at a lower standard of living the population would be too unhealthy to expand.

Before delving into these comparisons and calculations, it is important to stress that using the purchasing power adjustments for exchange rates has an especially important effect in poor countries. While tradable goods will have generally the same prices across countries because of arbitrage, nontradable goods are typically much cheaper in poorer countries because of their lower income levels. If one applies market exchange rates to convert incomes in these economies to U.S. dollars, one is typically far understating the ''true'' income level, because nontradable goods can be bought much more cheaply than market exchange rates will imply. There have been several large projects, especially the UN International Comparisons Project and the Penn World Tables, that through the collection of data on the prices of comparable baskets of goods in all countries attempt to express different countries' GDP in terms of a currency that represents an equivalent purchasing power over a basket of goods. Since this adjustment is so large and of such quantitative significance, I will denote figures that have been adjusted in this way by *P*$. By my own rough estimates, a country with a per capita GDP level of $70 in U.S. dollars, measured in market exchange rates, will have a per capita GDP of *P*$250.

The first criteria for a reasonable lower bound on GDP per capita is that it be a lower bound on measured GDP per capita, either of the poorest countries in the recent past or of any country in the distant past. The lowest five-year average level of per capita GDP reported for any country in the Penn World Tables (Mark 5) is *P*$275 for Ethiopia in 1961–65; the next lowest is *P*$278 for Uganda in 1978–1982. The countries with the lowest level of GDP per capita ever observed, even for a single year, are *P*$260 for Tanzania in 1961, *P*$299 for Burundi in 1965 and *P*$220 Uganda in 1981 (in the middle of a civil war). Maddison (1991) gives estimates of GDP per capita of some less developed countries as early as 1820: *P*$531 for India, *P*$523 for China and *P*$614 for Indonesia. His earliest estimates for Africa begin in 1913: *P*$508 for Egypt and *P*$648 for Ghana. Maddison also offers increasingly

speculative estimates for western European countries going back much further in time; for example, he estimates that per capita GDPs in the Netherlands and the United Kingdom in 1700 were P$1515 and P$992, respectively, and ventures to guess that the average per capita GNP in western Europe was P$400 in 1400. Kuznets's (1971) guess of the trough of the average per capita GDP of European countries in 900 is around P$400.[5] On this score, P$250 is a pretty safe bet.

A complementary set of calculations to justify a lower bound are based on ''subsistence'' income. While ''subsistence'' as a concept is out of favor, and rightfully so for many purposes, it is sufficiently robust for the task at hand. There are three related calculations: poverty lines, average caloric intakes and the cost of subsistence. Ravallion, Datt and van de Walle (1991) argue that the lowest defensible poverty line based on achieving minimally adequate consumption expenditures is P$252 per person per year. If we assume that personal consumption expenditures are 75 percent of GDP (the average for countries with GDP per capita less than P$400) and that mean income is 1.3 times the median, then even to achieve median income at the lowest possible poverty line requires a per capita income of $437.[6]

As an alternative way of considering subsistence GDP per capita, begin with the finding that estimated average intake per person per day consistent with working productively is between 2,000 to 2,400 calories.[7] Now, consider two calculations. The first is that, based on a cross-sectional regression using data on incomes from the Penn World Tables and average caloric intake data from the FAO, the predicted caloric consumption at P$250 is around 1,600.[8] The five lowest levels of

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[5] More specifically, Kuznets estimated that the level was about $160, if measured in 1985 U.S. dollars. However, remember from the earlier discussion that a conversion at market exchange rates—which is what Kuznets was using—is far less than an estimate based on purchasing power parity exchange rates. If we use a multiple of 2.5, which is a conservative estimate of the difference between the two, Kuznets's estimate in purchasing power equivalent terms would be equal to a per capita GDP of $400 in 1985 U.S. dollars, converted at the purchasing power equivalent rate.

[6] High poverty rates, meaning that many people live below these poverty lines, are not inconsistent with thinking of these poverty lines as not far above our lower bound, because many individuals can be in poverty, but not very far below the line. For instance, in South Asia in 1990, where 33 percent of the population was living in ''extreme absolute poverty,'' only about 10 percent of the population would be living at less than $172 (my estimates from extrapolations of cumulative distributions reported in Chen, Datt and Ravallion, 1993).

[7] The two figures are based on different assumptions about the weight of adult men and women, the mean temperature and the demographic structure. The low figure is about as low as one can go because it is based on a very young population, 39 percent under 15 (the young need fewer calories), a physically small population (men's average weight of only 110 pounds and women of 88), and a temperature of 25° C (FAO, 1957). The baseline figure, although based on demographic structure, usually works out to be closer to 2,400 (FA0, 1974).
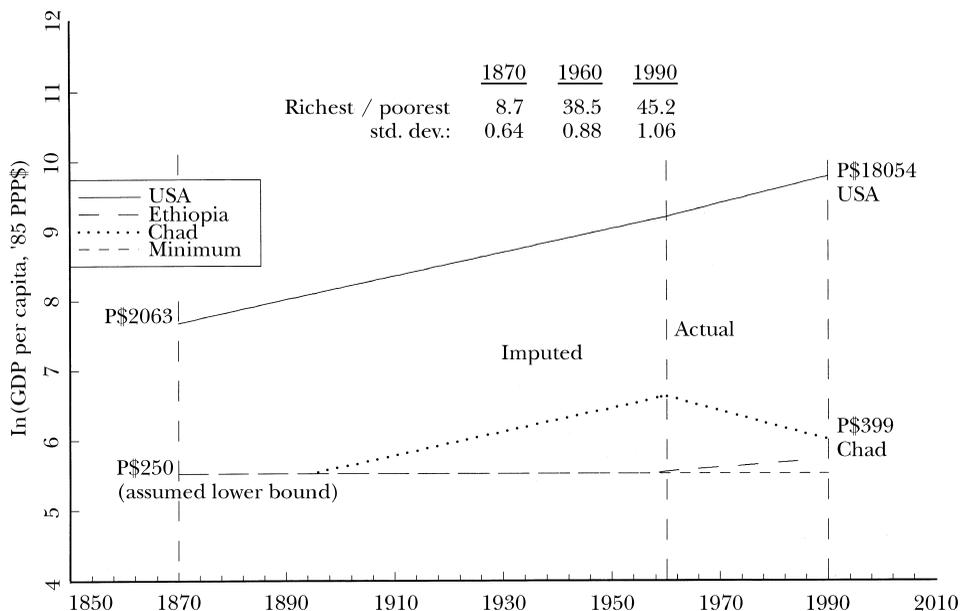
[8] The regression is a simple log-log of caloric intake and income in 1960 (the log-log is for simplicity even though this might not be the best predictor of the level). The regression is

$$\ln(\text{average caloric intake}) = 6.37 \quad + .183 * \ln(\text{GDP per capita}),$$
$$(59.3) \quad (12.56).$$

with *t*-statistics in parentheses, $N = 113$, and R-squared $= .554$.

caloric availability ever recorded in the FAO data for various countries—1,610 calories/person during a famine in Somalia in 1975; 1,550 calories/person during a famine in Ethiopia in 1985; 1,443 calories/person in Chad in 1984; 1,586 calories/person in China in 1961 during the famines and disruption associated with the Cultural Revolution; and 1,584 calories/person in Mozambique in 1987—reveal that nearly all of the episodes of average daily caloric consumption below 1,600 are associated with nasty episodes of natural and/or man-made catastrophe. A second use of caloric requirements is to calculate the subsistence income as the cost of meeting caloric requirements. Bairoch (1993) reports the results of the physiological minimum food intake at $291 (at market exchange rates) in 1985 prices. These calculations based on subsistence intake of food again suggest P\$250 is a safe lower bound.

That life expectancy is lower and infant mortality higher in poorer countries is well documented, and this relation can also help establish a lower bound on income (Pritchett and Summers, 1996). According to demographers, an under-five infant mortality rate of less than 600 per 1000 is necessary for a stable population (Hill, 1995). Using a regression based on Maddison's (1991) historical per capita income estimates and infant mortality data from historical sources for 22 countries, I predict that infant mortality in 1870 for a country with income of P\$250 would have been 765 per 1000.[9] Although the rate of natural increase of population back in 1870 is subject to great uncertainty, it is typically estimated to be between .25 and 1 percent annually in that period, which is again inconsistent with income levels as low as P\$250.[10]

Divergence, Big Time

If you accept: a) the current estimates of relative incomes across nations; b) the estimates of the historical growth rates of the now-rich nations; and c) that even in the poorest economies incomes were not below P\$250 at any point—then you cannot escape the conclusion that the last 150 years have seen divergence, big time. The logic is straightforward and is well illustrated by Figure 1. If there had been no divergence, then we could extrapolate backward from present income of the poorer countries to past income assuming they grew at least as fast as the United

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[9] The regression is estimated with country fixed effects:

$$\ln(\text{IMR}) = -.59 \ln(\text{GDP per capita}) \ \_ \ .013{*}\text{Trend} \ \_ \ .002{*}\text{Trend}{*}(1 \text{ if} >1960)$$
$$(23.7) \qquad\qquad\qquad (32.4) \qquad (14.23)$$

$N = 1994$ and t-statistics are in parenthesis. The prediction used the average country constant of 9.91.

[10] Livi-Basci (1992) reports estimates of population growth in Africa between 1850 and 1900 to be .87 percent, and .93 percent between 1900 and 1950, while growth for Asia is estimated to be .27 1850 to 1900, and .61 1900 to 1950. Clark (1977) estimates the population growth rates between 1850 and 1900 to be .43 percent in Africa and India and lower, .33 percent, in China.

Figure 1

Simulation of Divergence of Per Capita GDP, 1870–1985

(showing only selected countries)

States. However, this would imply that many poor countries must have had incomes below $P\$100$ in 1870. Since this cannot be true, there must have been divergence. Or equivalently, per capita income in the United States, the world's richest industrial country, grew about four-fold from 1870 to 1960. Thus, any country whose income was not fourfold higher in 1960 than it was in 1870 grew more slowly than the United States. Since 42 of the 125 countries in the Penn World Tables with data for 1960 have levels of per capita incomes below \$1,000 (that is, less than four times \$250), there must have been substantial divergence between the top and bottom. The figure of $P\$250$ is not meant to be precise or literal and the conclusion of massive divergence is robust to any plausible assumption about a lower bound.

Consider some illustrative calculations of the divergence in per capita incomes in Table 2. I scale incomes back from 1960 such that the poorest country in 1960 just reaches the lower bound by 1870, the leader in 1960 (the United States) reaches its actual 1870 value, and all relative rankings between the poorest country and the United States are preserved.[11] The first row shows the actual path of the U.S. econ-

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[11] The growth rate of the poorest country was imposed to reach $P\$250$ at exactly 1870, and the rate of the United States was used for the growth at the top. Then each country's growth rate was assumed to be a weighted average of those two rates, where the weights depended on the scaled distance from the bottom country in the beginning period of the imputation, 1960. This technique ''smushes'' the distri-

Table 2
Estimates of the Divergence of Per Capita Incomes Since 1870

	1870	*1960*	*1990*
USA (*P$*)	2063	9895	18054
Poorest (*P$*)	250	257	399
	(assumption)	(Ethiopia)	(Chad)
Ratio of GDP per capita of richest to poorest country	8.7	38.5	45.2
Average of seventeen ''advanced capitalist'' countries from Maddison (1995)	1757	6689	14845
Average LDCs from PWT5.6 for 1960, 1990 (imputed for 1870)	740	1579	3296
Average ''advanced capitalist'' to average of all other countries	2.4	4.2	4.5
Standard deviation of natural log of per capita incomes	.51	.88	1.06
Standard deviation of per capita incomes	P$459	P$2,112	P$3,988
Average absolute income deficit from the leader	P$1286	P$7650	P$12,662

Notes: The estimates in the columns for 1870 are based on backcasting GDP per capita for each country using the methods described in the text assuming a minimum of *P*$250. If instead of that method, incomes in 1870 are backcast with truncation at *P*$250, the 1870 standard deviation is .64 (as reported in Figure 1).

omy. The second row gives the level of the poorest economy in 1870, which is *P*$250 by assumption, and then the poorest economies in 1960 and 1990 taken from the Penn World Tables. By division, the third row then shows that the ratio of the top to the bottom income countries has increased from 8.7 in 1870 to 38 by 1960 and to 45 by 1990. If instead one takes the 17 richest countries (those shown in Table 1) and applies the same procedure, their average per capita income is shown in the fourth row. The average for all less developed economies appearing in the Penn World Tables for 1960 and 1990 is given in the fifth row; the figure for 1870 is calculated by the ''backcasting'' imputation process for historical incomes described above. By division, the sixth row shows that the ratio of income of the richest to all other countries has almost doubled from 2.4 in 1870 to 4.6 by 1990.

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bution back into the smaller range between the top and bottom while maintaining all cross country rankings. The formula for estimating the log of GDP per capita (GDPPC) in the ith country in 1870 was

$$GDPPC_i^{1870} = GDPPC_i^{1960}*(1/w_i)$$

where the scaling weight w_i was

$$w_i = (1 - \alpha_i)*\min(GDPPC^{1960})/P\$250 + \alpha_i*GDPPC_{USA}^{1960}/GDPPC_{USA}^{1870},$$

and where α_i is defined by

$$\alpha_i = (GDPPC_i^{1960} - \min(GDPPC^{1960}))/(GDPPC_{USA}^{1960} - \min(GDPPC^{1960})).$$

The magnitude of the change in the absolute gaps in per capita incomes between rich and poor is staggering. From 1870 to 1990, the average absolute gap in incomes of all countries from the leader had grown by an order of magnitude, from $1,286 to $12,662, as shown in the last row of Table 2.[12]

While the growth experience of all countries is equally interesting, some are more equally interesting than others. China and India account for more than a third of the world's population. For the conclusion of divergence presented here, however, a focus on India and China does not change the historical story. One can estimate their growth rates either by assuming that they were at $250 in 1870 and then calculating their growth rate in per capita GDP to reach the levels given by the Penn World Tables in 1960 (India, $766; China, $567), or by using Maddison's historical estimates, which are shown in Table 3, India's growth rate is a fifth and China's a third of the average for developed economies. Either way, India's and China's incomes diverged significantly relative to the leaders between 1870 and 1960.

The idea that there is some lower bound to GDP per capita and that the lower bound has implications for long-run growth rates (and hence divergence) will not come as news either to economic historians or to recent thinkers in the area of economic growth (Lucas, 1996). Kuznets (1966, 1971) pointed out that since the now-industrialized countries have risen from very low levels of output to their presently high levels, and that their previously very low levels of output were only consistent with a very slow rate of growth historically, growth rates obviously accelerated at some point. Moreover, one suspects that many of the estimates of income into the far distant past cited above rely on exactly this kind of counterfactual logic.

Considering Alternate Sources of Historical Data

Although there is not a great deal of historical evidence on GDP estimates in the very long-run for the less developed countries, what there is confirms the finding of massive divergence. Maddison (1995) reports time series data on GDP per capita incomes for 56 countries. These include his 17 ''advanced capitalist'' countries (presented in Table 1), five ''southern'' European countries, seven eastern European countries and 28 countries typically classified as ''less developed'' from Asia (11), Africa (10) and Latin America (7). This data is clearly nonrepresentative of the poorest countries (although it does include India and China), and the data for Africa is very sparse until 1960. Even so, the figures in Table 3 show substantially lower growth for the less developed countries than for the developed countries. If

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[12] In terms of standard deviations, the method described in the text implies that the standard deviation of the national log of per capita GDP has more than doubled from 1870 to 1990, rising from .51 in 1870 to .88 in 1960 to 1.06 by 1990. In dollar terms, the standard deviation of per capita incomes rose from $459 in 1870 to $2,112 in 1960 to $3,988 in 1990 (again, all figures expressed in 1985 dollars, converted at purchasing power equivalent exchange rates).

Table 3
Mean Per Annum Growth Rates of GDP Per Capita

	1870–1960	*1960–1979*	*1980–1994*
Advanced capitalist countries (17)	1.5	3.2	1.5
	(.33)	(1.1)	(.51)
Less developed countries (28)	1.2	2.5	.34
	(.88)	(1.7)	(3.0)
Individual countries:			
India	.31	1.22	3.07
China	.58	2.58	6.45
Korea (1900)	.71	5.9	7.7
Brazil	1.28	4.13	−.54
Argentina (1900)	1.17	1.99	.11
Egypt (1900)	.56	3.73	2.21

Source: Calculations based on data from Maddison (1995).

one assumes that the ratio of incomes between the ''advanced capitalist'' countries and less developed countries was 2.4 in 1870, then the .35 percentage point differential would have produced a rich-poor gap of 3.7 in 1994, similar to the projected increase in the gap to 4.5 in Table 2.

Others have argued that incomes of the developing relative to the developed world were even higher in the past. Hanson (1988, 1991) argues that adjustments of comparisons from official exchange rates to purchasing power equivalents imply that developing countries were considerably richer historically than previously believed. Bairoch (1993) argues that there was almost no gap between the now-developed countries and the developing countries as late as 1800. As a result, his estimate of the growth rate of the ''developed'' world is 1.5 percent between 1870 and 1960 as opposed to .5 percent for the ''developing'' world, which implies even larger divergence in per capita incomes than the lower bound assumptions reported above.

Poverty Traps, Takeoffs and Convergence

The data on growth in less developed countries show a variety of experiences, but divergence is not a thing of the past. Some countries are ''catching up'' with very explosive but sustained bursts of growth, some countries continue to experience slower growth than the richest countries, and others have recently taken nosedives.

Let's set the standard for explosive growth in per capita GDP at a sustained rate of 4.2 percent; this is the fastest a country could have possibly grown from 1870 to 1960, as at this rate a country would have gone from the lower bound in 1870

to the U.S. level in 1960. Of the 108 developing countries for which there are available data in the Penn World Tables, 11 grew faster than 4.2 per annum over the 1960–1990 period. Prominent among these are east Asian economies like Korea (6.9 percent annual growth rate in per capita GDP from 1960–1992), Taiwan (6.3 percent annual growth) and Indonesia (4.4 percent). These countries are growing at an historically unprecedented pace. However, many countries that were poor in 1960 continued to stagnate. Sixteen developing countries had *negative* growth over the 1960–1990 period, including Mozambique (−2.2 percent per annum) and Guyana (−.7 percent per annum). Another 28 nations, more than a quarter of the total number of countries for which the Penn World Tables offers data, had growth rates of per capita GDP less than .5 percent per annum from 1960 to 1990 (for example, Peru with .1 percent); and 40 developing nations, more than a third of the sample, had growth rates less than 1 percent per annum.[13]

Moreover, as Ben-David and Papell (1995) emphasize, many developing countries have seen their economies go into not just a slowdown, but a ''meltdown.'' If we calculate the growth rates in the Penn World Tables and allow the data to dictate one break in the growth rate over the whole 1960–1990 period, then of the 103 developing countries, 81 have seen a deceleration of growth over the period, and the average deceleration is over 3 percentage points. From 1980–1994, growth in per capita GDP averaged 1.5 percent in the advanced countries and .34 percent in the less developed countries. There has been no acceleration of growth in most poor countries, either absolutely or relatively, and there is no obvious reversal in divergence.

These facts about growth in less developed countries highlight its enormous variability and volatility. The range of annual growth rates in per capita GDP across less developed economies from 1960 to 1990 is from −2.7 percent to positive 6.9 percent.

Taken together, these findings imply that almost nothing that is true about the growth rates of advanced countries is true of the developing countries, either individually or on average. The growth rates for developed economies show convergence, but the growth rates between developed and developing economies show considerable divergence. The growth rates of developed countries are bunched in a narrow group, while the growth rates of less developed countries are all over with some in explosive growth and others in implosive decline.

Conclusion

For modern economists, Gerschenkron (1962) popularized the idea of an ''advantage to backwardness,'' which allows countries behind the technological frontier to

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[13] The division into developed and developing is made here by treating all 22 high-income members of the OECD as ''developed'' and all others as ''developing.''

experience episodes of rapid growth driven by rapid productivity catch-up.[14] Such rapid gains in productivity are certainly a possibility, and there have been episodes of individual countries with very rapid growth. Moreover, there are examples of convergence in incomes amongst regions. However, the prevalence of absolute divergence implies that while there may be a potential advantage to backwardness, the cases in which backward countries, and especially the most backward of countries, actually gain significantly on the leader are historically rare. In poor countries there are clearly forces that create the potential for explosive growth, such as those witnessed in some countries in east Asia. But there are also strong forces for stagnation: a quarter of the 60 countries with initial per capita GDP of less than $1000 in 1960 have had growth rates less than zero, and a third have had growth rates less than .05 percent. There are also forces for "implosive" decline, such as that witnessed in some countries in which the fabric of civic society appears to have disintegrated altogether, a point often ignored or acknowledged offhand as these countries fail to gather plausible economic statistics and thus drop out of our samples altogether. Backwardness seems to carry severe disadvantages. For economists and social scientists, a coherent model of how to overcome these disadvantages is a pressing challenge.

But this challenge is almost certainly not the same as deriving a single "growth theory." Any theory that seeks to unify the world's experience with economic growth and development must address at least four distinct questions: What accounts for continued per capita growth and technological progress of those leading countries at the frontier? What accounts for the few countries that are able to initiate and sustain periods of rapid growth in which they gain significantly on the leaders? What accounts for why some countries fade and lose the momentum of rapid growth? What accounts for why some countries remain in low growth for very long periods?

Theorizing about economic growth and its relation to policy needs to tackle these four important and distinct questions. While it is conceivable that there is an all-purpose universal theory and set of policies that would be good for promoting economic growth, it seems much more plausible that the appropriate growth policy will differ according to the situation. Are we asking about more rapid growth in a mature and stable economic leader like the United States or Germany or Japan? About a booming rapidly industrializing economy trying to prevent stalling on a plateau, like Korea, Indonesia, or Chile? About a once rapidly growing and at least semi-industrialized country trying to initiate another episode of rapid growth, like Brazil or Mexico or the Philippines? About a country still trying to escape a poverty trap into sustained growth, like Tanzania or Myanmar or Haiti? Discussion of the theory and policy of economic growth seems at times remarkably insensitive to these distinctions.

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[14] I say "for modern economists," since according to Rostow (1993), David Hume more than 200 years ago argued that the accumulated technological advances in the leading countries would give the followers an advantage.

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