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Economic Growth and the Diffusion of Power

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Economic Growth and the Diffusion of Power

Q. This year you completed your six-volume series, *Ideas and Action*, with the publication of *The United States and the Regional Organization of Asia and the Pacific, 1965-1985*. The series covers a broad range of policy issues from the preinvasion bombing of Europe in 1944 right down to current issues of growth and development in the world economy. What ideas stand out in the four decades covered in this series?

A. Two: the ongoing process of increasing global interdependence and the diffusion of power. Commentators often focus on the relative decline in the economic power of the United States in the world. What they may not realize, and I have argued this since the late 1950s, is that the most powerful underlying force at work in the world arena is the diffusion of effective power away from both Washington and Moscow. That has been accompanied by a growing interdependence, economically and politically, in the contemporary world.

First came the economic revival after World War II of Europe and Japan. Then the developing countries of

the Pacific Basin emerged beyond “Takeoff” into what I call their “Drive to Technological Maturity,” when they tend to grow faster than the most advanced nations—incidentally, an historical as well as contemporary phenomenon. When I spoke about the diffusion of power at a conference in Moscow, back in 1960, I saw three choices open to the Soviet Union and the United States. We could stumble into a war and destroy a large part of what man has built on the face of the earth and a large part of the world’s population. Or, we could continue a cold war until finally the diffusion of power removes the capacity to decide away from Moscow and Washington. Or, working together and with others, we could actually shape the terms on which that power becomes diffused. I expressed the hope, of course, that we would choose the latter path.

The diffusion of power stems not only from the revival of Western Europe and Japan but also from the increasing capacity of the developing countries to shape their own economic and political destiny. On the one hand, their economic, social, and technical prog-

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ress strengthened their nationalism and their scope for independent action. But, on the other, they became more dependent on the world economy and its transnational institutions, public and private.

Q. What was going on in the developing world at this time?

A. In terms of my perception of the stages of economic growth, many developing countries moved beyond Takeoff into the Drive to Technological Maturity. Early in the 1950s, India and China—the world's most populous countries—had entered the Takeoff into Sustained Growth. They are now moving into the next stage in which their growth rates tend to rise toward a maximum. At the moment, everyone looks at Japan as the great challenger to Western Europe and the United States. But there is a fundamental and virtually unnoticed revolution going forward in the technically more advanced developing countries. It involves South Korea, Taiwan and the other Southeast Asian countries gearing up to go high tech. India and China are not running far behind, and Brazil and other Latin American countries are in the race.

Q. What do you mean by revolution?

A. A revolution in education and, potentially, in technological absorptive capacity. Specifically, if you take the World Bank's group of countries called "lower-middle income" you will see that the percentage of their population aged 20-24 enrolled in higher education rose from 3 percent to 10 percent between 1960 and 1982. For "upper-middle income" countries that percentage rose from 4 percent to 14 percent. Even in India, with low income per capita, the share of this group enrolled in higher education skyrocketed from 3 percent to 9 percent. You can get some insight into the implications of this advance in education by looking at the figures for the United Kingdom where the percentage of people 20-24 in higher education was 9 percent in 1960 and in Japan 10 percent.

Q. Do you see this as significant simply as a general rise in literacy?

A. No, much more than that. It is a radical shift toward education in science and engineering. That's the revolution I'm talking about. The pool of scientists and engineers in India, for example, rose from about 190,000 in 1960 to 2.4 million in 1984. That is a critical mass of technical talent exceeded only by the United States and the Soviet Union. Another example

is Mexico, where, in the period 1957-1973, the number of graduates in natural science grew about 3 percent per year, and in engineering about 5 percent. Then from 1973 to 1981 this growth of Mexican graduates reached an astonishing fivefold acceleration—14 percent per year in the sciences and 24 percent in engineering. This constitutes a tremendous expansion in the potential absorptive capacities for the new technologies in the more advanced developing countries. It is already asserting itself in some cases and will become self-evident when the debt problem is brought under control.

Q. Are even the advanced developing economies ready for the Fourth Industrial Revolution?

A. When I was in China in 1983-84 with my wife, Elspeth, on our round-the-world tour (which she earned for us, incidentally), students, research workers, and government officials exhibited a compulsive but somewhat apprehensive interest in the new technologies. A Chinese student said, roughly: "We're confident we can absorb the technologies of the Third Industrial Revolution—steel and metal manufacturing, machine tools, chemicals, electronics, television—but now the North is coming along with a whole new wave of technologies in microelectronics, genetic engineering, and lasers. We feel set back and dependent again." My retort to him was that the more advanced developing countries were generating excellent scientists, engineers, and technicians. They all, including China, have—or would soon—a critical mass of technical talent. Their problem is how to organize the teams of scientists, engineers, businessmen, and workers to translate high technology into useful goods and services. They have to work at developing an osmotic process. That may well mean a radical reorganization of the big scientific and engineering bureaucracies to achieve flexible interactive partnerships so that the new technologies can be diffused throughout the old basic industries, agriculture, and the services.

It is a profound misunderstanding for social scientists to talk about the postindustrial society and the information society as if an economy could be sustained in the modern world by simply taking in each other's washing and selling computer services while letting basic industry atrophy or float off to less developed countries where air and water can be polluted with impunity. Most of the new technologies on the frontier will either be applied to the old basic industries, or they won't be applied at all. What are robots

for? The new revolution has produced ceramics, optical fibers, and plastics that are useful in substituting for conventional materials, even for aluminum and steel. Lasers are ubiquitous—appearing in some completely new uses, as in medicine, but also with applications in conventional industries such as textiles and steel.

Q. So the developing countries actually face the same kind of dynamic adjustment problem that the United States and other advanced countries face?

A. It's not only the same problem, but a very old problem in the evolution of national economies. David Hume posed it in the 18th century long before the first wave of industrial innovations rolled over England starting in the 1780s. Hume asked in 1758 what would happen to front-runners who first make improvements in the "mechanic arts" and go on to develop the skills of large-scale production and trade that go along with specialization and the exploitation of comparative advantage. The success of the front-runners, he said, would start a "fermentation" in the less advanced economies which would imitate the advanced front-runners, but with the advantage of lower wage rates. Two centuries ago, Hume anticipated what is and will increasingly be recognized as the central problem of the present, the next generation, and beyond.

Q. And how did he propose to deal with it?

A. He responded to the mercantilist instinct to throttle the imitators in their cradles by arguing that the front-runner would reap gains from expanding two-way trade with the latecomers. It was, therefore, in their interest to maintain an open trading system. But to sustain themselves in the face of increased competition they would have to remain "industrious and civilized." In Hume's words, "...the more the arts increase in any state, the more will be its demand from its industrious neighbors." But the central question now for the United States and Western Europe is: Are we capable of remaining "industrious and civilized" and thus reaping the benefits of the rise of the nations in "fermentation"? The returns are not yet in.

Q. Your book *Eisenhower, Kennedy and Foreign Aid* (Volume 5 in the *Ideas and Action* series) examines the debates on economic development and foreign aid, starting with the Eisenhower administration. Bipartisan support for more aid to India emerged

with the Senate resolution (1958) sponsored by John F. Kennedy and John Sherman Cooper, despite strong opposition within the administration, including Treasury Secretary George Humphrey, and development economists such as P.T. Bauer (who, incidentally, not long ago was expressing some of the same criticisms of foreign aid in the *Wall Street Journal*—now 30 years later). Didn't the Reagan administration embark on a development policy strategy much like the Eisenhower administration's? Haven't we come full circle?

A. You have got to be careful in making that judgment. There are political and economic similarities in the 1980s, but vast changes separate us from the 1950s and 1960s. True, the Reagan administration started with exactly the same doctrines that the Eisenhower administration initially asserted in 1953. Reagan's advisers wanted private investment in the developing world to displace government foreign aid. They did quite an interesting and objective review of the World Bank when they came into office and were surprised to find it so well run. Nevertheless, they tried to phase down the international development institutions and let private enterprise take over foreign aid. Yet, I bet they will end up being the biggest foreign aid administration in U.S. history.

Q. What evidence do you have for that?

A. Wait and see. Treasury Secretary Jim Baker is now running around trying to get more funds for the World Bank and the regional development banks. The private commercial banks won't put up the rollover money for LDC debts unless the governments put up some backup money. So you have to get the IMF and the World Bank and the regional banks involved. We shall have to make a huge consortium of financial institutions to sustain the international financial system weighed down by this monumental debt load, and then create the circumstances in which the heavily indebted countries can again move forward. Lending them money to pay us interest is not enough.

Q. So the LDC debt burden is one of the great differences between the 1980s and the 1950s?

A. But there is an even more fundamental difference—most of the developing countries are now beyond Takeoff into the Drive for Technological Maturity. They are what I call the fourth graduating class of countries moving through and beyond the Takeoff—Argentina, Brazil, Mexico, and Turkey took off in the 1930s in the shock of the Great Depression, followed

by India, China, Taiwan, Iran, Thailand and South Korea in the 1950s and '60s. Some are now pushing ahead and absorbing the latest technology from the advanced countries. Sooner or later, the advanced economies will have to compete with this new graduating class. This is part of the diffusion of power. At the same time, developing countries gain new strength and independence, they also grow more dependent on an increasingly interdependent world. I spelled this out in my *World Economy: History and Prospect* (University of Texas Press, 1978). You remember Britain stood alone in the 1780s in the first graduating class to push into Takeoff. The second class came along in the second quarter of the 19th century—Belgium, France, Germany and the United States. And the third group includes Sweden and Japan in the 1870s-80s, Canada, Italy and Russia in the 1890s and Australia at the turn of the century.

Q. Within the process of increasing interdependence and the diffusion of economic power, how do you explain the rise and fall in U.S. growth?

A. Many American economists like to explain our growth in the period after World War II in terms of our successful macroeconomic policy. As the postwar boom was developing, the economics profession was busy interpreting Keynesian theory, refining it and building models to guide policy. But it was all done from a very short time perspective. Keynes wrote *The General Theory* with short-period Marshallian assumptions excluding technological and other critical supply-side changes. The British and the Americans were delighted with the simple, highly aggregated, system of Keynesian categories. They organized the statistics of national income and with this statistical base they went on to develop Harrod-Domar growth models and the Hicksian and other refinements. But, in my view, technological change was critical, and nothing emerged from these macroeconomic analyses that forced economists to look at technology. Oh, yes, the macroeconomic equations included the capital/output ratio—the links between real investment and production—but that is really an empty theoretical black box.

Q. What should economists have been looking at?

A. They should have been asking about why Japan had a higher rate of growth than Western European countries, which in turn had higher rates of growth than the U.S. economy. Those growth differentials

reflected the scale of the technological backlog among these countries. Japan, the latecomer, had the biggest backlog to digest which resulted in the highest rate of growth. But macroeconomists didn't seem to ask why. They blithely went along with studies which assumed savings was determined by the consumption function without thinking about how the level of investment is a function of the size of a country's technological backlog and its entrepreneurial capacity to absorb that backlog efficiently. A very big chunk of plant and equipment spending depends on that process. The rate of growth of individual sectors of the economy is based on the technological backlog of that sector, and the rate of sectoral growth determines the scale of profits. With rapid growth in a sector, a high proportion of profits is plowed back into more plant and equipment expenditures.

Q. But how does that explain what happened in the United States?

A. While economists went on playing neoclassical games until the games fell apart, the momentum of post-World War II growth collapsed. Neoclassical economists still see the great boom in the world economy of 1951-72 as a triumph of modern macroeconomics and skillful policymaking. They say it was a high level of effective demand that produced low unemployment, rapid growth, and low rates of inflation, at least until the mid 1960s.

Q. It's true, isn't it, that macro policy was successful, certainly in comparison with experience in the 1980s?

A. Yes, but that demand-side theory omits three critical forces.

- First, the United States benefited from certain relatively new technologies: television, synthetic fibers, plastics. In addition, Western Europe enjoyed a large backlog of auto and durable goods technologies. And this was true to an even greater degree in Japan. The rapid diffusion of those technologies led eventually to high levels of mass consumption in Western Europe and Japan as well as North America.

- Second, this country, along with other advanced industrial economies, benefited by the absolute decline in the price of basic commodities from 1951 to 1964 that yielded a 20 percent lift to the U.S. terms of trade. That favorable shift in world commodity prices contributed to a rise in U.S. real wages that supported consumer spending and also had a powerful damping effect on our inflation rates right down to the mid

sixties. Just take one example: This country had a roughly 40 percent *drop* in the price of electricity relative to the general price level. Economists seemed to take that as a free gift. There was nothing in their theoretical structures that forced them to ask why it was happening and when it would end.

• Third, the leading sectors of the postwar boom began to decelerate in a perfectly natural way in the mid sixties, at the same time that the decline in basic commodity prices bottomed out. That yielded a slowdown in the rate of productivity growth and a tendency for the capital/output ratio to rise in all the advanced industrial countries.

Q. Then, in the 1970s, we came to the end of that expansion?

A. Yes. There were supply-side factors at work, bringing it to an end. For example, few economists looked at the stocks of grain relative to annual consumption; but they were falling as a matter of trend in the 1960s. Mainstream economists simply didn't examine global food requirements, even when back-to-back famines in India in 1965-66 and 1966-67 should have sounded an alarm. I remember writing a memo to President Johnson warning that the Indian famine was much like the Irish potato famine of exactly 120 years earlier which foreshadowed a doubling of wheat prices in the early 1850s.

Few seemed interested in the increasing U.S. dependence on imported oil. Economists didn't even take seriously in 1970-71 that we began an absolute decline in oil and gas production. The typical attitude among economists was that these were trivial "exogenous" developments. There was an expert down the hall on oil and gas and agriculture, but serious macroeconomists didn't bother with these events or try to include them in their debates or model-building. That's a painful story. In any case, you can't explain the boom and its collapse by 1972-1974 simply in terms of demand-side macroeconomic theory. You have to bring in these supply-side factors as well. All this leads me now to try to change in a basic way the theoretical structure we now teach our economics students and apply to contemporary affairs.

Q. Just how do you see an alternative theoretical structure?

A. Three themes in the flow of economic history should be interwoven into a new theoretical structure. I

wrote about them in my Tawney Memorial Lecture in 1984 delivered in Glasgow. The stages of economic growth is the first of these analytic concepts and they show the relationship between the stage of a country's economic growth and its rate of growth.

Q. Those are the four stages you have been working on for decades, aren't they?

A. Yes, the Preconditions for Takeoff, the Takeoff, the Drive to Technological Maturity, and High Mass Consumption. I introduced them in my *Process of Economic Growth* (Oxford University Press, 1952) and fully elaborated them in *The Stages of Economic Growth* (Cambridge University Press, 1960).

Add to that framework a second analytical theme that focuses on long-term trends in the prices of basic commodities relative to prices of manufactures—the global intersectoral terms of trade. This approach is the primary means for interpreting historical cycles in prices, money wages, and interest rates starting around 1790. Kondratieff first identified them. In my view, they continue right down to the present.

The third theme is the ebb and flow of major innovations in the world economy and the timing of their diffusion. It was the backlog of new technologies and mass consumption based on them that fueled the postwar expansion. Using this approach, I see a dramatic waning of what I call the Third Industrial Revolution in the second half of the 1960s and the emergence since the mid 1970s of the Fourth Industrial Revolution—that is, the wave of microelectronics, genetics, robots, lasers, new industrial materials, and new methods of communication.

Q. What technological changes characterized the Third Industrial Revolution?

A. That embraced the cluster of innovations including the internal combustion engine, electricity, and a new round of chemicals, a wave that I date from about 1900. You see, the First Industrial Revolution, that emerged in the 1780s, generated factory-manufactured textiles, the more efficient Watt steam engine, and the production of good iron from coke. The Second centered on the railroads and cheap steel that powered economic advances starting in the 1830s and 1840s in Great Britain, Western Europe, and the American Northeast. Economic theory and, certainly, a theory of economic growth must link up the historical clusters of technology change and their impact on investment, output, and employment.

Q. So a cluster of technological innovations explains the postwar economic boom?

A. The uniquely high real growth rates during 1951-1972 were driven by (1) the catching up of Western Europe and Japan to the United States in the High Mass Consumption stage of growth; and (2) the transition of many developing countries into their Drive to Technological Maturity, a stage in which growth rates rise to maximum levels. In the advanced countries, consumers had to absorb a large backlog of familiar technologies linked to the automobile and other durable goods. Normally, growth rates decelerated progressively in societies moving into High Mass Consumption, but in the postwar period the great backlog of technologies to be diffused and absorbed helped to hold growth rates up for a while.

Beyond those three themes I just mentioned, I would add a fourth theme: you can't do serious systematic economic analysis, particularly if you're involved in policy matters and trying to forecast the outlook, without introducing systematically noneconomic factors. Here I would endorse what John Stuart Mill wrote in the preface to all six editions of his *Principles*—that there are no major practical problems, even those nearest to the character of purely economic questions, which can be decided on economic premises alone. All issues are ultimately political. The agenda for research and for policy should, for example, include a lot of noneconomic analysis that explores the optimum institutional linkage between science, engineering, entrepreneurship, and the working force. It will vary from country to country, sector by sector.

Q. How can we integrate the generation of technological innovations into economic theory?

A. It's difficult but possible. I saw this problem at the outset of my career when I settled down at MIT in 1950 to teach the history of the world economy. Conventional micro and macroeconomics gave me no map, so my first duty was to create one. It's all in *The Process of Economic Growth*, the most fundamental book I ever wrote. *The Process* had nice, thoughtful reviews, but mainstream economists paid no attention to it because it cut across what they were doing at the time—conventional Harrod-Domar growth models and neoclassical and Keynesian refinements. So, in a final effort, I am turning to 300 years of the theory of growth and then the best formulation of my own view of which I'm

capable, incorporating the generation and diffusion of technologies and other supply-side factors into the theory. I start out reviewing the basic growth equation: how population and the work force are treated, how demographic transitions are woven into the system, and how technological change is related to the investment process. Then I look at how growth theorists treated business cycles. Did earlier economists see cycles as the manifestation of growth in the economy, or did they abstract from the trend and try to isolate the nature of the business cycle, independent of growth? So far my review of old theories brings me up to Keynes. His work absolutely screwed up business-cycle analysis as it had evolved quite constructively from 1900 to 1936. He used Marshallian short-period analysis, removing technological change and other supply-side factors which are at the heart of growth and of business cycles which are, simply, the form growth has historically assumed. After rereading earlier economists, I've come to the conclusion that the last across-the-board growth economist was Alfred Marshall.

Q. But people think of Marshall as a microeconomist. Did he have much to say about growth?

A. He was *primarily* a growth economist, but later economists have seized on his partial-equilibrium microanalysis, and his kind of Walrasian general equilibrium stated in nonmathematical terms. In my new book, I will have a long chapter on Marshall as a growth economist. It is rooted in Book 4 of his *Principles*. Everyone knows about Marshall's Books 3 and 5, but most economists don't know (or only vaguely remember from graduate school) what's in Book 4. Marshall early laid out a mathematical growth equation totally recognizable as a kind of neoclassical growth model of the 1960s. When he began to specify the determinants of each of the variables in his early equation, he soon saw how complicated and noneconomic they were. When he realized the false elegance of his mathematical equations—he was, after all, a far better mathematician than Walras, Jevons, or the other modern economists of his day, and he knew the limitations of mathematics—he gave up on the math and wrote about the larger issues in good clear prose backed by a great deal of economic history. For example, he wrote about the shift in the locus of economic leadership among nations, with Germany and the United States challenging Britain. He talked about Russia and Japan entering the world scene and even about the future

roles of India and China. Marshall even ventured into the limits of growth which he thought would be reached by the end of the 21st century.

Q. He seems to have been a prophet, as well as an economist.

A. Yes, but few read that part of Marshall. He was a great economist. In general, when you go back to read what the founding fathers of economics actually said, as opposed to what's in the good, conventional histories of economic doctrine, you wouldn't believe how fresh and good they were, and how badly communicated they are in paraphrase.

Q. It also indicates how hard it is to find a truly fresh idea. They said it all in the 18th and 19th centuries.

A. Schumpeter is another fascinating economist who figures importantly in my review of growth theories. He was an extraordinarily paradoxical man, it turns out, coming out of 19th century Moravia with more personal complexities than you can shake a stick at. But he had a powerful insight that a great deal of growth was propelled by massive clusters of innovations which he dealt with endogenously in his theory. Later macroeconomists simply walked away from the problems he posed. There was nothing in the structure of macroeconomics that emerged to force economists to look at technological change and innovation. In part this is because of a technical problem: increasing returns render difficult the definition of equilibrium in terms of calculus.

Q. You mentioned earlier that economists missed the alarm bells sounding in the 1960s and '70s—the Indian famine and the downturn in U.S. oil production and the upturn in basic commodity prices. Are we missing any alarm bells ringing now for the 1990s?

A. Clearly, one we are not missing, because it's so palpable, so broad in scope, is the global mess we've gotten into and how we can manage a soft landing. I refer, of course, to the interlocked problems of our budget and balance-of-trade deficits, excessive real interest rates, and the international debt problem. Our immediate challenge has many dimensions and themes—like a soap opera. We have to deal with the LDC debt problem in some way to avoid a big breakdown in the world financial and trading system. We have to revive the growth momentum in the developing

world; otherwise, we shall have big, strategic, political and social problems to deal with on top of protracted very low rates of growth. Given the high rates of population growth in developing countries, and especially the flood of young people headed for the work force, economies in this stage in history have got to run very fast just to absorb the influx of young people. Even then, we'll still have big fringes of partial employment and unemployment.

Q. Texans are especially sensitive to that, with Mexico so near, aren't they?

A. We live next to a ticking economic, social, and political bomb. A solution to the debt problem requires higher growth rates in Mexico's potential export markets. That bears directly, of course, on reviving Western Europe and Japan, as well as this country. We often forget that an important margin in OECD growth is the increase in our exports to the developing regions. If exports don't revive, our basic industries can't; if we don't revive, the LDCs can't pay interest on their debts. From the U.S. vantage point, there is the question of our balance-of-payments disequilibrium—our huge trade deficit. We have devalued the dollar, but so far we haven't had the usual inflationary surge that follows devaluation, because of falling oil and food prices. We could still get an inflationary impulse through higher import prices, if we start accelerating increases in money wages and then revive high interest rates and inflationary expectations. We should be thinking about an incomes policy in this country, and how we'll treat the next round of inflation; but most economists, as in the 1950s and 1960s, are not asking how long falling oil and food prices will continue.

If we are to solve our trade deficit, the rest of the world will have to adapt to losing part of their share of the U.S. market. The much cheaper dollar should eventually have that effect, especially if we accelerate the diffusion of the new technologies and maintain wage discipline. The good side of the dollar's fantastic fall is that the 30 percent "tariff" against U.S. exports—the result of an overvalued dollar—has been reduced. Yet, if developing countries lose their exports to the United States, they won't be able to get dollars to service their debts at American banks or to buy our exports. We certainly want to avoid an outcome in which the United States and other advanced countries, along with the developing world, all cut back—we take less of their goods and they take less of ours. That

would simply evoke something like the unhappy experience of the 1930s.

Q. But aren't we already in that predicament?

A. Yes—to a degree. And the only way out is for the United States to maintain a high rate of growth so that the trade adjustment takes place within a rapidly expanding global economic pie. Developing countries will be able to sell more to us, even as their share of our market declines, while we sell more to them, thereby bringing the U.S. trade account gradually into balance. Japan will have to play a key role in the adjustment. They must restructure their whole economic and social policy, because they don't absorb foreign manufactured goods and spend too much effort in driving for export markets. Japan will have to do more to raise the average standard of living—more and better housing, for example. They ought to provide more *real* foreign aid; that means real transfers, not simply promoting and financing their exports. Japan will probably also have to play a larger defense role, building up its conventional naval and air forces, and patrolling the sea lanes, especially since the Russian air force often penetrates its air space.

Q. Coming back to the problem of the potential for renewed inflation, given our current stagnation and price deflation, is that really a problem?

A. Yes, if we look ahead. Policymakers are often stuck in the past when they should be looking ahead. It would be unwise to assume that falling oil, agricultural, and raw material prices will continue to damp inflation for us as they have in the last few years. That is especially so now that the dollar has fallen so far, so fast. I don't have hard answers here. But, if we want to forecast the future, we have to remember that history is *never* linear. Yet human beings, including contemporary economists, tend to assume it is. That's how we got into this trouble in the U.S. oil patch, in Mexico, and other oil-producing countries—we believed the glossy scenarios coming out of the big Houston oil companies that assumed oil prices would continue to rise indefinitely in real terms. It would be equally unwise to assume they are now going to go *down* indefinitely.

One thing we know for sure: history is full of surprises; it never replays itself. Economic events today are not repeats of the interwar years. Favorable terms of trade for the raw material exports of developing

countries may help some, but that's not the solution to the problems of LDCs. Better export prices may help, as they helped Mexico with oil. But remember, that works against the domestic sectors undergoing industrialization. The Latin American economist (and my old friend) Raul Prebisch argued for much of his professional life quite legitimately that the fall in basic raw material prices after 1951 did hurt developing countries, but he neglected to note that low raw material and energy prices also were a great stimulus to their industrialization.

Q. But the collapse in export prices did cut their export proceeds and constrain their sources of capital.

A. That's why foreign aid was so appropriate. That led to the great debate on foreign aid in the 1950s and the subsequent push for foreign aid championed by John F. Kennedy.

Q. So it looks as if we are coming full circle on foreign aid now, doesn't it?

A. So long as we realize that there are patterns that recur, but we can't expect to recapture the precise patterns of our youth. This is a different ball game now and we have got to be conscious of those differences and correct for them. That's where being an economic historian is helpful. I don't expect exact recurrence. The 1990s will be quite a lot different from the 1960s.

Q. These surprises in economic history—the discontinuities in economic processes—are really at the heart of the “abiding schism” you see among American economists, aren't they?

A. Though I risk oversimplification, I am convinced that economists today are divided between what I call the neo-Newtonians and the biologists. I am no doubt a biologist. But that distinction has been around a long, long time. I see it most clearly represented in our profession by the polar extremes of Ricardo and Malthus. They carried on a virtual dialogue of the deaf for twelve years. They tried with great integrity to define and reconcile their differences, but never succeeded. The neo-Newtonians among economists today continue the Ricardian Vice—to use Schumpeter's phrase—piling up abstract assumptions until the desired results of economic models really emerge essentially as tautologies—elegant but out of touch with the complexities of reality.

Q. Who are the neo-Newtonians today?

A. They dominate the American economics profession. They generate the products of U.S. graduate schools all over the country. The students, following their professors, are writing elegant papers. Elegance is the criterion for success. We are training students to worship method and technique; they have more mathematics and econometrics than ever before, and I've always supported that kind of training if it is a means, not an end in itself. But the conclusions and proposals coming out of neo-Newtonian thinking are fairly modest. They don't know how to tackle a big problem, the global issues that are gripping policymakers everywhere.

Not long ago I participated in a symposium in Belgium honoring a long-time friend and colleague. When my turn came to speak, I said, "Gentlemen, you know there is something very odd about this—these are elegant papers but with relatively modest proposals. Yet here we stand in Belgium, where the two great problems are 15 percent unemployment and a much more sluggish generation and absorption of the new technologies than in Japan and in the United States. But not a word has been said about technology and employment. And don't tell me that you can't generate employment here, because three of the four American participants come from Massachusetts, where at the moment unemployment is down to under 4 percent, due to the rapid expansion of high tech."

Economists must be able to talk about generating new technologies that flow from the 2 or 3 percent of GNP we allocate to R&D. Research and development ought to be treated as an investment sector in the accounts, and the flow of inventions and innovations into the economy treated as an integral part of the growth process. Schumpeter's insights on innovation were basically correct. This means economists will have to deal with large discontinuous change in production functions and their impact on employment and productivity growth. Specialization of function and economies of scale with all their refinements are no longer adequate. We economists have a long and quite revolutionary agenda for theoretical and empirical research ahead of us. In short, neoclassical economists—the neo-Newtonians—don't know how to deal with the generation and diffusion of technologies as an integral part of mainstream economics nor indeed the cycles in relative prices. Yet we can't understand the processes of growth and development until we do.

Q. In the light of your long experience as a public servant, adviser to presidents, and academician, what do we have to do in the next few years to achieve our soft landing?

A. I've already commented on the technical agenda and the directions in which answers are to be sought. But the most basic change required is political. If the United States and Western Europe are going to adapt, they will have to make radical changes in their political rhetoric and methods. Since the last quarter of the nineteenth century, we have been embroiled in a zero-sum conflict over allocating an economic pie that everyone assumed was automatically growing. We now must shift to a cooperative communal effort to make sure the pie will continue to expand. Look at the 1984 presidential campaign: the terms of the debates were similar to those of every election since 1896—protect the private sector from government intrusion versus providing equity for the disadvantaged. Our national politics has recently forced us to hold up our standard of living by borrowing massively abroad. At the same time, we have inflicted on ourselves, as if in awkward penance, a fiscal chastity belt named Gramm-Rudman to curb an irrepressible passion for federal spending or to overcome an unconquerable resistance to the discipline of taxes. The politics of communal cooperation, rather than confrontation alone, can solve these problems.

Our economic and political institutions also face a major global adjustment in coming decades. Advanced industrial countries, including the Soviet Union and Eastern Europe, now hold some 1.1 billion people, roughly a quarter of the world's population. Another 2.6 billion people now live in countries that will very likely acquire technological virtuosity in, say, the next fifty years (or in the working life of my students). This represents a vast historical transformation. I started out talking here about the diffusion of economic and political power away from both Moscow and Washington. That diffusion continues as the latecomers achieve technological equality with the old-timers, and as it does we shall have to resolve all kinds of mercantilist frictions and political dangers in the context of the mortal dangers that go with a nuclear age. It will demand unusual leadership and wisdom—and a sense of international as well as domestic community—to manage a soft landing over the long term; that is, the achievement of Hume's "industrious and civilized" societies.