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Economic Growth, Population Theory, and Physiology: The Bearing of Long-Term Processes on the Making of Economic Policy

The Nobel Prize Lecture

The following is a summary of the Nobel Prize Lecture, "Economic Growth, Population Theory, and Physiology: The Bearing of Long-Term Processes on the Making of Economic Policy," by NBER Research Associate Robert W. Fogel. This is available as NBER Working Paper No. 4638, and will be published in the American Economic Review.

Economic history has contributed significantly to the formulation of economic theory," Fogel begins, "and nowhere is the need to recognize the role of long-run dynamics more relevant than in such pressing current issues as medical care, pension policies, and development policies." He then puts these issues into perspective by describing the escape from hunger and premature mortality that began in Europe and North America about 300 years ago and has not yet run its course.

Fogel notes that between 1871 and 1901, life expectation in Britain increased by four years. During the next three decades, there was an additional gain of 16 years in Britain, and similar declines in mortality occurred in other European nations. Surprisingly, researchers have determined that the elimination of crises, including famines, reduced mortality rates by less than 10 percent. Chronic malnutrition was a far more important cause of the high mortality rates of the past, they find.

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Fogel explains that malnutrition can be caused either by an inadequate diet or by excessive claims on that diet (including work and disease). For many European nations before the middle of the 19th century, the production of food was so low that the poorer classes were bound to have been malnourished under any conceivable circumstance. In fact, if either the 18th century British or French had been as large as the typical American male today, then virtually all of the energy produced by their food supplies would have been required for maintenance, and hardly any would have been available to sustain work. To have the energy necessary to produce the national products of England and France around 1700, the typical adult male must have been quite short and very light.

Data on stature and weight collected for European nations support this conclusion. During the 18th and 19th centuries, Europeans were severely stunted by modern standards. The average weight of English males in their thirties was probably about 135 pounds in 1790, about 20 percent below current levels. The corresponding figure for French males at that time appears to have been about 110 pounds, or about one-third below current standards.

Yet, even after allowing for the reduced requirements of small stature and body mass, the food supply in England and France permitted very little work. In France, for example, the bottom 10 percent of the labor force lacked the energy for regular work; the next 10 percent had enough energy for less than three hours of light work daily. Although the English situation was somewhat better, the bottom 3 percent of its labor force lacked the energy for any work; the balance of the bottom 20 percent had enough energy for about six hours of light work each day.

Fogel has found that factors associated with a gain in the body mass index (BMI) and height explain about 90 percent of the decline in French mortality rates between 1785 and 1870. But these factors explain only about half of the decline in mortality rates during the past century. Other factors, including improved biomedical treatment of chronic conditions, have become increasingly important. In this connection, Fogel observes the same relationship—more chronic conditions found among men of small stature—both among men in the 1860s and among those surveyed by the U.S. National Health Interview in 1985 to 1988.

Further, by comparing the height and BMI of Union Army veterans aged 65 or over in 1910, and veterans (mainly of World War II) who were the same ages during 1985–8, Fogel is able to predict a decline of about 35 percent in the prevalence of chronic disease, quite close to what actually occurred. Among the Union Army veterans, heart disease was about three times as prevalent, musculoskeletal and respiratory diseases about one-and-a-half times as prevalent, and digestive diseases almost five times as prevalent as in the group in 1985–8.

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Summing up, Fogel explains that by current standards, even persons in the top half of the income distribution in Britain during the 18th century were stunted and wasted, suffered far more extensively from chronic diseases at young adult and middle ages than is true today, and died 30 years sooner than today. Childhood stunting and wasting has a long reach, causing high chronic disease rates at young adult and later ages. Although we do not have the data yet to predict disabling chronic diseases among adults in the developing nations, our knowledge of the legacy of childhood malnutrition in rich countries, both now and when they were much poorer than they are today, suggests that a similar interconnection exists in developing countries.

Malnutrition has an economic impact as well. When the mean amounts of calories are as low as they are in the poor nations of the world, labor force participation rates and labor productivity are bound to be low. In fact, Fogel finds that improved gross nutrition explains roughly 30 percent of the growth of per capita income in Britain between 1790 and 1980.

He theorizes that economic growth can be explained by both "thermodynamic" and "physiological" factors. The first law of thermodynamics holds that energy output cannot exceed energy input. That law applies as much to human engines as to mechanical ones, he writes. Producing more food in Britain raised the labor force participation rate by bringing in the bottom 20 percent in 1790, who previously had only enough energy for a few hours of strolling. For those already in the labor force, the intensity of work per hour increased because the number of calories available for work increased. This change in the intensity of effort, by itself, appears to have accounted for about 20 percent of the long-term growth rate in England.

Increases in the intensity of labor per hour also occurred in America, although food supplies were far more abundant than in Europe. If the daily number of calories available for work had been the same in the United States in 1860 as today, the intensity of work per hour must have been well below today's levels, since the average number of hours worked in 1860 was about 1.75 times as great as today. During the mid-nineteenth century, only slaves on southern gang-system plantations appear to have worked at levels of intensity per hour approaching current standards!

In Fogel's theory of economic growth, the physiological factor pertains to the efficiency with which the human engine converts energy input into work output. The average efficiency of the human engine in Britain increased by about 60 percent between 1790 and 1980. The combined effect of the increase in dietary energy available for work, and of the increased human efficiency in transforming energy into work, appears to account for about 50 percent of the British economic growth since 1790, Fogel finds.

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He cautions that change does not come quickly, though. Much of the gain in thermodynamic efficiency that occurred in Britain and other OECD countries between 1910 and 1980 was caused by a series of investments made as much as a century earlier. In the United States, the social investment in biomedical research between 1870 and 1930 (which included the establishment and expansion of modern teaching and research hospitals) had its largest payoffs well after it was made. The lagged income streams generated by such investments are not adequately reflected in national income accounts.

Fogel concludes that we have not yet completed the escape from hunger and premature death that began nearly three centuries ago. Chronic diseases and death still are occurring prematurely, even in the rich countries. If the reforms of health care and pension programs now being considered by policymakers are to be successful, they must be consistent with the long-term physiological changes governing the decline in chronic diseases and the increase in longevity. Long-term forecasts that do not take account of the dynamics of these changes over the past century, and of the socioeconomic, biomedical, and other environmental improvements that made them possible, are liable to be far off the mark.

Welfare Benefits Determine Hours of Work

Congress recently expanded the welfare safety net by requiring all states to broaden the Aid to Families with Dependent Children (AFDC) program to include two-parent households in which the "principal earner" works less than 100 hours per month.

Now in a new study for the NBER, **Hilary Hoynes** finds that benefit levels in the extended AFDC-UP (for unemployed parent) program significantly affect the number of low-income households that participate. Evidence from differences in AFDC benefits across states shows that increasing AFDC-UP benefits by 20 percent increases participation in the program by about 14 percent. Decreasing the AFDC-UP benefit reduction rate affects both participation in the program and family labor supply, but by less than increasing the maximum benefit level does.

In **Welfare Transfers in Two-Parent Families: Labor Supply and Welfare Participation Under AFDC-UP** (*NBER Working Paper No. 4407*), Hoynes also finds that eliminating the work restriction for the principal wage earner, a provision currently under consideration, would have a dramatic effect on the number of families eligible to receive benefits under AFDC-UP, but does not increase program participation among the eligibles appreciably. The increase in eligibility reflects the fact that many low-wage individuals are eligible for benefits even while working full time. However, families affected by the elimination of the work restriction are eligible for only relatively low levels of benefits. Consequently, the potential gain associated with their increase in income would be small relative to the cost of being on welfare.

If the AFDC-UP program were eliminated altogether, and workers were free to work as many hours as they wished, labor supply among formerly participating parents would increase substantially: about 47 hours per month for husbands, and 32 hours per month for wives. Despite this, if the AFDC-UP program were eliminated, most families would not have enough of an increase in their earnings to replace the lost income. As a result, almost 75 percent of previous AFDC-UP recipients would still be eligible for other welfare benefits.

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AFDC-UP recipients are quite different from female-headed households receiving AFDC, Hoynes learns. UP families tend to have older parents, contain more children, and are more likely to be white: about 65 percent of AFDC-UP families are white. Further, UP families are more likely to have both earned and unearned income, and are more than twice as likely to have any financial assets.

Beyond the income and asset tests required of all AFDC families, the "principal earner" in AFDC-UP families must satisfy a work history requirement, and is not allowed to work more than 100 hours a month while receiving benefits. This 100-hour work limit is what gives the AFDC-UP program the name "unemployed parent." Since a work history is required of the AFDC-UP families, at least one of the parents has had some prior attachment to the labor market. That typically translates into higher wages and greater labor market opportunities for these households. So, these two-parent families will respond more than other households to changes in welfare programs. Hoynes finds that both the estimated disincentive effects and the sensitivity of participation to increases in the maximum benefit level are greater among the AFDC-UP families than among female-headed households.

As of fiscal year 1988, 26 states offered AFDC-UP programs, with a combined caseload of over 225,000 households serving almost one million recipients. To extend the program, Congress passed the Family Support Act of 1988: it requires all states to establish AFDC-UP programs for eligible two-parent households.

Consumers Surprise Economists When It Comes Time to Spend

In 1992, the income tax withholding tables were adjusted so that less would be taken out of workers' pay and, as a result, year-end tax refunds would be smaller. The Bush Administration hoped that the extra take-home pay would boost spending, and help the country out of the recession. Many economists didn't think this would work, though, since only the timing of income would change, not the total amount. But a new study by **Matthew Shapiro** and **Joel Slemrod** suggests that the economists may have been wrong.

In **Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding** (*NBER Working Paper No. 4344*), the authors report the results of a survey they took one month after the change in withholding took effect. They found that 43 percent of the respondents said they would spend the extra cash that resulted from a change in the timing of tax payments, while the balance would save it, or use it to pay off debts.

"Forty-three percent of the respondents said that they would spend the extra cash that resulted from a change in the timing of tax payments."

Economists would expect only those who were "liquidity constrained"—basically, short of cash—in 1992, but expecting not to be in 1993, to spend the extra take-home pay. But Shapiro and Slemrod find no link to liquidity in the spending promises of the survey respondents: Although ". . . age and educational attainment are related to the response to the change in withholding, neither current financial status nor expected future financial status plays an important role," they find.

The withholding change put an extra $28.60 per month in the paycheck of the typical married worker between March and December 1992. If the results of the survey were indicative of actual consumer behavior, then the withholding change boosted consumption by $11 billion at an annual rate.

What History Teaches About Regional Trade Arrangements

The congressional ratification of the NAFTA Treaty, the November 1993 APEC Summit in Seattle, and the progress of the European Community's Single Market initiative have prompted fears that the international trading system could break up into regional trade blocs. Many fear a repeat of the 1930s, with a rise in preferential trade arrangements, the regionalization of transactions, and the collapse of international trade. But in a recent NBER study, **Barry Eichengreen** and **Douglas Irwin** find that preferential arrangements in the 1930s had neither uniformly favorable nor uniformly unfavorable implications for the world trading system. Some regional arrangements created trade, others diverted it. Some lowered trade barriers and encouraged financial links among the participants without hampering trade and payments with nonmember countries.

In **Trade Blocs, Currency Blocs, and the Disintegration of World Trade in the 1930s** (*NBER Working Paper No. 4445*), Eichengreen and Irwin analyze data for 34 countries and 560 bilateral trade flows for 1928, 1935, and 1938. They describe the extent of regionalization, showing, for example, that the share of British imports drawn from Commonwealth countries rose from 30 percent to 42 percent between 1928 and 1938. The 1932 British Tariff, from which Commonwealth countries essentially were exempted at Ottawa, raised import duties above 1928 levels, but not by enough to significantly depress imports from non-Commonwealth countries. The share of intra-Commonwealth trade did not rise because of discriminatory policies, but because of rising incomes, caused by the relatively rapid recovery of these countries from the Great Depression.

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In contrast, other initiatives to promote regional links raised barriers to imports from nonbloc members and placed obstacles in the way of financial relationships with those countries. This was most obvious in Germany's commercial and financial policies toward the central and eastern European countries within its sphere of influence, policies consciously designed to encourage intrabloc trade at the expense of trade with the rest of the world.

Eichengreen and Irwin also consider whether exchange rate instability following the breakdown of the gold standard depressed the volume of trade. They do find evidence of this depressing effect in 1935. But in 1938, following the implementation of the Tripartite Agreement to manage exchange rates, the link from exchange rate instability to trade disappears. This suggests that trade was not depressed by exchange rate variability but by exchange rate uncertainty, and that the Tripartite Agreement, by reducing uncertainty, attenuated the impact of exchange rate movements on trade.

Eichengreen and Irwin conclude that the implications for the multilateral trade system of emerging regional arrangements, like NAFTA and Europe's Single Market, will depend on the specific structure of these initiatives and on accompanying policies. Bilateral and regional initiatives can encourage trade among the participants without hampering it with other countries if they are accompanied by liberalization vis-à-vis the rest of the world and by policies conducive to growth. But it is equally possible for such initiatives to have a corrosive impact on the multilateral system. The key, interwar history suggests, lies not in the regional or global character of policy initiatives but on their precise structure and design.

New NBER Book

American Economic Policy in the 1980s

Edited by NBER President Martin Feldstein, ***American Economic Policy in the 1980s,*** is now available from the University of Chicago Press.

Ronald Reagan's election in 1980, partly a reaction to the high inflation and increasing taxes of the 1970s, marked a return to traditional market-oriented economic ideas. Reagan was committed to achieving low inflation, to lowering taxes, and to shrinking the role of government in the economy. In the decade that followed, some of these goals were realized, but not without a price.

According to Feldstein's preface, this volume aims to improve "our understanding of how and why economic policy developed as it did in the 1980s and to create an authoritative record that others who study this period will want to consult." It will be a valuable source of information, and the standard reference for anyone interested in the U.S. economy in the 1980s.

Focusing on determinants and description rather than policy consequences, the background papers, written by leaders in their fields, provide extensive coverage on a wide variety of topics, including: monetary policy; tax policy; budget policy; exchange rate policy; economic regulation; health and safety regulation; financial regulation; antitrust; trade policy; LDC debt; and policy toward the aged. The background papers are complemented by personal essays by "insiders," who were actually involved in the policy process, including Paul A. Volcker, David Stockman, and Russell B. Long.

In addition, an introductory chapter by Feldstein, subtitled "A Personal View," recounts decisions about inflation and monetary policy, taxes, the budget deficit, and the dollar and the trade deficit. All of those issues were of special concern to him during his turn as Chairman of the Council of Economic Advisers in 1982–4. The price of this volume is $75.00.

American Economic Policy in the 1980s may be ordered directly from the University of Chicago Press, Order Department, 11030 South Langley Avenue, Chicago, IL 60628-2215. Academic discounts of 10 percent for individual volumes and 20 percent for standing orders for *all* NBER books published by the University of Chicago Press are available to university faculty; orders must be sent on university stationery.

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