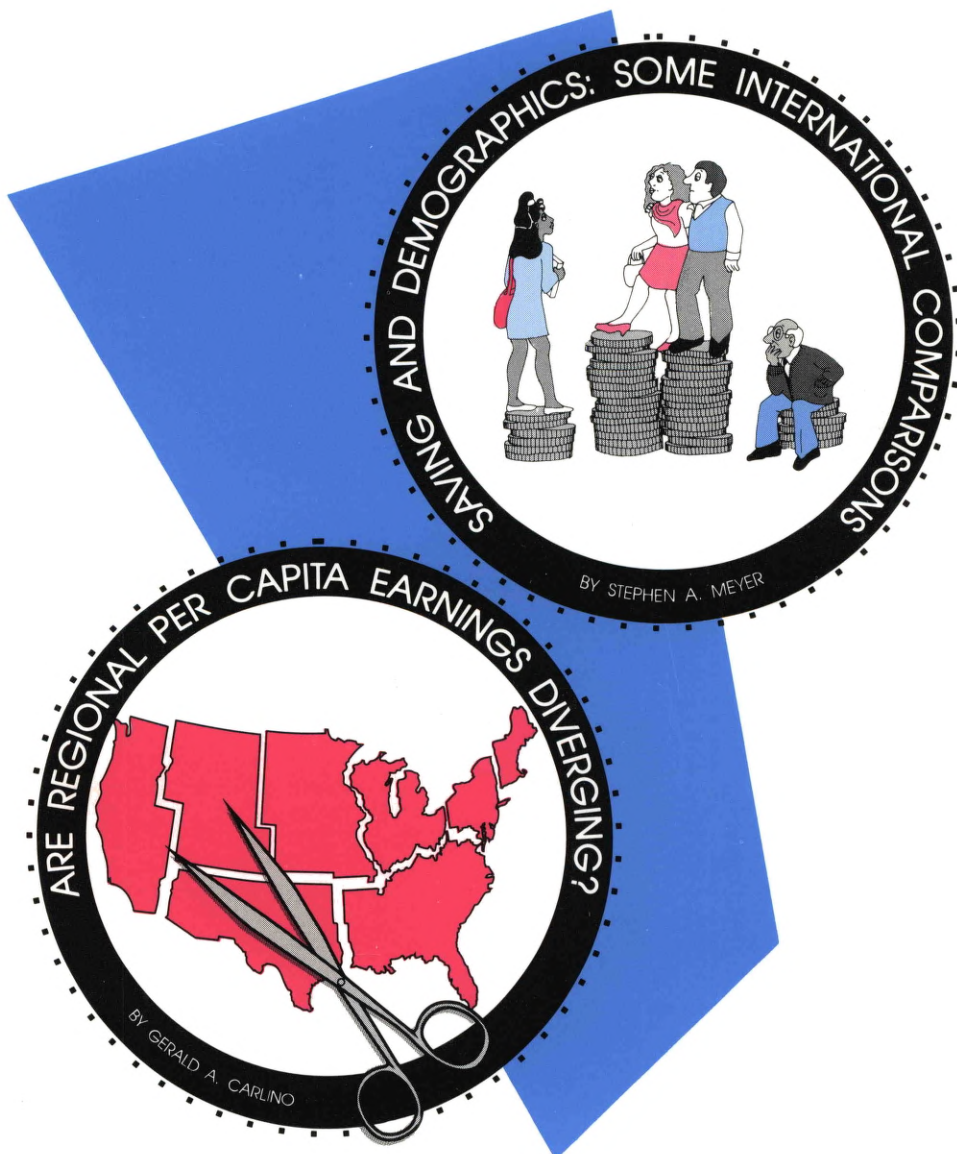


Business Review

Federal Reserve Bank of Philadelphia

March • April 1992

ISSN 0007-7011



Business Review

The BUSINESS REVIEW is published by the Department of Research six times a year. It is edited by Sarah Burke. Artwork is designed and produced by Dianne Hallowell under the direction of Ronald B. Williams. The views expressed here are not necessarily those of this Reserve Bank or of the Federal Reserve System.

SUBSCRIPTIONS. Single-copy subscriptions for individuals are available without charge. Institutional subscribers may order up to 5 copies.

BACK ISSUES. Back issues are available free of charge, but quantities are limited: educators may order up to 50 copies by submitting requests on institutional letterhead; other orders are limited to 1 copy per request. Microform copies are available for purchase from University Microfilms, 300 N. Zeeb Road, Ann Arbor, MI 48106.

REPRODUCTION. Permission must be obtained to reprint portions of articles or whole articles. Permission to photocopy is unrestricted.

Please send subscription orders, back orders, changes of address, and requests to reprint to Publications, Federal Reserve Bank of Philadelphia, Department of Research and Statistics, Ten Independence Mall, Philadelphia, PA 19106-1574, or telephone (215) 574-6428. Please direct editorial communications to the same address, or telephone (215) 574-3805.

MARCH/APRIL 1992

ARE REGIONAL PER CAPITA EARNINGS DIVERGING?

Gerald A. Carlino

For several decades, per capita earnings converged across regions. But since 1978, the trend has reversed, and regional per capita earnings are diverging. Does this divergence indicate a permanent change, or is it merely a response to temporary changes in certain regional factors? Regional per capita earnings probably should vary, and the divergence of the last decade probably signifies a short-run adjustment to a new long-run equilibrium.

SAVING AND DEMOGRAPHICS: SOME INTERNATIONAL COMPARISONS

Stephen A. Meyer

During the decade of the 1980s, Americans saved less than their counterparts in Japan and Germany. During the next 20 years, however, the gap most likely will narrow. Why? Demographic factors, such as the age composition of the population and the proportion of the population that is working or retired, explain some of the differences and provide a basis for projected changes in saving behavior in the U.S. and those in other countries.

Are Regional Per Capita Earnings Diverging?

*Gerald A. Carlino**

In the last 10 years, per capita earnings have tended to diverge across U.S. regions after decades of gradual convergence. In 1990, for example, earnings in the states of the New England and Mideast regions were well above the U.S. average. In 1978, however, earnings in both regions had been close to the U.S. average. (See *Definitions of Regions* on page 12.) Meanwhile, the Plains' and Rocky Mountain's 1990 per capita earnings, which were slightly below the rest of the country in 1978, had fallen even farther behind the U.S. average.

*Gerald A. Carlino is a Senior Economist and Research Adviser in the Regional and Urban Section of the Philadelphia Fed's Research Department. He is also an Adjunct Associate Professor at the University of Pennsylvania, Wharton Real Estate Center.

Differences in region-specific factors, such as labor force participation ratios, industry mix, and amenities, result in differentials in real per capita earnings across regions in the long run. It may be that the widening gap in regional earnings after 1978 was caused by changes in these factors. If so, the gap would reflect a permanent adjustment toward a new long-run equilibrium. Alternatively, the widening gap may reflect the effects of powerful, but temporary, shocks to the national economy—energy and agricultural shocks, for example—that affect regions differently.

Does the widening gap in regional earnings indicate a fundamental change in regional economies, or is it just a temporary reversal of the trend toward equality that results from powerful, but transitory, economic shocks?

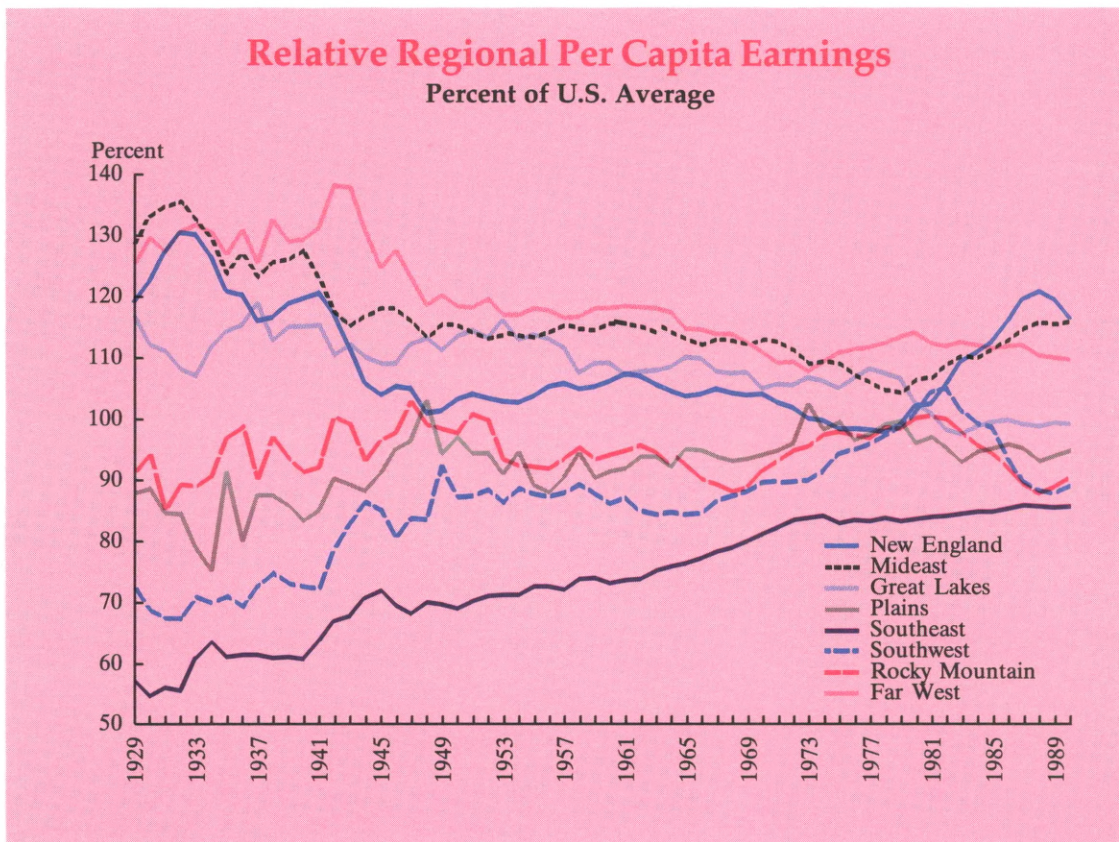
THE CONVERGENCE HYPOTHESIS

On the eve of the Great Depression, per capita earnings differed widely across regions. In the New England, Mideast, Great Lakes, and Far West regions, per capita earnings were well above the national average. (See *Relative Regional Per Capita Earnings*.) In the remaining areas, however, they ranged from 43 percent below average (as in the Southeast) to 8 percent below (as in the Rocky Mountain region).¹

Economists have identified several reasons for the vast inequality of regional per capita earnings in the years before World War II. One reason is the relatively low level of agricultural prices, which depressed earnings in regions where agriculture was relatively important.² In addition, national immigration policies virtually halted the influx of cheap labor after World War I, removing the constraints on wage increases in industrial regions that had been employing most of that labor—mainly the Mideast and Great Lakes.

¹Earnings are by place of work. Wages and salaries, including tips, commissions, and in-kind receipts, account for the bulk of earnings. The other sources of earnings are proprietors' income and "other labor income," which consists primarily of employers' contributions to private pensions and group insurance plans.

²Edgar Hoover and Frank Giarrantani, *An Introduction to Regional Economics* (New York: Alfred A. Knopf, 1984), p. 335.



The period between 1929 and the late 1970s saw a pronounced trend toward equalization, or *convergence*, of regional per capita earnings. All of the low-income regions made substantial gains, while the high-income regions lost ground. A main source of the convergence during the period was the shift of labor from low-wage agricultural employment to higher-paying nonagricultural jobs.³ This shift of employment largely occurred *within* regions.

Reinforcing the intraregional shift in the work force was the increased ability of workers to move freely from region to region in search of the highest return. Continuing improvements in communications and transportation technologies since 1929 have given labor and capital more mobility, narrowing the differences in regional per capita earnings. By the late 1970s it appeared as if regional per capita earnings might equalize.

Should We Expect Per Capita Earnings to Be Equal Across Regions? In its crudest form, the issue of regional per capita earnings differentials has been addressed in terms of nominal earnings, or earnings that have not been adjusted for differences in regional living costs. From the viewpoint of households, the possible advantages of working in a region with high nominal earnings depend partly on how expensive it is to live there. Other things being equal, households should be indifferent between a region whose earnings and prices are at the national average and one whose living costs and earnings are, say, 10 percent above the average. Thus, households will choose a region on the basis of real earnings differentials—that is, earnings that have been adjusted for differences in living costs.

Since workers can move freely from region to region, why should differentials in regional earnings persist once we have adjusted for the

cost of living? For one thing, differences in the educational or skill level of the work force or in occupation or industry mix might lead to earnings differentials, even after cost-of-living adjustments. For example, real earnings in a region may be higher if the dominant industries there are among those offering their workers higher real wages.⁴ To the extent that differences in industry mix influence real earnings, these differences in earnings will persist across regions. Studies that have controlled for the many factors that could affect real earnings find that real earnings are relatively higher in areas with a larger proportion of jobs in the mining, transportation, manufacturing, and government sectors.⁵

Another important factor behind the earnings differentials across regions is the differences in amenities offered by the regions. Workers may trade off real earnings for amenities, accepting lower earnings in high-amenity regions and demanding higher earnings in low-amenity regions. For example, workers seem to care about environmental characteristics, such as the number of sunny days per year, the average annual rainfall, and nearness to large bodies of water. Since these sorts of environmental amenities differ across regions, regional earnings could differ in equilibrium. Economists have found that part of the difference in earnings is due to just such a trade-off.⁶

Even if real earnings per worker were to equalize across regions, earnings per *person*

⁴See Gerald A. Carlino, "Do Regional Wages Differ?" this *Business Review* (July/August 1986).

⁵See Richard P. Voith, "Compensating Variation in Wages and Rents," *Journal of Regional Science* 31 (1991), pp. 127-45.

⁶Jennifer Roback, "Wages, Rents, and the Quality of Life," *Journal of Political Economy* 90 (1982), pp. 1257-78. Studies have found that regional amenity differences tend to be reflected in both land values and wages.

³George H. Borts and Jerome L. Stein, *Economic Growth in a Free Market* (Columbia University Press, 1964).

need not equalize. Real per capita earnings depend not only on how much a region's workers earn, but on the number of workers relative to the region's total population. The proportion of a region's population that is employed depends on 1) the fraction of its population that is old enough to work; 2) the percentage of its working-age population that chooses to work (the labor force participation rate); and 3) the proportion of its population that chooses to work and actually finds work. A study by the Federal Reserve Bank of Boston found that differences in the proportion of a region's population that is employed were an important source of differences in regional per capita earnings.⁷ Moreover, some of these demographic factors, such as the relative age structure of a region, change slowly over time.

If the factors that affect a region's real per capita earnings remain constant, an equilibrium differential exists between the region's real per capita earnings and the national average, and the region's relative per capita earnings should approach that differential through time. (See *Equilibrium Differentials in Regional Per Capita Earnings*.) As long as the gaps in regional real per capita earnings reflect only such differences as participation ratios, industry mix, and amenities, workers will not have an incentive to migrate from regions with relatively low per capita earnings. If so, relative regional per capita earnings will have converged and the remaining gaps in per capita earnings would reflect equilibrium differentials.⁸

⁷Lynn E. Browne, "Shifting Regional Fortunes: The Wheel Turns," Federal Reserve Bank of Boston *New England Economic Review* (May/June 1989).

⁸Although real per capita earnings may differ across regions, in equilibrium, wages and rents will adjust to ensure equalization of worker utility across regions.

Equilibrium Differentials in Regional Per Capita Earnings

Differentials in regional per capita earnings have a tendency to converge to an equilibrium. To simplify, assume two regions: a frostbelt region and a sunbelt region. Suppose that, in equilibrium, per capita earnings are \$10,000 annually in both regions. Initially, suppose that per capita earnings in the frostbelt are well above \$10,000, while per capita earnings in the sunbelt are well below \$10,000. This inequality in regional per capita earnings causes workers to migrate from the sunbelt to the frostbelt in search of higher per capita earnings.

Over time, the migration of workers causes an expansion in the frostbelt's labor force and a decline in the sunbelt's labor force. The increased supply of labor causes per capita earnings in the frostbelt to fall. Similarly, the reduced labor force in the sunbelt causes its per capita earnings to rise. If the two regions were the same in all respects, migration from the sunbelt to the frostbelt would continue until per capita earnings are equal to \$10,000 in both regions.

But other things are not always equal across regions. For example, suppose workers place a \$1000 value on the environmental characteristics that the sunbelt offers. That is, workers will accept relatively lower per capita earnings to live in this region. Similarly, workers must be compensated to live in the frostbelt. In equilibrium, per capita earnings are still \$10,000 annually for the nation. But now, the equilibrium per capita earnings are \$10,500 in the frostbelt and \$9500 in the sunbelt. If the actual differential exceeds \$1000, workers would continue to migrate from the sunbelt to the frostbelt until the actual differential in per capita earnings between these two regions is \$1000. Once the difference has been reduced to \$1000, there is no tendency for the differential to decline any further. This gap in regional per capita earnings reflects the equilibrium differential to which these two regions converge over time.

The narrowing differential in regional per capita earnings between 1929 and the late 1970s suggests that perhaps we were approaching such an equilibrium, but the widening of the differentials since then has raised doubts. Recently, several studies have looked at the sources of the gaps in regional per capita earnings and at whether the recent widening is temporary.⁹

WHAT IS THE EVIDENCE?

Studies on regional convergence have sometimes considered per capita income and sometimes per capita earnings, but both variables have exhibited the same pattern of convergence and divergence since the late 1920s.¹⁰ In the Boston Fed study, Lynn Browne reported that the main source of divergence in regional per capita *income* after 1978 was changes in *earnings* per capita, especially earnings in the more locally oriented industries. Changes in other forms of income, such as dividends, interest, and rents, reinforced the basic earnings pattern. In general, shifts in industry mix played a minor role in the changes in relative earnings that occurred after 1978.

Randall Eberts, in a Cleveland Fed study, built on Browne's work by looking at earnings of *individual workers* rather than at earnings that have been *averaged* across all of a region's

residents or workers.¹¹ He reported that a narrowing of the regional differentials in earnings of workers similar in terms of occupation, skill, and education accounted for much of the convergence during the 1970s. Similarly, a widening of the earnings differentials for similar workers accounted for much of the divergence of regional earnings in the 1980s. Eberts speculated that temporary shocks to the economy from the 1980 and 1981-82 recessions and from the fall in oil prices during the 1980s are probably responsible for this interruption in the long-term trend toward more equal earnings across regions.

Cross-Sectional and Time-Series Evidence.

A growing body of research examines per capita earnings (income) convergence at both the national and international levels. These studies have used two approaches—cross sectional and time series. The cross-sectional approach looks at the average rate of convergence across regions, given initial differences. The time-series approach looks at the long-term effects of economic shocks on a region's per capita earnings (income) relative to the national average.

In 1929, regional per capita earnings showed more inequality than could be readily explained by equilibrium differentials alone. For cross-sectional convergence, regions having a relatively low (high) level of earnings per capita should grow relatively quickly (slowly) through time. A study by the National Bureau of Economic Research (NBER) looked for evidence of cross-sectional convergence in real per capita income levels by state for the 1930-88 period.¹²

⁹The equilibrium differential we are discussing is taken to be characterized by a constant gap. In an endogenous growth framework, however, the gap in the equilibrium differential could be increasing through time. See Robert Lucas, Jr., "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22 (July 1988), pp. 3-42.

¹⁰See Thomas D. Rowley, John M. Redman, and John Angle, "The Rapid Rise in State Per Capita Income Inequality in the 1980s: Sources and Prospects," U.S. Department of Agriculture, Economic Research Service (January 1991). Income includes interest, rent, and transfer payments, as well as earnings. Earnings, however, accounted for the largest portion of personal income. In 1987, for example, earnings accounted for more than two-thirds of personal income.

¹¹Randall W. Eberts, "Accounting for the Recent Divergence in Regional Wage Differentials," Federal Reserve Bank of Cleveland *Economic Review* (Third Quarter 1989), pp. 14-26.

¹²Robert Barro and Xavier Sala i Martin, "Economic Growth and Convergence Across the United States," Working Paper 3419, National Bureau of Economic Research (August 1990).

The study examined the correlation between a state's growth rate of real per capita income over this roughly 60-year period and its level of real per capita income in 1930. Convergence implies a negative correlation between a state's real per capita income in 1930 and its growth rate during the 1930-88 period. The NBER study finds evidence of cross-sectional convergence in state-level data.¹³

Using an approach similar to the one employed in the NBER study, we find evidence of cross-sectional convergence of regional per capita real earnings during the 1929-90 period. Specifically, for every \$1000 that a region's real per capita earnings was above (below) the national average in 1929, the region's real growth rate of per capita earnings was lowered (raised) by 0.35 percentage point per year during the 1929-90 period.¹⁴

Although the cross-sectional approach is one way to examine per capita earnings convergence, this technique may not provide conclusive evidence on convergence. If shocks to the nation's economy have differential and long-lasting effects across regions, these shocks may widen the dispersion in regional per capita

earnings. Until recently, economists have viewed the effects of shocks to the economy as temporary, lasting one year or less. However, recent research reveals that economic shocks to the national economy tend to have highly persistent and long-lasting effects. One recent study found that anywhere from 50 percent to 113 percent of an initial shock to real per capita GNP persists after four years. Even after 100 years, between 19 and 41 percent of a shock still persists.¹⁵

A shock is an event that causes the level of aggregate per capita income and earnings to deviate from trend. From 1930 through the early 1970s, changes in per capita income and earnings were generally caused by aggregate demand shocks, such as changes in fiscal policy or investment demand. But the shocks of the 1970s occurred largely on the supply side of the economy. One example of a supply shock is the oil price shock that doubled the real price of oil between 1979 and 1980 and reduced per capita income and earnings. Weather-related crop failures are another example of supply shocks that have had adverse effects on the national economy. Of course, some shocks—such as the oil shock in 1986 that lowered the relative price of oil—can have beneficial effects on per capita income and earnings.

Although the 1986 energy shock had beneficial effects on the national economy, it had adverse effects on some regions. Energy shocks influence per capita earnings differently for energy-producing regions than for energy-consuming regions. Per capita earnings would decline in the energy-producing regions and increase in the energy-consuming regions as a result of a 1986-type drop in energy prices.

¹³Robert Barro has also examined convergence for a cross section consisting of 98 countries during the 1960-85 time period. He finds evidence of convergence when the cross-country regression of per capita output growth rates on initial per capita levels includes proxies for human capital development. See Robert Barro, "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics* 151 (May 1991), pp. 407-43.

¹⁴The result from the cross-sectional estimation is:

$$g_{r,i} = 3.0958 - 0.35R_{i0}$$

(14.3) (-5.27)

$$R^2 = 0.8222$$

where $g_{r,i}$ represents compound average annual real growth rate in region i from 1929 to 1990 in real per capita earnings, and R_{i0} represents the level of real per capita earnings in region i in 1929 in thousands of dollars. The numbers in parentheses are t -statistics.

¹⁵Francis Diebold and Glenn Rudebusch, "Long Memory and Persistence in Aggregate Output," *Journal of Monetary Economics* 24 (1989), pp. 189-209. The upper bound (113 percent) of their estimate indicates that the initial effects of a shock may even be magnified.

A study by the Federal Reserve Bank of St. Louis showed that per capita income in the energy-producing states fell from 95.4 percent of the U.S. average in 1978 to 86.8 percent by 1987.¹⁶ Per capita income in the farming states of the West North Central region was also severely affected by the 1981-82 recession and the farm crisis during the first half of the 1980s.¹⁷ According to the St. Louis Fed study, average per capita income in the West North Central region declined from 97 percent of the U.S. average in 1978 to 93 percent in 1987. Other types of shocks that could have differential regional effects include increases in national defense-related expenditures and the introduction of new technologies that favor some regions, such as the development of the high-tech industries that favored New England during the 1980s.

Are the Effects of Economic Shocks on Relative Regional Earnings Temporary? Drawing on the evidence, we can examine the extent to which shocks to relative regional per capita earnings also have persistent effects. As we saw, per capita earnings tended to converge across regions until the late 1970s. We saw also that the introduction of new shocks, such as the oil shocks of the past two decades, affected regional per capita earnings differently. If the differential effects of these shocks are highly persistent, they may, for practical purposes, lead to a permanent widening in the dispersion in regional per capita earnings. Given the evidence that national shocks have differential effects across regions, the effects of these shocks on a region's per capita earnings must be tem-

porary in order for regional per capita earnings to converge over time.

Extending a Philadelphia Fed study by Gerald Carlino and Leonard Mills, we find that, over the entire 1929-90 period, 72 percent of a shock in the Mideast region persisted five years out and 38 percent persisted 10 years out.¹⁸ (See *How Persistent Are the Effects of Shocks?*) Stated differently, if some event raises per capita earnings in the Mideast region an additional \$1 above the national average, five years later per capita earnings would be 72 cents above the national average because of that event. Ten years later, per capita earnings in the Mideast region would still be 38 cents above the national average.

The persistence of shocks is less pronounced in the other regions. For example, each dollar shock leads to a 28-cent deviation in New England's relative per capita earnings five years out and to an 8-cent deviation 10 years out. For every region, at least 15 cents of a \$1 shock remains five years out.

The regional persistence of economic shocks is not what theory predicts. Workers can move freely from region to region in search of employment, which would tend to dampen the differential regional effects of any shock through

¹⁸Gerald Carlino and Leonard Mills, "Have Regional Per-Capita Incomes Converged?" Working Paper 91-18, Federal Reserve Bank of Philadelphia (1991). This article extends the analysis in the working paper by including data for three more years—1988, 1989, and 1990. We examine regional per capita earnings relative to national average per capita earnings to control for the common effect of national economic shocks across regions. A number of recent studies test for *stochastic* convergence (that is, the persistence of shocks to relative output) across *countries*. They generally find that shocks have highly persistent effects, a result inconsistent with cross-sectional convergence. See Andrew Bernard and Steven Durlauf, "Convergence of International Output Movements," Working Paper 3717, National Bureau of Economic Research (May 1991), and Danny Quah, "International Patterns of Growth: I. Persistence in Cross-Country Disparities" (January 1990), mimeo.

¹⁶See Cletus C. Coughlin and Thomas Mandelbaum, "Why Have State Per Capita Incomes Diverged Recently?" Federal Reserve Bank of St. Louis *Review* (September/October 1988).

¹⁷The West North Central region consists of Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, and South Dakota.

time. Are there other factors, then, that help explain the pattern of relative regional per capita earnings over the past half century?

Researchers have recently questioned whether the high degree of persistence found in time series of various measures of income or economic activity may be accounted for by a major event, such as an oil shock, that represents an unusually large departure from their previous trends.¹⁹ Could such a single major disturbance account for the persistence that we find in shocks to relative regional incomes in the 1929-90 period? A number of studies have found that the dispersion in regional per capita

incomes has increased since 1978.²⁰ After controlling for a single break in the convergence trend in 1978, we find that persistence is reduced for all regions. The effects of shocks are found to be most persistent in the Southwest region. For every dollar shock to the Southwest's per capita earnings, 33 cents remains after five years and 10 cents after 10 years. Among the other regions, no more than 6 percent of a shock remains 10 years out. In four regions—Great Lakes, Plains, Southeast, and Rocky Mountain—the effects of shocks are essentially gone within 10 years.

In an earlier study on per capita income, Richard Easterlin reported that a break in the convergence trend occurred in 1946.²¹ Indeed, inspection of the data on relative regional per capita earnings reveals that such a break may have occurred after World War II. After controlling for such a break, we find a substantial reduction in the persistence of shocks occurring during the 1929-90 period. The results

¹⁹Pierre Perron, "The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis," *Econometrica* 57 (November 1989), pp. 1361-401.

How Persistent Are the Effects of Shocks?

(Estimated proportion of a shock to relative regional earnings that remains 5 and 10 years out)

	1929 - 1990		1929 - 1990 (Break in 1978) ^a		1929 - 1990 (Break in 1946) ^b	
	5 yrs	10 yrs	5 yrs	10 yrs	5 yrs	10 yrs
New England	0.28	0.08	0.25	0.06	0.23	0.05
Mideast	0.72	0.38	0.25	0.03	0.31	0.05
Great Lakes	0.25	0.06	0.11	0.01	0.10	0.01
Plains	0.15	0.04	0.08	0.01	0.02	0.00
Southeast	0.25	0.04	0.02	0.00	0.07	0.00
Southwest	0.58	0.29	0.33	0.10	0.33	0.10
Rocky Mtn.	0.20	0.04	0.10	0.01	0.11	0.01
Far West	0.33	0.13	0.17	0.03	0.13	0.02

^aControls for a break in trend in 1978.

^bControls for a break in trend in 1946.

Source: Extension of Gerald Carlino and Leonard Mills, "Have Regional Per-Capita Incomes Converged?" Working Paper 91-18, Federal Reserve Bank of Philadelphia (1991).

²⁰See Coughlin and Mandelbaum (September/October 1988); Barro and Sala i Martin (August 1990); and Rowley, Redman, and Angle (January 1991).

²¹Richard Easterlin, "Interregional Differences in Per Capita Income, Population, and Total Income, 1840-1950," in Conference on Research in Income and Wealth, *Trends in the American Economy in the Nineteenth Century* 24 (1960), pp. 73-140.

are similar to what we found when we incorporated a break in 1978. Thus, after controlling for breaks in first 1978 and then 1946, we find that shocks during the 1929-90 period did not have highly persistent effects on relative regional per capita earnings. This finding is important, since even if the shocks that occurred over the past 60 years had increased the dispersion in regional per capita earnings, the effect in most cases was not highly persistent.

The time-series analysis confirms the usual convergence view that the initially poor regions tended to catch up to rich ones over time. During the 1929-45 period, regions that had per capita earnings above the national average in 1929 grew less rapidly than regions with per capita earnings below the U.S. average. (See *The Trend Rate of Convergence Slows After 1946*.) For example, per capita earnings in the New England region were above the national average in 1929, but the region had an annual growth rate 1.7 percent per year below the national average growth during the 1929-45 period. Similarly, per capita earnings in the Southwest region were below the national average in 1929, but the region had an annual growth rate 2.2 percent above national average growth during the same period.

During the postwar period, a slowdown in the rate of convergence is indicated for most regions.²² For example, growth in the Mideast re-

gion was almost 1 percent per year below national average growth in the 1929-45 period, but equal to the national average on an average annual basis during the 1946-90 period.

CONCLUSION

Regional per capita earnings, which varied substantially in 1929, continue to differ today.

²²The Great Lakes region is an exception, since it converged at a faster rate during the postwar period. The rate of convergence in the New England region reverses from -1.7 percent per year in the 1929-45 period to slightly positive in the 1946-90 period. This reversal in New England's rate of convergence is an anomaly, since per capita earnings in the region were still above the national average in 1946. Similarly, the rate of convergence in the Rocky Mountain region changes from 0.8 percent per year in the 1929-45 period to slightly negative in the 1946-90 period, even though per capita earnings were still below the national average in 1946. In the New England and Rocky Mountain regions, however, the rate of convergence in the 1946-90 period is not significantly different from zero.

The Trend Rate of Convergence Slows After 1946

	Per Capita Earnings Relative to U.S. Average in 1929	Rate of Convergence ^a 1929-45 (percent)	Per Capita Earnings Relative to U.S. Average in 1946	Rate of Convergence ^a 1946-90 (percent)
New England	ABOVE	-1.7	ABOVE	0.2
Mideast	ABOVE	-0.9	ABOVE	0.0
Great Lakes	ABOVE	-0.1	ABOVE	-0.4
Plains	BELOW	0.9	BELOW	0.0
Southeast	BELOW	1.4	BELOW	0.6
Southwest	BELOW	2.2	BELOW	0.2
Rocky Mtn.	BELOW	0.8	BELOW	-0.1
Far West	ABOVE	-0.2	ABOVE	-0.2

^aEstimated average annual rate at which the ratio of regional per capita earnings relative to national per capita earnings changed.

Should we expect per capita earnings to vary across regions? It appears so. Regional differences in labor force participation ratios, industry mix, and amenities result in differentials in real per capita earnings across regions. In fact, the gap that had been narrowing through the late 1970s has widened since.

Does the widening gap in regional per capita earnings after 1978 represent a reversal of the long-run trend toward convergence? Apparently not. After allowing for the possibility that the equilibrium gap widened in the late 1970s, we find that what appears to be a divergence of regional per capita earnings may actually represent a short-run adjustment to a new long-run equilibrium. Once this adjustment has occurred, the gap, although wider, should remain stable provided that there are no further changes in the underlying equilibrium. Moreover, economic shocks that occurred during the entire 1929-90 period have not generally had highly persistent effects on a region's relative per capita earnings.

Definitions of Regions

New England	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont
Mideast	Delaware District of Columbia Maryland New Jersey New York Pennsylvania
Southeast	Alabama Arkansas Florida Georgia Kentucky Louisiana Mississippi North Carolina South Carolina Tennessee Virginia West Virginia
Southwest	Arizona New Mexico Oklahoma Texas
Great Lakes	Illinois Indiana Michigan Ohio Wisconsin
Far West	California Nevada Oregon Washington
Rocky Mountain	Colorado Idaho Montana Utah Wyoming
Plains	Iowa Kansas Minnesota Missouri Nebraska North Dakota South Dakota

Saving and Demographics: Some International Comparisons

*Stephen A. Meyer**

The United States saved only a small share of its aggregate income during the 1980s—a much lower share than most other large, industrial countries saved. As shares of GNP, both household and government saving were smaller in the U.S. The differences in personal saving owe much to demographic factors—especially to differences in the age composition of countries' populations. The differences in government

saving around the world reflect budget balances: surpluses in high-saving countries and deficits in low-saving countries.

Differences in saving are important because saving is the source of funds required to finance investment in plant and equipment, structures, and housing. Persistently higher saving shares in both West Germany and Japan, for example, financed greater net investment relative to GNP than in the U.S. Over time, investment has increased the stock of productive capital and contributed to growing labor productivity and a rising standard of living in all three countries. But West Germany and Japan experienced a more rapid increase in labor productivity over

*Stephen A. Meyer is Vice President and Associate Director of Research at the Federal Reserve Bank of Philadelphia. He also is an Adjunct Professor of Finance at the Wharton School of the University of Pennsylvania.

the past 40 years because they saved a larger share of their aggregate incomes.¹

Some analysts argue that the share of personal income saved in the United States will rise strongly during the next 20 years, as more and more of the baby-boom generation enters middle age.² These analysts anticipate that saving rates in the U.S. will rise to levels more like those in Germany and Japan. Indeed, recent economic research does suggest that projected demographic changes are likely to narrow the gap in saving rates between the U.S. and Germany or Japan, but this result derives as much from falling saving rates abroad as from a rising saving rate in the U.S.

COMPARING U.S. SAVING IN THE 1980s TO GERMANY AND JAPAN

The net national saving rate in the United States was lower in the 1980s than in many other industrial countries, especially West Germany and Japan (Table 1).³ The lower saving rate in the U.S. was accompanied by lower net investment relative to GNP. Net national sav-

¹From 1950 through 1989, labor productivity grew at an average rate slightly below 6 percent per year in Japan, at an average annual rate somewhat above 4 percent in Germany, and at a rate averaging just 1.75 percent per year in the U.S. For a technical discussion of the relationship between investment and productivity growth, and a careful examination of the data, see Wolff (1991). Productivity growth rates cited here are from Wolff (1991), updated with data for the 1980s from the OECD *Economic Outlook*, July 1991.

²See, for example, "Upbeat Generation," *Barron's*, August 1, 1988, pp. 15 and 30.

³The saving, investment, and aggregate income data cited in this article are those available as of November 1991. The data are taken from *National Accounts* and from *Quar-*

TABLE 1
Saving and Investment
as a Share of GNP
(Average for 1980s, in percent)

	U.S.	West Germany	Japan
Net National Saving	3.0	10.2	18.1
Household	3.8	7.8	11.0
Business	1.7	1.0	2.8
Government	-2.5	1.3	4.3
Net Fixed Investment	5.1	8.0	15.4

ing in West Germany, when measured as a share of GNP, was more than three times as large as in the U.S. And in Japan the share was six times that in the U.S.⁴ Among the components of national saving, household saving was more than twice as big a share of GNP in West Germany as in the U.S., while in Japan it was

terly National Accounts, published regularly by the Organization for Economic Cooperation and Development (OECD) in Paris. These publications draw on each country's official national income and product accounts. Figures for net investment cited here include net fixed investment spending by governments—spending on capital equipment, buildings, and infrastructure such as roads, bridges, dams, water systems, and airports. Government investment is included in the OECD data for Germany and Japan. Investment spending by governments in the U.S. was estimated using other sources.

⁴Part of a country's saving is used to finance the replacement of buildings and capital equipment that wear out or are abandoned each year. To the extent that saving and investment spending exceed replacement investment, they can contribute to growing labor productivity and a rising standard of living. The definition of saving that corresponds to this concept of funds available to finance growth of the capital stock, or net investment, is net national saving.

nearly three times as big. The government sector in the U.S. ran budget deficits throughout the 1980s, thus reducing national saving. In contrast, governments in West Germany and Japan added to national saving by running budget surpluses in most years. Net business saving (mostly retained earnings) differed much less among these countries.⁵

Not only was net national saving a smaller share of GNP in the U.S. than in West Germany and Japan, but the gaps widened during the 1980s. Household saving declined relative to GNP in all three countries as the 1980s progressed. In Germany and Japan, government sector budget surpluses rose relative to GNP, offsetting the drop in personal saving (and in Germany business saving also rose strongly). But in the U.S., the government sector continued to run budget deficits, thus reinforcing the decline in personal saving relative to GNP.

Differences in government saving largely reflect political decisions about government spending and taxes. Differences in household saving rates between the U.S., Germany, and Japan during the 1980s reflect demographic factors, in part. The way in which demographic factors affect household saving can best be understood by looking at some basic economic theory of saving behavior.

THE FORWARD-LOOKING THEORY OF SAVING

Economic theory has focused on five major reasons why people save: (1) to provide for

their retirement; (2) to leave a bequest; (3) to bridge temporary declines in their incomes; (4) to finance unanticipated expenditures such as medical bills; and (5) to finance purchases of durable goods such as furniture and automobiles. The theory of saving behavior is complex, and economists' understanding of saving behavior is still evolving. We can avoid many of the complications, but nonetheless gain a good deal of insight into the effect of demographic factors on saving behavior, by focusing on a somewhat simplified description of the basic forward-looking theory of family saving.

Theory. The basic theory of saving begins by recognizing that real earnings usually are relatively low early in people's careers, peak shortly before retirement, and then fall substantially after retirement. The theory proceeds with the idea that people prefer to spread their consumption of goods and services evenly over their lives to the extent they can do so and, in particular, that people would rather not have their consumption fall sharply when they retire.

From these premises, the theory predicts that younger families actually will spend more than their incomes if they have ready access to credit or an inheritance, so their saving will be negative on average. If they do not have ready access to credit or an inheritance, younger families will save at most a small share of their incomes. Middle-aged families typically will save a larger share of their rising earnings as they prepare for retirement and accumulate an estate. Families headed by retired people typically will save little, if any, of their incomes, and in many cases they will dissave. This predicted pattern of changing personal saving rates over one's lifetime is known as *life-cycle saving*.

Evidence. Surveys of consumer spending and finances in the U.S. yield results that are broadly consistent with the life-cycle pattern of earnings and saving discussed above. Average earnings do rise with age, and there is a broad peak in average earnings between ages 50 and

⁵Fumio Hayashi of the University of Pennsylvania argues that Japanese national income accounts understate replacement investment, and thus overstate net national saving and investment, so that the gap between Japanese and American saving and investment shares is smaller than indicated here. But Robert Dekle of Boston University and Lawrence Summers of the World Bank present other data suggesting that the gap really is as large as shown by the official statistics. See Hayashi (1989) and Dekle and Summers (1991).

60. Very young families, those headed by people less than 25 years old, do tend to spend more than they earn (their savings are negative, on average), indicating that they are incurring debts or spending gifts and inheritances. Surveys show that average earnings substantially exceed average spending for families in the peak-earning years. And many families do draw down their savings during retirement; families headed by people over 64 save very little of their incomes, on average. During the mid-1980s, the share of income saved by households headed by people between the ages of 45 and 64 averaged 6 to 8 percentage points higher than the share saved by households headed by people over the age of 64.⁶ Surveys of saving behavior in Canada and Japan yield similar results.⁷ All of these observations are broadly consistent with the predicted life-cycle pattern of saving derived from a simple forward-looking theory.

The simplest version of the life-cycle saving model, described above, does not explain all of what we observe about family saving. Many families in the peak-earning years save an appreciably larger share of their incomes than do families whose heads are between 25 and 44, but some families save a small and relatively constant share of their incomes throughout their working years. Many older families draw down their savings, but others neither save nor dissave, and those with substantial wealth typically continue to save. These observations are

⁶Data cited here are based on Tables 3, 13, and 23 in "Consumer Expenditure Survey: Integrated Survey Data, 1984-86", *BLS Bulletin* 2333 (August 1989), published by the Bureau of Labor Statistics of the U.S. Department of Labor. The Survey of Consumer Finances, conducted by the Federal Reserve System, yields broadly similar conclusions; see Kennickell (1990).

⁷Saving behavior in Canada and Japan, as well as in the U.S., is examined in Bosworth, Burtless, and Sabelhaus (1991).

broadly consistent with the life-cycle saving pattern predicted by more complex versions of the forward-looking theory, which incorporate precautionary saving, social security, borrowing constraints, uncertainty about lifespans, and saving to accumulate an estate.⁸ Even in these more complicated models, age affects saving behavior.

Demographic factors are not the only determinants of household saving. People's saving also is affected by the tax treatment of saving and interest, by the structure of social security and pension systems, by the variability of incomes, by the extent to which people can insure against unanticipated expenditures or income reductions, by unanticipated changes in wealth, and by the strength or weakness of the economy, among other factors.⁹ There also is evidence that household saving is affected by the size of government budget surpluses or deficits. Demographic factors do have important influences on household saving, however.

THE EFFECT OF DEMOGRAPHICS ON HOUSEHOLD SAVING

While there is vigorous debate among economists about how much household saving is generated by each of the five major reasons for saving, there is broad agreement that the age composition of a country's population can af-

⁸For a brief review of economists' knowledge of saving behavior, see Weil (1991). For a more detailed and extensive treatment of the roles of saving for retirement and for bequests, see Kotlikoff (1989). For a discussion of the role of precautionary saving and evidence of its importance, see Carroll (1991). For a focus on borrowing constraints, see Zeldes (1989).

⁹See Boskin and Lau (1988) for a careful discussion of the roles of these and other factors.

¹⁰A lively exchange between Franco Modigliani of MIT and Laurence Kotlikoff of Boston University summarizes much of the agreement and disagreement. See Modigliani (1988) and Kotlikoff (1988).

fect the share of income that is saved.¹⁰ The “life-cycle saving” theory suggests that a high share of household income will be saved in a country that has a large fraction of its population in the high-saving years from 45 to 64 and a small fraction in the low-saving or dissaving years up to 20 and beyond 64. Household saving would be a relatively large share of GNP as a result. Conversely, the theory predicts that household saving would be a smaller share of GNP in a country that has a small fraction of its population in the peak-saving years from 45 to 65 and a large fraction of its population in the low-saving or dissaving age groups.

Empirical research clearly bears out these expectations. The strongest demographic effect appears to result from an increase in the share of the population that is beyond retirement age, accompanied by a decrease in the working-age share of the population. Researchers estimate that a 1-percentage-point increase in the ratio of the population over the age of 64 to the working-age population, holding constant other factors that affect saving, has been associated with a reduction in the ratio of household saving to GNP by an amount in the range from 0.4 to 1.4 percentage points, for an average estimate of 0.9 percentage point. There also is evidence that an increase in the ratio of the under-20 population to the working-age population reduces household saving relative to GNP, but this effect appears smaller—perhaps half as big.¹¹

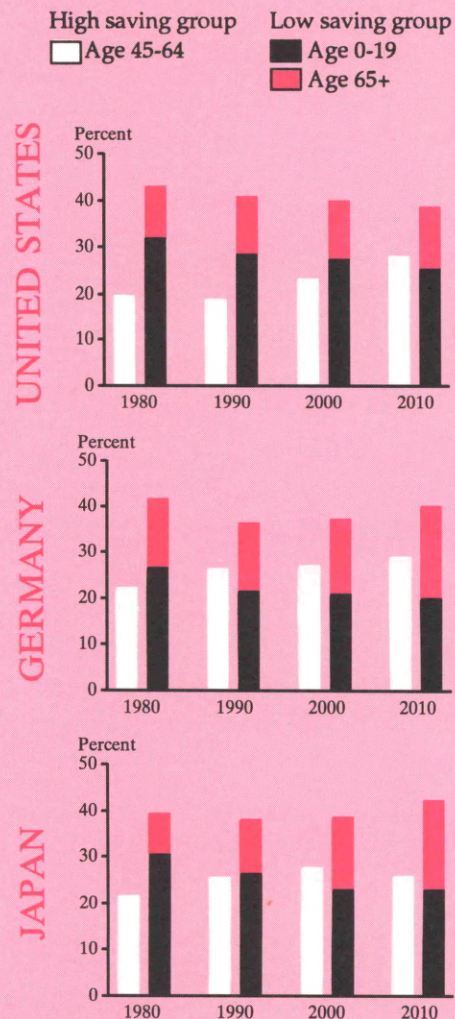
COMPARING U.S. DEMOGRAPHICS IN THE 1980s TO GERMANY AND JAPAN

The share of the U.S. population in the high-saving age group from age 45 to 64 was appreciably lower than in Germany and Japan in both

¹¹For a summary of the results of these studies, see Table 9 in Heller (1989). The numbers presented here correspond to those presented by Heller, but here they are presented as shares of GNP rather than as shares of national income.

FIGURE 1
Population Shares
(percent)

The share of the U.S. population in the high-saving age group fell in the 1980s, but will rise more strongly during the next 20 years than in Germany and Japan. The share of the U.S. population in the low-saving age groups will continue to fall during the next 20 years, but will rise in Germany and Japan.



1980 and 1990 (Figure 1). And the share of the U.S. population in that high-saving age group declined during the 1980s, while it rose strongly in Germany and Japan. In addition, the total share of the U.S. population in the low-saving age groups was larger at both the beginning and the end of the 1980s than was the case in either Germany or Japan.¹²

On average during the 1980s, 19 percent of the U.S. population was in the high-saving group from age 45 to 64—about 4.5 percentage points lower than in Japan and nearly 5.5 percentage points lower than in Germany. The ratio of 65-and-over to working-age populations in the U.S. averaged roughly 4 percentage points lower than in Germany during the 1980s, but 4 percentage points higher than in Japan. The ratio of under-20 to working-age populations also was higher in the U.S., averaging 12 percentage points higher than in Germany and about 4 percentage points higher than in Japan. In total, an average of nearly 42 percent of the U.S. population fell into the two low-saving age groups during the 1980s, about 3 percentage points higher than in Germany and Japan.

On balance, these demographic ratios imply somewhat higher personal saving relative to GNP in Germany than in the U.S. during the 1980s, and much higher household saving relative to GNP in Japan, as we in fact observed. Taken together, the demographic differences can account for roughly one-third of the gap in personal saving relative to GNP between Germany and the U.S. during the 1980s and roughly two-thirds of the gap between Japan and the U.S.¹³

Demographic factors help explain not only why household saving in the U.S. was lower relative to GNP than in Germany and Japan but

also why household saving shares declined during the 1980s. As the ratio of the 65-and-over to working-age populations grew in the U.S. from 1980 to 1990, personal saving declined relative to GNP (Table 2). Similarly, the sharp rise in the ratio of 65-and-over to working-age populations in Japan from 1980 to 1990 helps explain why personal saving declined relative to GNP in that country.

Demographic factors, by themselves, do not entirely explain the decline in household saving during the 1980s.¹⁴ Personal saving in Germany did not rise relative to GNP, for example, even though the ratio of 65-and-over to working-age populations declined. Other factors that may have reduced household saving shares include expanded coverage by pension, social security, and medical insurance systems, large capital gains in equity and housing markets, and declining birthrates. While demographic factors are not the sole determinant of household saving behavior, the fact that saving by households was roughly twice as large relative to GNP in Germany as in the U.S. during the 1980s, and roughly three times as large in Japan, does reflect differences in the age composition of these countries' populations.

PROJECTED DEMOGRAPHIC CHANGES AND FUTURE SAVING RATES

Demographers project that the age composition of the U.S., German, and Japanese populations will change markedly during the next 20 years. Those changes have the potential to raise personal saving relative to GNP in the United States and to reduce it in Germany and Japan.

Population Shares Will Change Markedly. Demographers project that the share of the U.S. population in the high-saving years from 45 to 64 will rise by half from 1990 to 2010, to nearly 28 percent from about 18.5 percent, as the baby-

¹²Population data and projections cited in this article are taken from United Nations (1982).

¹³Based on the average size of the estimated effects found by the studies cited in Table 9 of Heller (1989).

¹⁴See Kennickell (1990) and Boskin and Lau (1988) for evidence on this point.

TABLE 2
Ratio of 65-and-Over Population
to Working-Age Population
and Household Saving

	1980	1985	1990
United States:			
65-and-over/working-age (%)	19.9	20.3	21.4
household saving/GNP (%)	5.0	3.1	3.3
Germany:			
65-and-over/working-age (%)	26.8	23.9	24.1
household saving/GNP (%)	8.3	7.2	8.2
Japan:			
65-and-over/working-age (%)	13.0	16.9	19.0
household saving/GNP (%)	12.7	10.7	9.4*

*This number for Japan is for 1989. Japanese saving data for 1990 were not yet published when this article went to press.

boom generation ages (Figure 1). The working-age share of the population will grow as well. The share of the U.S. population over the age of 64 is projected to be roughly constant during the next 20 years, and the share under the age of 20 is projected to decline.

In Germany and Japan, in contrast, the share of the population in the high-saving age group is projected to change much less during the next 20 years. But demographers project that the share of the population over the age of 64 will rise by one-third in Germany, to nearly 21 percent. In Japan, the share of the population 65 or older will rise by two-thirds, to nearly 20 percent in 2010. While the share of the population under the age of 20 is projected to shrink about as much in each of those countries as in the U.S., the working-age share of the population also is projected to shrink in Germany and Japan, in contrast to the U.S.

People who will be older than 20 during the

next two decades have been born already, and major industrial countries have reasonably accurate census data. As a result, demographers' projections of changes in the age composition of those countries' populations over the next 20 years are likely to be fairly accurate. There is uncertainty about future birthrates and about how much average lifespans may increase. Even so, population projections for the next two decades are unlikely to be far off unless birthrates or death rates change dramatically—or un-

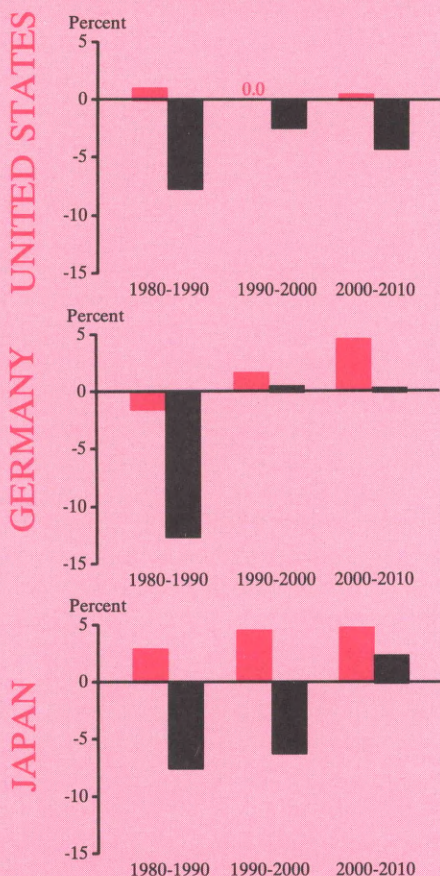
less migration occurs on a larger scale than observed in recent decades. The possibility of larger-than-usual immigration to Germany is quite real, considering ongoing developments in Eastern Europe. Should large-scale migration occur, the working-age population in Germany might not shrink as projected. For the U.S. and Japan, however, larger-than-usual immigration seems unlikely.

If demographic projections prove correct, the ratio of 65-and-over to working-age populations will rise by 6.4 percentage points in Germany and by 9.5 percentage points in Japan during the next 20 years, but will remain essentially unchanged in the U.S. (Figure 2). During the same period, the ratio of under-20 to working-age populations is projected to fall by about 7 percentage points in the U.S., but to rise roughly 1 percentage point in Germany and to reverse course and begin rising in Japan. Clearly, projected changes in the age composition of

FIGURE 2
Changes in Ratios
of 65-and-over and Under-20
Populations to Working-Age
Population

The ratio of low-saving, 65-and-over population to higher-saving, working-age population in the U.S. will remain essentially unchanged over the next 20 years, but will rise strongly in Germany and Japan. And the ratio of low-saving, under-20 population to higher-saving, working-age population will continue to decline in the U.S., but not in Germany and Japan.

■ 65+ to working-age ■ 0-19 to working-age



these three countries' populations have the potential to raise household saving in the U.S. and to lower it in Germany and Japan.

Changes in Population Shares Will Affect Household Saving. There is widespread agreement on this point among economists who have studied the issue, but there is disagreement on how large those changes are likely to be. Taking the average of earlier-cited estimates of the effects of changes in population ratios on household saving behavior, and multiplying that average by the projected changes in population ratios, one might conclude that demographic trends, by themselves, have the potential to raise the ratio of household saving to GNP in the U.S. by 3.5 to 4 percentage points by the year 2010, and to reduce the ratio by 6 to 6.5 percentage points in Germany and by 7 to 7.5 percentage points in Japan. Changes in saving shares are unlikely to be so large, however.

Because the U.S. baby-boom generation is so large relative to previous generations, it is difficult to predict just how much baby boomers' incomes and saving will rise as they enter their peak-earning years. Their peak incomes may not exceed the incomes they earned earlier in their lives by as much as was the case for earlier generations simply because so many baby boomers are competing for jobs. Also, if labor productivity in the U.S. continues to grow as slowly as it did during the 1980s, baby boomers' incomes will not rise as rapidly over the remainder of their working lives as was the case for earlier generations. Both of these possibilities suggest that U.S. baby boomers' saving rates may not rise as much when they enter their peak-earning years as was the case for earlier generations. In Germany and Japan, though, the shrinking working-age populations may cause the incomes of those entering their peak-earning years during the next two decades to rise more rapidly than was the case for earlier generations. In addition, if lifespans continue to grow longer, those now at work in all three countries may postpone retirement

and may save more as they prepare for a longer retirement. Thus longer lifespans may raise aggregate personal saving.

Although it is difficult to forecast just how much household saving behavior will change as a result of projected demographic changes, some recent economic research provides at least a rough idea. Taking into account projected changes in the ratio of 65-and-over to working-age populations and in the ratio of under-20 to working-age populations, and also taking into account the changes in real wages and in income distribution that seem likely to result, Paul R. Masson of the International Monetary Fund and Ralph W. Tryon of the Federal Reserve estimate that demographic shifts during the next 20 years have the potential to raise the ratio of household saving to GNP in the U.S. by roughly 2 to 2.5 percentage points by the year 2010. In contrast, they estimate that demographic shifts can lower the ratio of household saving to GNP by roughly 1.5 to 2 percentage points in Germany and by roughly 3.5 to 4 points in Japan.¹⁵

Changes in Population Shares May Affect Government Saving. Changing age distributions may affect government budget balances as well as private saving. As the number of people aged 65 and over in Germany and Japan grows rapidly during the next 20 years, their governments' spending on medical care, pensions, social security systems, retirement housing, and other programs for the elderly is likely to grow rapidly too. On the other hand, spending on education may decline as the number of children shrinks. One careful study undertaken by the OECD estimates that, on balance, projected demographic shifts would increase

government spending in Germany by an amount equal to nearly 5.5 percent of GNP by 2010, and in Japan by 9.5 percent of GNP—if there are no changes in government pension or benefit programs.¹⁶ At the same time, the working-age population in those two countries is projected to decline, making it more difficult for governments to raise additional revenues. Thus government saving in Germany and Japan may well shrink relative to GNP during the next two decades and could become negative, although governments are likely to offset at least part of the effect of demographic changes on their budgets.

In the United States, by contrast, the number of people 65 and older is projected to grow slowly during the next 20 years. Over the same period, the working-age share of the population is projected to rise. Thus in the U.S., the demand for government services for the elderly is likely to grow less rapidly during the next two decades than it did during the previous two. The OECD study cited in the preceding paragraph estimates that demographic shifts could reduce government spending in the U.S. by an amount roughly equal to 1.5 percent of GNP over the next 20 years. Over the same period, changing demographics are projected to generate large and growing surpluses in the U.S. Social Security System. Government dissaving in the United States could well shrink as a result.

Over the next two decades, then, projected changes in the age distribution of populations are likely to lower personal saving relative to GNP in Germany and Japan and perhaps re-

¹⁵Masson and Tryon (1990) undertake a careful empirical investigation of the effects of projected demographic changes in these three countries. For studies focusing on the U.S., see Kennickell (1990) and Auerbach and Kotlikoff (1989).

¹⁶For a discussion of the implications of projected demographic changes for social policy and the demand for government services, see *Ageing Populations: The Social Policy Implications*, published by the OECD (Paris, 1988). Several other estimates of the likely size of changes in demand for government services are summarized in Heller (1989) and in Table 2 of Masson and Tryon (1990).

duce government saving as well. In the United States, by contrast, demographic trends are likely to increase personal saving relative to GNP—and perhaps raise government saving, too.

Beyond 2010, however, the share of the U.S. population over 65 is projected to rise and the share in the high-saving, peak-earning years is projected to gradually decline as the baby-boom generation begins to enter the retirement years. Thus the projected rise in national saving relative to GNP in the U.S. may prove temporary. Demographers project that the ratio of over-65 to working-age populations will continue to rise in Germany and Japan, although more gradually. The projected decline in national saving relative to GNP in those two countries may prove longer lasting.

SUMMARY

From 1980 to 1990, both personal saving and net national saving were much smaller relative to aggregate income in the U.S. than in Germany or Japan. The lower ratio of personal saving to GNP in the U.S. partly reflected the age composition of the three countries' populations: an appreciably smaller share of the U.S. population was in the peak-earning, high-saving years from age 45 to 64 than was the case in Germany and Japan; and the share of the U.S. population in the low-saving years before people enter the labor force and after they retire was larger than for the other two countries. In addition, the government sector in the U.S. ran

budget deficits throughout the 1980s, thus reducing net national saving, while the government sectors in Germany and Japan ran budget surpluses.

Looking ahead, demographic projections suggest that personal saving will rise relative to GNP in the U.S. during the next 20 years as the share of the U.S. population in the high-saving years rises by half and the share in the low-saving age groups declines. Demographic projections also suggest that personal saving will fall relative to GNP in Germany and Japan during the same period, as the share of their populations that is over the age of 64 rises sharply and the working-age share of their populations shrinks.

The projected changes in the age composition of the German and Japanese populations seem likely to reduce government saving as well as household saving. But in the U.S., demographic changes are likely to contribute to smaller budget deficits—and possibly to budget surpluses.

Overall, projected demographic changes are likely to narrow the gap between high national saving relative to GNP in Germany and Japan and low national saving relative to GNP in the U.S. But demographic trends seem unlikely to raise U.S. saving rates to levels observed in Germany or Japan during the 1980s. The projected narrowing of saving gaps during the next 20 years will result as much from lower saving shares in Germany and Japan as from a higher saving share in the U.S.

REFERENCES

- Auerbach, Alan J., and Laurence J. Kotlikoff. "Demographics, Fiscal Policy, and U.S. Saving in the 1980s and Beyond," Working Paper 3150, National Bureau of Economic Research (October 1989).
- Boskin, Michael J., and Lawrence J. Lau. "An Analysis of Postwar U.S. Consumption and Savings Behavior, Parts I and II," Working Papers 2605 and 2606, National Bureau of Economic Research (June 1988).

- Bosworth, Barry, Gary Burtless, and John Sabelhaus. "The Decline in Saving: Evidence from Household Surveys," *Brookings Papers on Economic Activity* 1 (1991).
- Carroll, Christopher D. "Buffer Stock Saving and the Permanent Income Hypothesis," Working Paper 114, Division of Research and Statistics—Economic Activity Section, Board of Governors of the Federal Reserve System (February 1991).
- Dekle, Robert, and Lawrence Summers. "Japan's High Saving Rate Reaffirmed," Working Paper 3690, National Bureau of Economic Analysis (April 1991).
- Hayashi, Fumio. "Is Japan's Saving Rate High?" Federal Reserve Bank of Minneapolis *Quarterly Review* (Spring 1989).
- Heller, Peter S. "Aging, Saving, and Pensions in the Group of Seven Countries: 1980-2025," Working Paper 89/13, International Monetary Fund (January 1989).
- Kennickell, Arthur B. "Demographics and Household Savings," Finance and Economics Discussion Series Paper 123, Board of Governors of the Federal Reserve System (May 1990).
- Kotlikoff, Laurence J. "Intergenerational Transfers and Saving," *Journal of Economic Perspectives* (Spring 1988).
- Kotlikoff, Laurence J., ed. *What Determines Savings?* (MIT Press, 1989).
- Masson, Paul R., and Ralph W. Tryon. "Macroeconomic Effects of Projected Population Aging in Industrial Countries," Working Paper 90/5, International Monetary Fund (January 1990).
- Modigliani, Franco. "The Role of Intergenerational Transfers and Life Cycle Saving in the Accumulation of Wealth," *Journal of Economic Perspectives* (Spring 1988).
- United Nations. *Demographic Indicators of Countries: Estimates and Projections as Assessed in 1980* (New York, 1982).
- Weil, David N. "What Determines Saving: A Review Essay," *Journal of Monetary Economics* (August 1991).
- Wolff, Edward N. "Capital Formation and Productivity Convergence Over the Long Term," *American Economic Review* (June 1991).
- Zeldes, Stephen P. "Consumption and Liquidity Constraints: An Empirical Investigation," *Journal of Political Economy* (April 1989).



FEDERAL
RESERVE BANK OF
PHILADELPHIA

BUSINESS REVIEW Ten Independence Mall, Philadelphia, PA 19106-1574