Economic Consequences of an Aging Population

Diane Lim Rogers, Eric Toder, and Landon Jones

THE RETIREMENT PROJECT

Occasional Paper Number 6

URBAN INSTITUTE

Economic Consequences of an Aging Population

Diane Lim Rogers, Eric Toder, and Landon Jones

THE RETIREMENT PROJECT

Occasional Paper Number 6

The Retirement Project

ABOUT THE SERIES

THE RETIREMENT PROJECT IS A MULTIYEAR research effort that will address the challenges and opportunities facing private and public retirement policies in the twenty-first century. As the number of elderly Americans grows more rapidly, Urban Institute researchers will examine this population's needs. The project will assess how current retirement policies, demographic trends, and private-sector practices influence the well-being of older individuals, the economy, and government budgets. Analysis will focus on both the public and private sectors and will integrate income and health needs. Researchers will also evaluate the advantages and disadvantages of proposed policy options. Drawing on the Urban Institute's expertise in health and retirement policy, the project will provide objective, nonpartisan information for policymakers and the public as they face the challenges of an aging population. All Retirement Project publications can be found on the Urban Institute's Web site, http://www.urban.org. The project is made possible by a generous grant from the Andrew W. Mellon Foundation. Financial support was also provided by the Brookings Institution.

Table of Contents

ABOUT THE AUTHORS

DIANE LIM ROGERS IS A SENIOR RESEARCH associate in the Income and Benefits Policy Center at the Urban Institute. She was principal analyst in the Tax Analysis Division of the Congressional Budget Office (1994–99) and assistant professor of economics at Pennsylvania State University (1989–94). Her research and publications have focused on the distributional and incentive effects of broad-based taxes, welfare economics, state and local public finance, environmental taxation, and models of economic behavior and the macroeconomy. With Don Fullerton, she developed a life cycle model of the effects of taxation and wrote *Who Bears the Lifetime Tax Burden?* (Brookings Institution, 1993). She continues to teach public economics on a part-time basis and serves on the Board of Directors of the National Tax Association.

ERIC TODER is a senior fellow at the Urban Institute. Prior to joining the Urban Institute, he held a number of policy advisory positions in the U.S. government and overseas. Between 1993 and 1996, Dr. Toder served as deputy assistant secretary for tax analysis in the U.S. Department of the Treasury. His previous service in the U.S. Treasury between 1976 and 1984 included positions as deputy director of the Office of Tax Analysis for domestic taxation and as a financial economist on the Treasury's business taxation staff. Dr. Toder has also held positions in other government tax policy offices. He was deputy assistant director for tax analysis at the Congressional Budget Office from 1984 to 1988 and again from 1991 to 1993. Between 1988 and 1991, he was a consultant to the New Zealand Treasury, where he helped develop New Zealand's tax reforms.

LANDON JONES was a research associate in the Income and Benefits Policy Center at the Urban Institute when this paper was written. Prior to joining the Urban Institute, he was a research assistant in the International Finance Division of the Federal Reserve Board. He holds a bachelor's degree in economics from Princeton University and is currently a graduate student in public policy at the University of Michigan.

Economic Consequences of an Aging Population

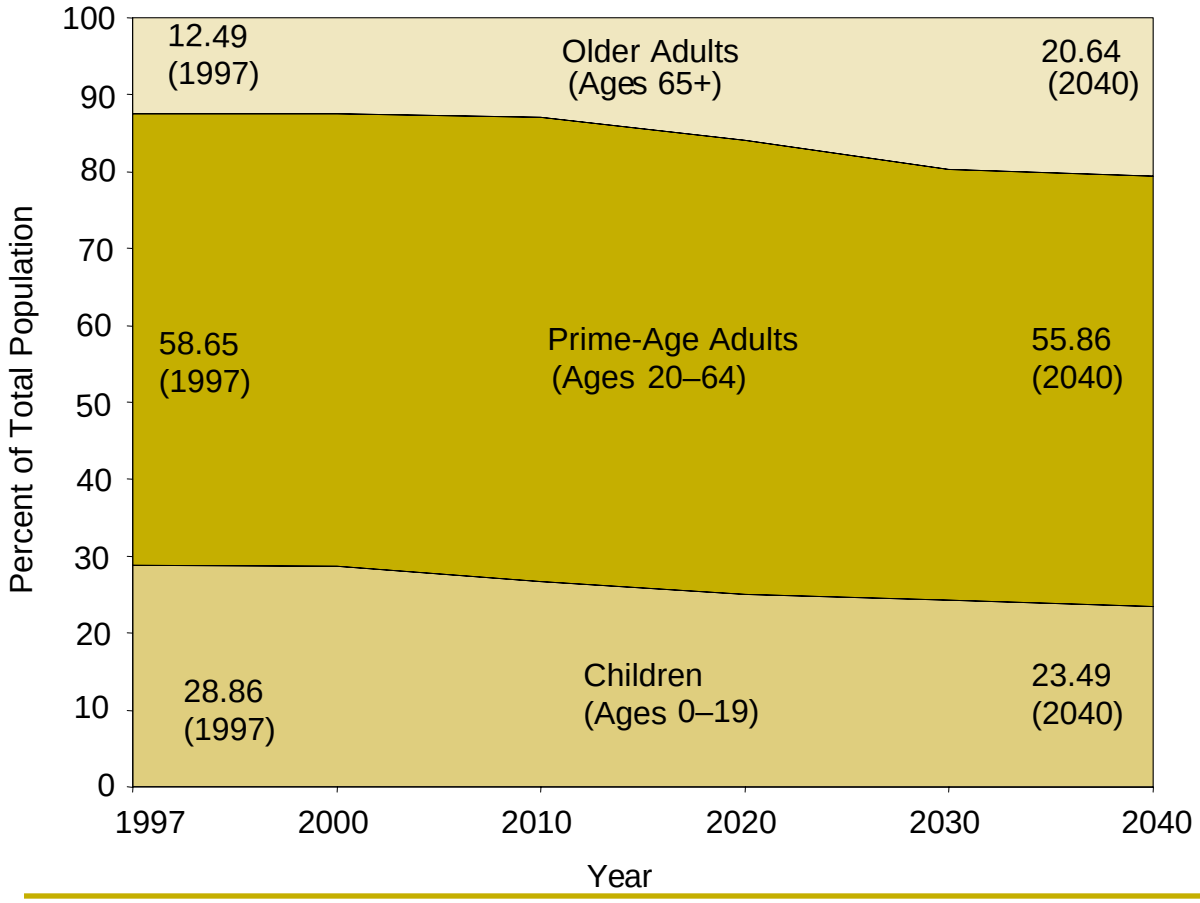
The retirement of baby boomers and the increase in the share of elderly in the population will create economic and fiscal stresses beginning in the second decade of the 21st century. These demographic developments, if not offset by changes in household behavior and government fiscal policy, will reduce the number of workers in relation to the population needing support and lower the national saving rate. The result will be slower growth in national income and consumption after 2010.

Over the next 40 years, the share of prime working-age adults will decline from about 59 percent of the population to about 56 percent (figure 1). The share of older adults (65 and over) will increase from just over 12 percent to almost 21 percent of the population. The higher costs of supporting these retirees will be offset partially by lower costs of supporting children, as the share of the population age 19 and under will drop from 29 percent to just over 23 percent.

This paper examines how demographic developments will affect the pattern of economic growth over the next 40 years. Demographic changes will alter labor supply, private and public saving rates, and the growth of national income and consumption. How these variables ultimately change will depend on behavioral adjustments by workers, savers, and governments.

The first section of this paper discusses the impact of demographic changes on future labor supply, while the second section explores the potential implications of these changes for private and public saving. The third section combines the labor supply and saving projections in a simple macroeconomic model, examining the effects of demographic changes on output, consumption, interest rates, and wages. It also examines the consequences of alternative assumptions about the following: workforce participation rates of older people, private saving behavior, and government fiscal policies.

FIGURE 1.
Projected Shifts in Population



Source: Authors' calculations based on data from the Census Bureau (1997) and the Social Security Administration (SSA) Office of the Chief Actuary (1997).

FUTURE LABOR SUPPLY

Projections show that the percentage of the population between ages 20 and 64 will decline after 2010 and the percentage of people over age 65 will increase dramatically. These changes reflect the short-run effect of the aging of baby boomers (1946–64 birth cohorts) and the long-run effect of reduced fertility and increased life expectancy. If labor force participation rates in each age group remain the same, the ratio of workers to retirees will decline sharply between 2010 and 2030 and continue to decline, although much more slowly, after 2030. The ratio of workers to dependents (children and older adults) will decline by less than the ratio of workers to retirees because the proportion of children in the population will also decline.

A decline in the share of workers in the population means that, if all else remains the same, output per capita and living standards will be lower than they otherwise would have been if the share of workers had remained stable. The following section briefly summarizes recent estimates of future labor supply by Toder and Solanki (1999) and compares them to projections by the Board of Trustees of the Federal Old Age and Survivors and Disability Insurance Trust Funds (Trustees) (1999). Later, these estimates will be used to project the effect of demographic changes on economic growth.

Projections of Future Labor Input

As mentioned above, the changing age composition of the population will reduce the share of workers and increase the share of dependent elderly. However, several factors may mitigate this decline. Labor force participation rates of older women are likely to increase over the next two decades as women born after World War II, with their higher lifetime participation rates, replace older women in the workforce. The increase in experience associated with an older workforce will raise average earnings and productivity per worker. General workforce education levels will also increase as less educated workers retire and are replaced by the better educated workers in later birth cohorts.

According to the Trustees, the number of workers covered by Social Security will increase by 19 percent between 1997 and 2040; Toder and Solanki find a similar increase of 22 percent over the same period if 1997 labor force participation rates by age and gender remain constant (table 1). However, when Toder and Solanki adjust for greater labor force participation of postwar birth cohorts of women, increased worker experience, and higher education levels, they discover that the effective labor supply increases by about 26 percent between 1997 and 2040.[1]

While total labor supply will be higher in 2040 than it was in 1997, labor supply growth is expected to decline sharply over the first four decades of this century. For example, according to Toder and Solanki, the adjusted labor supply increases by 1.04 percent per year between 2000 and 2010, followed by continually declining annual rates—0.72 percent, 0.42 percent, and 0.27 percent—in each of the next three decades (figure 2). The Trustees' projection and Toder and Solanki's unadjusted numbers exhibit the same pattern of declining growth.

However, these projections hold only if past patterns of labor force participation by age and gender continue. But, of course, behavior *within* age and gender groups has not always been stable and may change in unforeseen ways. For example, Toder and Solanki (1997) report that the number of workers per capita increased by about 32 percent between 1965 and 1997. About half of this growth in overall labor force participation was attributable to an increase in the share of working-age people and the other half to changes in labor force participation rates *within* age and gender groups. The most important source of this growth was the increase in labor force participation rates of working-age women, which outweighed the reduction in labor force participation rates of older men. However, the growth in labor force participation rates of young and middle-aged women and the decline in participation rates of older men have virtually ceased in recent years.[2]

Consequences for Living Standards

The slowdown in the growth of the workforce will leave fewer workers in relation to the population they must support. The term "labor supply adequacy" refers to the ratio of the quality-adjusted workforce to the total consumption needs of the population. Labor supply adequacy is one factor influencing living standards of the population; the stock of capital and technological know-how are others.

A simple measure of labor supply adequacy is the ratio of the workforce to the total population. But not all people have equal consumption needs. For example, the government spends much more per capita on the over-65 population than it does on other age groups. So what is the appropriate ratio to use in measuring labor supply adequacy?

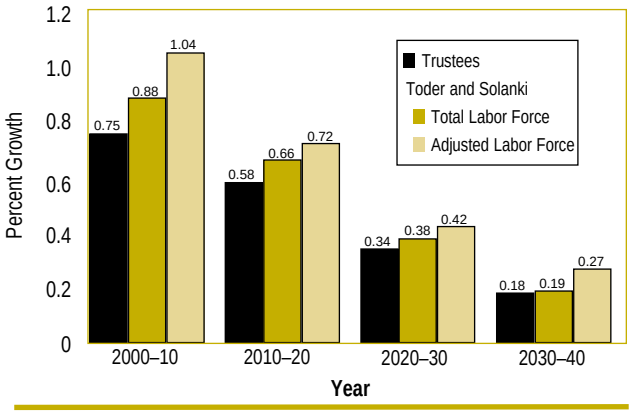
Table 2 reports alternative measures of labor supply adequacy. The Trustees use projections of the ratio of covered workers to Social Security beneficiaries because their concern is the adequacy of Social Security financing. Between 1997 and 2040, the covered-workers-to-beneficiary ratio is expected to decline dramatically from 3.35 workers per beneficiary to 2.03 workers per beneficiary—a drop of about 40 percent. This projection is

TABLE 1.
Labor Supply Growth Rate Projections: Toder-Solanki versus Trustees

Year	Covered Workers, Trustees: Number (thousands)	Covered Workers, Trustees: Index (1997 = 100)	Total Labor Force, Toder-Solanki: Index (1997 = 100)	Total Labor Force, Toder-Solanki: Ratio to Trustees	Adjusted Labor Force, Toder-Solanki: Index (1997 = 100)	Adjusted Labor Force, Toder-Solanki: Ratio to Trustees
1997	146,719	100.0	100.0	1.000	100.0	1.000
2000	151,105	103.0	103.2	1.002	104.2	1.012
2005	157,082	107.1	108.2	1.011	110.6	1.033
2010	162,882	111.0	112.6	1.014	115.6	1.041
2015	166,503	113.5	115.5	1.018	118.8	1.047
2020	168,480	114.8	116.9	1.018	120.6	1.050
2025	169,509	115.5	117.7	1.019	122.0	1.056
2030	170,705	116.3	118.7	1.020	123.4	1.061
2035	172,770	117.8	120.2	1.021	124.7	1.059
2040	174,887	119.2	121.8	1.022	126.0	1.057

Sources: Toder and Solanki (1999) and Board of Trustees (1999).

FIGURE 2.
Labor Supply Annual Growth Rates:
Toder-Solanki versus Trustees



consistent with the 42 percent decline, reported by Toder and Solanki (1999), in the ratio of people between ages 20 and 64 to those who are 65 and older. By any measure, the ratio of workers to retirees will be substantially lower in 40 years than it is today.

Labor supply adequacy measures that compare workers to retirees are best suited for measuring the ability to fund Social Security but less appropriate for measuring overall effects on living standards. When a broader measure of the population that workers support is considered—one that includes workers and children—the decline in labor supply adequacy is much smaller because the nonelderly population grows more slowly than the elderly population. Compared to the 42 percent decline between 1997 and 2040 of 20- to 64-year-olds compared to those over age 65, Toder and Solanki report much smaller declines—about 11 percent for the ratio of 20- to 64-year-olds to the 20-and-over population, 5 percent in the ratio of 20- to 64-year-olds to the total population, and only 2 percent in the ratio of the quality-adjusted workforce to the total population (table 2). These quality-adjusted labor supply adequacy projections are used for the "base-case" simulation presented in the third section of this paper.

The quality-adjusted labor supply adequacy projections assume that labor force participation rates by age will remain constant. However, improvements in health and longevity of the elderly may cause workers to retire at older ages so that their *expected years in retirement* remain constant. This possibility is considered in a "longevity-adjusted" simulation. Under this assumption, retirement ages will increase with longevity. For example, if life expectancy of older people increases by two years between 1997 and 2040, then the labor force participation rates of older workers at age x in 2040 will be similar to the participation rates of workers at age $x - 2$ in 1997.

Toder and Solanki present a simulation of future labor supply under the assumption that people ages 55 to 75 maintain a constant expected number of years in retirement after 1997. This assumption raises labor supply in 2040 by 4.4 percent, compared with the assumption of constant age-specific labor force participation rates. Even under this scenario, however, labor supply adequacy declines between 2010 and 2040, as baby boomers enter retirement.

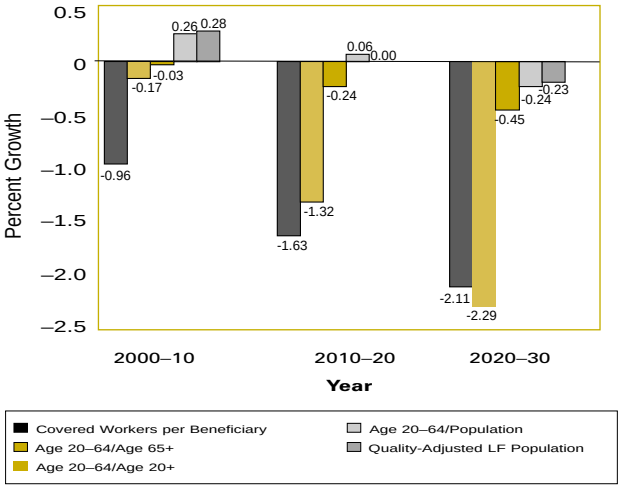
The potential decline of the workforce in relation to the population it supports is only one component of the problem created by the aging of the population. There is also a potential decline in national saving rates caused by increased transfer payments to, and lower private saving rates of, the growing elderly population. The following

TABLE 2.
Measures of Labor Force Adequacy

	Trustees		Toder and Solanki (1999)			
Year	Covered Workers per Beneficiary	Index (1997 = 100)	Ages 20–64/ Age 65+	Ages 20–64/ Age 20+	Ages 20–64/ Population	Quality-Adjusted LF/Population
1997	3.350	1.000	1.000	1.000	1.000	1.000
2000	3.364	1.004	1.011	1.002	1.005	1.014
2005	3.252	0.971	1.029	1.005	1.021	1.036
2010	3.055	0.912	0.994	0.999	1.031	1.043
2015	2.759	0.824	0.901	0.981	1.027	1.036
2020	2.468	0.737	0.789	0.955	1.007	1.019
2025	2.239	0.668	0.678	0.923	0.978	1.003
2030	2.098	0.626	0.603	0.896	0.955	0.992
2035	2.039	0.609	0.578	0.886	0.949	0.985
2040	2.032	0.607	0.578	0.886	0.952	0.982

Sources: Toder and Solanki (1999) and Board of Trustees (1999).

FIGURE 3.
Annual Labor Force Growth Rates



section turns to the effects of demographic changes on private and national saving rates.

EFFECTS OF DEMOGRAPHIC CHANGES ON NATIONAL SAVING

Saving enhances society's ability to produce and consume in the future, but it requires the sacrifice of current consumption. The trend toward longer life spans and longer periods of retirement, in addition to projections suggesting growth in the share of elderly, implies that more saving will be necessary over the next several decades to maintain growth in living standards.

Private saving is defined as net national product (our measure of output) plus transfers and interest received from government debt minus taxes and private consumption. The personal and corporate components of private saving are not separately modeled; instead, it is assumed that households determine the sum. Public saving is what is left of taxes after subtracting transfers, interest paid on government debt, and government consumption. Public saving can also be thought of as government investment minus the budget deficit. National saving is net national product minus private consumption and government consumption. It also equals the sum of private and public saving. Our projections of saving depend on our assumptions about how each of the components going into this product-side definition evolve over time.

National saving equals all savings by households, businesses, and government and determines the growth of the national capital stock. Table 3 shows how the national saving rate, and its private and public components, has evolved over the past few decades. The long downward trend in the national saving rate has recently turned around because of recent improvements in government (particularly federal) fiscal positions. But the private saving rate, which has been declining since the 1980s, continues to fall. Private saving is the sum of personal and business saving. Personal saving has dropped sharply in recent years, while business saving has been relatively stable. If one believes that personal saving is a good indicator of "true" saving, this trend is alarming. Gale and Sabelhaus (1999) argue that a broader measure of personal saving, including accumulated wealth in retirement plans and consumer durables, paints a less bleak picture. Despite some theories that suggest that private and public saving are interdependent (to be discussed later), table 3 shows that the historical relationship between the two components is not obvious.

TABLE 3.
NIPA Product-Side Measures of Saving, 1959–1997 (rates as percentage of NNP)

Category	1959	1964	1968	1973	1979	1984	1989	1994	1995	1996	1997
Private saving (personal + business)	9.12	10.40	9.39	10.80	10.04	10.25	6.49	6.67	6.68	6.05	5.33
Public saving (all levels of government)	2.70	2.82	2.44	2.11	1.91	–1.37	–0.04	–1.21	–0.77	0.30	1.66
National saving (private + public)	11.82	13.22	11.83	12.91	11.94	8.88	6.44	5.46	5.90	6.35	6.99

Source: Authors' calculations from National Income and Product Accounts data.

Assuming that current policies stay the same, the national saving rate will probably fall between now and 2040 for two main reasons. First, the increase in the share of elderly in the population means a relative increase in the numbers who draw down assets, thereby reducing total private saving. Second, the current transfer commitments of the government are heavily weighted toward the elderly in the form of Social Security and health (Medicare and Medicaid) transfers, implying that the ratio of transfer payments to national income will increase if per capita transfer payments for each age group grow at the same rate as income. Unless tax rates increase, or other government spending falls, the growth in transfers will significantly reduce public saving. The following sections examine how future demographic change might affect all types of saving.

Influences on Private Saving

There are many theories about what determines saving, but none is definitive. Several of the theories—especially the life-cycle model—suggest that age is an important determinant of saving behavior (box). Although past changes in demographics, on their own, cannot explain the recent trends in the saving data, future changes in demographics—in particular the ratio of elderly people to working-age people—will be dramatic. This paper considers how demographic changes might affect saving in the future if current differences in saving rates among age groups persist.

The approach taken in this paper is very similar to the one by Leibfritz et al. (1996) described in the box. The central assumption in the macroeconomic model presented here is that age-related patterns in private saving, government consumption, and transfer payments hold up over time. Various sources of household survey data are used to determine consumption as a share of annual income by age group, and the propensities to consume are preserved over time, with some adjustment for changes in the number of children per household. (Each age group's saving rate will rise if fewer children come into their group.[3]) Because propensities to consume vary by age, aggregate private saving will evolve as the shares of population at different ages change.

Table 4 shows the saving rates by adult age group that are derived from household survey data for 1997, the starting point in the simulation. "Private income" in the table is a measure that includes both personal and corporate income. It is equal to disposable income, as shown in

TABLE 4.
Private Income Shares and Saving Rates by Age Group, 1997

		Base Case from Survey Data		20–64 versus 65 and Older	
Age	Share of Private Income (%)	Private Saving as Percentage of Private Income	Contribution to Aggregate Private Saving Rate	Private Saving as Percentage of Private Income	Contribution to Aggregate Private Saving Rate
20–34	19.8	–26.3	–5.21	7.94	1.57
35–44	26.0	11.1	2.89	7.94	2.06
45–54	23.8	24.6	5.85	7.94	1.89
55–64	13.1	23.1	3.03	7.94	1.04
65–74	9.4	2.6	0.25	–0.08	–0.01
75–84	5.8	–1.3	–0.07	–0.08	–0.01
85+	2.2	–8.8	–0.19	–0.08	*
All	100.0	6.55 (average)	6.55 (sum)	6.55 (average)	6.55 (sum)

Source: Authors' calculations based on various sources of household-level data, calibrated to aggregate values in the NIPA.
*Less than –0.05 percent.

THEORIES OF SAVING

One of the most prominent theories of saving is the life-cycle model (LCM), which predicts that people will save in order to translate their fluctuating levels of income into smooth paths of consumption. Because earnings tend to rise first and then fall over a lifetime, smooth consumption implies that households borrow when young, save when middle-aged, and spend savings, or "dissave," when old. The pure version of the LCM assumes that people consume all their wealth by death (no bequests) and that people have unlimited access to capital markets at a single interest rate paid by borrowers or received by savers. Given these assumptions, the pure LCM implies pronounced differences in annual saving rates by age, with consumption fluctuating with changes in permanent income but not transitory income.

Many economists, including Bosworth (1996), are unimpressed with the life-cycle theory, because it fails to explain recent trends in saving. However, empirical evidence is mixed; cross-country data appear to be more supportive of the LCM, while the U.S. historical time series or household survey data are less so. Recent declines in private saving have occurred even as the baby boomers are entering their high-saving years. The household survey data suggest that the decline in saving has been widespread and not related to differences across age groups or changes in the age distribution (see Bosworth, Burtless, and Sabelhaus 1991). Finally, when productivity growth slowed after 1973, saving decreased, instead of increasing as the LCM would predict. (If consumption is a function of expected future income, then an expected slowdown in future income should decrease consumption and increase saving.)

Research has exposed other inconsistencies between the LCM and empirical facts. Given the pattern of age-earnings and age-consumption profiles, the pure LCM cannot explain the size of the aggregate capital stock; hence, intergenerational transfers and bequest motives ("dynastic models") may be important in determining saving and asset accumulation. Also, consumption appears more sensitive to fluctuations in current or transitory income than theory would suggest. Therefore, rules of thumb, mental accounts, and other theories involving less-than-lifetime planning horizons might better explain saving behavior. More recent explanations of the downturn in saving have considered the role of uncertainty and the need for precautionary saving (less of such saving is needed with recently expanded credit markets) and the expansion of public transfers to the elderly (everyone saves less on their own in anticipation of greater government support in retirement).

Economists have taken a variety of approaches to embedding demographic effects into macroeconomic models. In any data set, one can find particular empirical relationships between saving and consumption and the age distribution of the population, but it is unclear if such relationships will be maintained in the future.

- Bosworth (1996) and the Congressional Budget Office (CBO) (1997) both model saving as a fixed share of income so that the saving rate does not depend on the age distribution. This approach is reasonable if one does not believe that age-related saving rates in current data will remain stable over time.
- The Federal Reserve Board's (1996) macroeconomic model of the United States specifies an aggregate consumption function that represents a combination of life-cycle and liquidity-constrained behavior based on different propensities to consume out of different types of income and wealth (see Brayton and Tinsley 1996). Because income and wealth composition vary by age, the consumption function implicitly allows changes in the age distribution to affect the aggregate saving rate.
- Auerbach and Kotlikoff (1987) use an explicit overlapping generations model that tracks the paths of consumption that maximize lifetime utility subject to lifetime budget constraints and perfect capital markets. In the Auerbach and Kotlikoff model, changes in the age distribution affect the aggregate saving rate by changing the relative numbers of people at different (saving and dissaving) points in the life cycle.
- An OECD analysis by Leibfritz et al. (1996) starts with age-dependent saving rates, keeping track of trends in the numbers of people in different age groups and assuming behavior by age group is constant. While the central case considered generally reflects a life-cycle pattern of saving by age, they also adjust the age-saving profiles to consider patterns possibly more consistent with other theories of saving (such as bequest motives). This approach of modeling age-based saving rates differs from an explicit utility-based overlapping generations framework, however, because it provides no accounting for lifetime utility and lifetime budget constraints. It also is an empirically based, reduced-form type of approach that does not apply the pure LCM.

the National Income and Product Accounts (NIPA), plus corporate retained earnings. Private saving is computed as the difference between private income and private consumption. In making this computation, labor income, capital income, taxes, transfer payments, and consumption are calibrated to NIPA data. The distribution of income, transfer payments, and consumption by age is based on other data sources. Labor income by age is from Census data, while the distribution of capital income is from the distribution of wealth in the Survey of Consumer Finances.[4] The age distribution of transfers comes from the various program agencies.[5] Household consumption by age of household head comes from the Consumer Expenditure Survey. Taxes by age are assigned by applying national effective tax rates on capital, labor, and consumption to each age group's tax bases.

The data suggest strong implications for private saving associated with changes in the relative numbers of both young and old people. Calibrating aggregate private saving to the 6.55 percent rate observed in 1997, we obtain a wide distribution of saving rates across the adult age categories. Middle-aged adults are the largest savers, saving nearly a quarter of private income. In contrast, the youngest adults have the largest negative saving rate (over a quarter of their private income) and also produce more total dissaving than the elderly (negative 5.21 percent toward the aggregate private saving rate versus negative 0.07 or negative 0.19 percent, as seen in the fourth column of the table), because they have a much larger share of private income. This effect at the young end of the age distribution has received little attention from other researchers; for example, Leibfritz et al. focus on saving rates of the elderly relative to the rest of the population.

This high rate of dissaving by young adults may reflect inconsistencies among the several sources of data combined to derive saving rates by age. To test the sensitivity of results to the assumed distribution of saving rates by age, simulations with alternative age patterns of saving were run. The high measured rates of dissaving among young adults may in part reflect the fact that NIPA treats purchases of durable goods as current consumption. In the appendix, we examine the consequences of using a measure of private saving that treats net increases in the stock of consumer durables as saving.

Previous estimates of the effects of dependency ratios on saving rates have found a more negative effect of the elderly dependency ratio than the child dependency ratio; as mentioned, those analyses did not look at differences in consumption by age among working-age adults.[6] To examine how much this matters, a more aggregate distribution of private saving rates across adults is considered, one that differentiates only between adults between ages 20 and 64 and adults 65 and older. The distribution of saving rates corresponding to this view is also shown in table 4. The 64-and-under population saves about 8 percent of private income, while the 65-and-over population dissaves at a very slow rate of 0.08 percent of private income, so that the aggregate private saving rate is maintained at the 1997 level of 6.55 percent. In the model simulations presented here, this and other alternative patterns of saving rates by age are examined. In addition, the model explores the saving rate's sensitivity to assumptions about how the number of children per adult affects consumption.

The model uses a straightforward method of capturing the effect of demographic changes on saving, but it leaves out important potential effects. Consumption and saving by age are simply fixed shares of private income. Thus, both wealth, which could be defined in various ways, and changes in the rate of return to capital are assumed to have no effect on saving. In addition, the assumption that consumption propensities by age are fixed makes the model subject to the "Lucas critique," a term applied to the use of equations that might not be stable as policy changes. In this particular context, consumption and saving propensities may depend on pension and transfer policies, which could change as the age distribution changes. Finally, there may be systematic differences among cohorts in saving propensities.[7]

Influences on Public Saving

The nation saves through its government sector when governments collect more than they spend. According to NIPA data, public saving equals taxes minus government consumption (public goods and services), transfer payments, and interest on the debt. This measure of public saving is equal to government investment minus the deficit. By this measure, public saving fell from the 1960s to the mid-1990s but has risen in recent years, largely reflecting changes in the federal budget position. Government investment has been relatively stable. While increases in health-related costs continue to put upward pressure on government transfers, and accumulating debt has necessitated greater payments of interest, higher taxes and decreases in government consumption in the 1990s have created overall surpluses.

Future public saving will be profoundly affected by the aging of the population because the major government transfer programs—Social Security and the health programs (Medicare and Medicaid)—disproportionately benefit the elderly. Part of government consumption, expenditures on public education, goes disproportionately to the young, who will become a smaller share of the population. This will reduce government spending in the future but only partially offset the upward pressures from the transfer system. Public education spending was about

half of Social Security and health transfers in 1997, and the increase in the elderly population will be much more pronounced than the decrease in the number of children.

Public saving is projected by assuming that the age-related patterns in transfers and education spending found in the initial-year data largely hold up in the future. These patterns are shown in table 5. For each of these programs, we assume that per capita expenditures by age group will grow with national output per capita. This makes total government spending grow relative to output, because of the concentration of transfer payments among the more numerous elderly.

Regarding Social Security, the projections presented in this paper of changes in aggregate benefits are based solely on the evolution of the age distribution. CBO's projections, in contrast, account for changes in program structure, adjusted for differences between CBO's and the Social Security Administration's (SSA) economic assumptions. But using both the age-related pattern in the data and SSA's aggregate projections is somewhat inconsistent because some of the movement in the aggregates reflects program changes that may affect the age distribution of benefits. In this paper, the demographic changes drive what happens to aggregate Social Security transfers, assuming the program's benefits-by-age structure stays the same. Despite the slightly different methodology, the projections presented here for the growth of Social Security turn out to be quite similar to those of CBO.

The projections presented in this paper of health transfers differ more substantially from CBO's, mainly because it is assumed that per-beneficiary health costs by age grow with productivity (output per capita), but not any faster. Recent research suggests productivity growth has offsetting effects on per-beneficiary costs, but the net effect is to raise costs. Prolonged longevity and improved health may allow health costs for those age 85 and older to fall, but technological advances may continue to put upward pressure on per capita costs, holding health status constant. Cutler and Sheiner (1999) believe that the technological cost factor will outweigh the improved health factor. Lee and Skinner (1999) also conclude that technology will increase the overall share of GDP spent on health care, but at a substantially lower rate than government projections. The projections presented here of the growth in aggregate health spending simply reflect demographic effects, but not the effect of sector-specific increases in medical costs. CBO's memo on its long-term model shows that its assumption about additional medical costs is critical in driving its result that health spending more than doubles as a share of national income over the 1997–2040 period. When CBO's assumptions about increases in health costs are applied to the model presented in this paper, very similar projections (not shown in this paper) are produced.[8]

Putting It Together: Demographic Influences on National Saving

Given that national saving is the sum of private and public saving, the effects of demographic change on national saving are driven by the age-related patterns of private saving rates and the age-related patterns in government transfers. Each age group's reliance on public versus private sources of funds is held constant. For example, the elderly will continue to do the bulk of their consuming through the public sector. The key age distributions affecting the two components of saving are summarized in tables 6A and 6B. Table 6A shows the 1997 distribution of children among the adult age categories. This distribution is held constant over time, but the total number

TABLE 5.
Age-Related Government Expenditures* per Capita, 1997

	Transfer Programs				
Age	Social Security ($)	Other Retirement ($)	Health ($)	All Other Public Transfers ($)	Public Education ($)
0–19	108	—	532	107	3,779
20–34	58	33	404	561	1,200
35–44	205	48	694	608	521
45–54	418	1,078	746	707	0
55–64	1,950	1,078	990	707	0
65–74	7,620	2,862	5,836	591	0
75–84	8,901	2,862	9,463	591	0
85+	8,681	2,862	15,266	591	0
Average across total population	1,311	594	1,547	471	1,438

Source: Authors' calculations based on various sources of household-level data, calibrated to aggregate values in the NIPA.

* All levels of government.

TABLE 6A.
Key Demographic Factors Affecting Saving: Distribution of Children by Age of Household Head, 1997

Head of Household	Population under Age 20 (%)
20–34	34.19
35–44	44.75
45–54	15.85
55–64	3.54
65–74	1.19
75–84	0.41
85+	0.07
All	100.00

Source: Authors' calculations based on Census and SSA data.

of children, relative to the total number of adults, changes according to the Trustees' midrange population projections. Because children are disproportionately found in households headed by young adults (between the ages of 20 and 44), any change in the relative number of children will disproportionately affect the consumption and saving of those young adult groups. Table 6B shows why these young adults—who are "high spenders" according to the 1997 saving rates shown previously (in table 4)—are an important part of the private saving story. There will be relatively fewer of them in the future and they will have fewer children. In contrast, the share of high-saving middle-aged people will be slightly higher in 40 years, while the share of elderly dissavers will increase dramatically. A focus on the oldest groups alone would suggest a dramatic fall in private saving. The drop in the share of the younger group, with its high consumption propensity, and the increase in the 45-to-64 age group, with its high saving propensity, push aggregate private saving upward.

The demographics affecting public saving are more straightforward. Although the decreasing share of children will reduce the growth in public education spending, the driving force affecting government outlays in the future will be the increase in the "high public spending" (65 and older) share of the population. Social Security transfers are skewed toward people ages 65 and older, with very little going to the remainder of the population. Thus, Social Security transfers as a share of national output are expected to increase substantially over time. Health transfers are enjoyed by more people throughout the age distribution but also favor older adults. Because the growth of the oldest elderly will be even more significant than the growth of the elderly as a whole, health transfers should also increase dramatically as a result of demographic change alone.[9]

Tables 7 and 8 quantify these effects. Table 7 shows that the age-related private saving rates in table 4 imply that changes in the age distribution of adults will make the private saving rate higher in the future than it is today. The evolution of the adult age distribution alone implies that the private saving rate would first rise significantly—from 6.55 percent of private income in 1997 to 8.71 percent of private income in 2010—and then fall. By 2040, the saving rate would remain nearly a percentage point above the 1997 level. This rather rosy view of the implications of demographic change for private saving is due to the fact that the biggest private spenders in the economy, the young adults, are shrinking in relative numbers between 1997 and 2040. Combined with the projection that the share of high-saving middle-aged people will rise at first, these trends cause the private saving rate to increase substantially in the next 20 years. In the subsequent 20 years, although the share of young adult spenders continues to fall, the share of middle-aged savers also drops slightly while the elderly share rises sharply. Thus, the overall private saving rate falls from its peak but remains higher than in the initial year, 1997.

The effect of changes in the number of children relative to adults reinforces the optimistic story about private saving, as table 7 shows. The marginal effect of this "kid

TABLE 6B.
Key Demographic Factors Affecting Saving: Population Shares of Key Groups Affecting Private and Public Saving

Age	1997 (%)	2000 (%)	2010 (%)	2020 (%)	2030 (%)	2040 (%)
Key Groups Affecting Private Saving						
Children (0–19)	28.9	28.7	26.6	25.0	24.2	23.5
Young adult "high spenders" (20–34)	22.0	20.6	20.3	20.4	18.9	18.8
Middle-aged "high savers" (45–64)	20.6	22.0	26.8	25.9	23.5	24.4
Elderly dissavers (75+)	5.7	5.9	6.0	6.4	8.7	11.0
Key Group Affecting Public Saving						
Older adults, or "high public spenders" (65+)	12.5	12.4	12.9	16.0	19.8	20.6

Source: Authors' calculations based on Census and SSA data.

TABLE 7.
Potential Effects of Demographic Change on Private Saving

Marginal effect of demographic change	Change in annual private saving rate *				
	2000	2010	2020	2030	2040
With distinctions across all adult age groups (as in base case)					
Change in adult population shares	+0.93	+2.16	+1.36	+0.87	+0.87
Change in share of children relative to adults	+0.14	+0.40	+0.58	+0.76	+0.88
With distinctions between 20–64 and 65+ age groups only					
Change in adult population shares	+0.12	+0.18	–0.22	–0.57	–0.62

Source: Authors' calculations based on initial distribution of saving rates by age and effects of changing population shares. For example, the private saving rate in 2000 based on the change in adult population shares would be about 7.5 percent (6.55 + 0.93).
*Deviation from 1997 rate of 6.55 percent of private income.

factor" builds over time as their share falls. Although changes in the mix of adults is a more significant influence over most of the 1997-2040 period, the effect of there being fewer children relative to adults becomes equally important by 2040. Alone, it boosts private saving by nearly a percentage point over the 1997 rate.

The prediction of the effect of demographic change on private saving depends on distinguishing among prime-age adults in terms of their saving rates. If, instead, the only differentiation is between people who are 20 to 64 and people 65 and over, a very different story about how the aging adult population affects aggregate private saving emerges, as shown in the last row of table 7. Although saving rates initially rise slightly (because of the slight growth in the younger share of the population), they eventually fall below the 1997 level as the share of older adults rises to over 20 percent of the population. Still, the private saving rate in 2040 is only slightly lower than in 1997.

Table 8 examines what demographic change may imply for the evolution of age-related components of government spending and hence public dissaving. Allowing transfers per capita by age category to rise with national output (net national product, or NNP), and then accounting for the changes in the age distribution of the population, the table shows the implied changes in their aggregates over time as a share of NNP. Transfer programs are skewed toward older adults, so transfers as a share of NNP rise as the share of the population over 65 increases. Public education spending is skewed toward the young, so the aggregate as a share of NNP falls as the relative numbers of young people decrease. These trends will put substantial upward pressure on public spending because the drop in education spending is outweighed by transfer spending and the growth in the share of older adults. Demographic trends raise spending of all levels of government by about 6 percent of NNP between 1997 and 2040.

Possible Interdependencies between Private and Public Saving

Changes in private saving could be unrelated to changes in public saving, as the above calculations suggest, but private and public saving may affect one another. The theory of Ricardian equivalence asserts that changes in the intergenerational distribution of taxes and transfers will be perfectly offset by changes in private transfers, so that changes in public saving would ultimately have no effect on national saving. However, the extreme case of full offset, or "strict Ricardian equivalence," has been rejected by most empirical studies (Leibfritz et al. 1996). Thus, a simple rule to look at the effects of a partial Ricardian offset is CBO's approach of letting private saving increase by half the decrease in public saving. Most of the simulations reported below assume that private saving is independent of public saving; but one variant assumes a partial Ricardian offset, according to CBO. With such an offset, there are many different ways that aggregate private saving can increase. For example, it can increase proportionately across age categories according to each category's initial saving or it can increase in proportion to the distribution of tax liabilities. The first approach is taken in the following analysis.

PROJECTIONS OF THE ECONOMIC EFFECTS OF AN AGING POPULATION

This section uses a simple macroeconomic growth model to show how demographic changes may affect total out-

TABLE 8.
Projections of Age-Related Components of Government Spending* Based on Demographic Changes

	Transfer Programs					
Year	Social Security (%)	Other Retirement (%)	Health (%)	All Other Public Transfers (%)	All Transfers (%)	Public Education (%)
1997 (actual)	*5.01*	*2.27*	*5.91*	*1.80*	*20.5*	*5.49*
2000	5.04	2.32	5.97	1.81	20.6	5.41
2010	5.41	2.56	6.19	1.87	21.1	5.04
2020	6.39	2.86	6.87	1.89	22.8	4.80
2030	7.45	3.18	8.00	1.90	25.2	4.64
2040	7.81	3.31	8.73	1.92	26.3	4.51

Source: Authors' calculations based on population projections and age-related patterns of spending in baseline year (1997).

* As a percentage of net national product.

put, wages, interest rates, saving rates, and consumption through 2040. The model illustrates how the economy might evolve under varying assumptions about labor supply growth, the effects of age composition of the population on private saving rates, and government fiscal policies.

The Macroeconomic Model

The macroeconomic model is a simple neoclassical growth model.[10] Output depends on effective labor supply, the amount of capital (capital stock), and the state of technological knowledge. Labor supply and saving are exogenously determined, but alternative assumptions about how labor supply and private saving rates evolve over time are considered. The model in its current form has no foreign sector, so that the growth of the capital stock depends only on net national saving. The parameters of the model are calibrated to data from the 1997 National Income and Product Accounts (NIPA).

The model has only one production sector, but it has seven representative households—one for each of seven groups based on the age of the head of the household (20 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74, 75 to 84, and 85 and over). Children who are 19 or younger are assigned to the seven household groups in proportion to their current distribution among households by age of household head, as reported in the Current Population Survey (CPS). Children do not have their own income or consumption, but their presence affects the saving rates of households.

Output is measured as NNP and is determined by a Cobb-Douglas production function, with weights on labor and capital that reflect the 1997 proportions of national income going to labor income and capital income in the NIPA, respectively.[11] Increases in total factor productivity are captured by a parameter that scales up the entire production function and grows over time. This represents increases in output that would result from technological improvements even if the quantities of labor and capital did not change.

Both the private sector and government sector employ capital and labor in production, but one production function covers both sectors; in other words, both sectors are assumed to follow the same technology in producing output. Given this production function, the growth of national output depends on the growth of total factor productivity, labor, and the capital stock. The demographic changes over the next 40 years will significantly affect the growth of labor and capital; they may also affect growth in total factor productivity, but no position is taken on the direction or magnitude of any such effect.[12]

According to CBO assumptions (1997), total factor productivity increases by 1 percent per year. The projections by Toder and Solanki (1999) of the quality-adjusted workforce, as summarized in the first section of this paper, determine how labor supply changes over time. The model can incorporate different assumptions about the growth of both total factor productivity and labor supply.[13]

The capital stock in any year is equal to the previous year's capital stock plus net saving. Net saving, in turn, is equal to the difference between NNP and consumption, where consumption is the sum of private and government consumption. The key factor determining the evolution of the capital stock, therefore, is the percentage of NNP devoted to private and public consumption.

Private Consumption

Private consumption as a share of NNP depends on the ratio of private consumption to private income and the ratio of private income to NNP. Private income is NNP minus all taxes (including indirect business taxes) plus transfer payments and interest on government debt. Private income differs from the NIPA concept of disposable income because we do not distinguish between corporations and individuals; corporate retained earnings are included in both private income and private saving.

As discussed in the second section of this paper, alternative consumption functions are used in the model presented here. Consumption is divided into nonhealth consumption and health consumption. The base-case simulation maintains a fixed ratio of each type of consumption *per adult equivalent* to income *per adult* in each age group.

Two equations are used: one for private nonhealth consumption and another for privately financed health consumption (out-of-pocket expenses plus insurance premiums paid by households and employers). The equations represent both components of consumption as proportional to private income (less government health transfers) multiplied by the ratio of adult equivalents to adults.[14] Including the ratio of adult equivalents to adults in the equations makes the ratio of consumption to income fall as the child dependency ratio increases. This means that child care costs displace saving instead of other consumption. An alternative simulation removes this ratio from the equations, which makes consumption of child care costs displace other consumption instead of affecting the saving rate.

Taxes and Transfers

The ratio of private income to NNP depends on the evolution of taxes, transfer payments, and government interest on the debt. Taxes are classified by category, and rates are set equal to the ratio of 1997 liability to income for each category. The four tax categories are (1) labor income taxes, (2) capital income taxes, (3) consumption taxes, and (4) taxes on nonhealth transfers (including Social Security benefits). In setting the initial tax rates from NIPA data on federal, and state and local, tax liabilities, the following allocations were made: payroll tax revenues to labor income taxes; corporate income tax, property tax, and estate tax revenues to capital income taxes; and sales and excise tax revenues and customs duties to consumption taxes. Individual income tax liabilities are divided among labor income taxes, capital income taxes, and taxes on nonhealth transfers, based on rough estimates of the share of federal tax payments attributable to each source of income.[15] In the base-case projection, taxes remain roughly constant as a share of NNP over time, although they are affected to some degree by changes in the ratios of different private income sources and consumption to NNP. Transfer payments per capita for each age group are assumed to rise in proportion to the growth of NNP. As described in the previous section, projected transfer payments rise relative to NNP over time due to the aging of the population. Changes in interest payments relative to NNP reflect variations in public-sector debt, due to past government deficits or surpluses.

In the base-case scenario, private income rises relative to NNP due to both rising transfer payments and the effects of these transfer payments on government interest payments via the accumulation of public-sector debt. This makes the ratios of both private consumption and private saving to NNP rise over time in relation to the ratios of consumption and saving to private income.

Public Consumption

Most public-sector consumption is assumed to grow in proportion to NNP; the model does not allocate the benefits of defense, highways, and most other public goods by age group. But it does incorporate an age distribution for public educational expenditures, which are concentrated among the youngest age groups. The result is that projected public educational expenditures as a share of NNP decline along with the share of young people in the population.

While public-sector consumption declines in relation to NNP, public saving also drops. This reflects the increase in transfer payments that reduces public income, defined as taxes minus transfers and interest payments.

Wage Rate, Rate of Return, and Income Distribution across Age Groups

The model computes the annual wage rate per quality-adjusted labor unit and the rate of return per unit of capital. Combining NNP with the constant factor shares from the Cobb-Douglas production function gives total labor and capital income in any year. The wage rate is then equal to total labor income divided by labor supply; the rate of return on capital equals total capital income divided by the stock of capital.

The distribution of income among age groups depends on a variety of characteristics, including factor prices (the wage rate and rate of return) and the shares of labor income, capital income, interest on the public debt, and transfer payments received by each age group. The distribution of labor income by age group in 1997 comes from CPS data on earnings by age group and evolves according to the projections of labor supply by age group discussed in the first section of this paper. The shares of transfer payments depend on the 1997 amounts of rela-

tive transfer payments per capita by age group and population shares.

The distribution of income from capital among age groups is complicated. For 1997, capital income is allocated among age groups in proportion to wealth data reported in the Survey of Consumer Finances (SCF). The same distributions are assumed for both wealth in the form of capital assets and private wealth in the form of government bonds. Asset accumulation over time is not tracked by age group, partly because it is unclear how bequests should be distributed by age. Instead, private wealth is increased by the amount of private saving and distributed among age groups based on the benchmark distribution of per capita wealth by age. This implicitly assumes that intergenerational transfers operate to preserve the current distribution of private wealth by age.

Base-Case Scenario

Table 9 reports the base-case simulation of the path of selected macroeconomic variables between 1997 and 2040. Tables 10 through 17 report alternative simulations based on varying assumptions about future labor supply growth, private saving behavior, and government fiscal policy.

In the base-case simulation, private consumption is determined using the two equations—one that determines private nonhealth consumption and another that determines privately financed health consumption—mentioned above. Labor supply grows according to the projections of Toder and Solanki (1999) described in the first section of this paper. Government consumption (except for education) remains a fixed percentage of NNP. Age-related components of government spending (education outlays and transfer payments) increase to keep the ratio of per capita spending to NNP fixed in all age groups. The concentration of transfer payments among the more numerous elderly causes the ratio of transfer payments to NNP to rise by almost 7 percent of NNP between 1997 and 2040. Average tax rates on labor income, capital income, consumption, and nonhealth transfer payments are kept fixed at their 1997 level.

The growth of NNP per capita decreases after 2010, due mainly to a decline in labor supply per capita. The growth of capital stock per capita also declines after 2010, but the capital-to-output ratio continues to increase, and rates of return continue to decline through 2030. The private saving rate rises through 2010, then declines slightly but remains higher than its 1997 level throughout the period; the national saving rate plummets after 2010 as increased transfer payments drive government deficits up. (Tax revenues as a percentage of NNP increase slightly, reflecting the increase in taxable transfer payments and consumption as a percentage of NNP.) Government debt as a share of NNP quintuples between 2020 and 2040. Even though government is absorbing more of private saving, interest rates in 2010 are still below their 1997 level. This continued adequacy of capital occurs, *in spite of the decline in saving,* because the decline in workforce growth reduces the demand for capital in production.

Growth rates of per capita private income and consumption decline between 2010 and 2020 but stabilize afterward. Private income and consumption grow faster than NNP because they are maintained by increased government transfer payments. In the long run, therefore, the base-case simulation implies an unsustainable path for the economy. But there is little slowdown in the growth of living standards through 2040.

Alternative Labor-Supply Behavior

Table 10 shows the effects of assuming faster labor supply growth. In this simulation, we assume that labor force participation rates of older workers increase to maintain a constant length of retirement as life expectancy increases after 1997. By 2040, labor supply per capita is 4.4 percent higher than in the base-case simulation.

The increase in labor supply makes NNP and consumption 4 percent higher per capita in 2040 than in the base-case simulation, but it is not sufficient to keep the growth in NNP from declining after 2010. Because transfer payments rise with NNP, the slightly faster growth rate does not ease the government fiscal position. The national saving rate is just slightly higher than in the base case, because households save some of their increased factor income.

Alternative Saving Behavior

Tables 11 through 14 show projections based on alternative assumptions about private saving behavior. Tables 11 and 12 alter the influence of changes in the relative numbers of adults at different points in the life cycle; table 11 assumes there are no age-related differences in private saving rates, while table 12 differentiates only between two groups of adults (basically retirement-age versus others) in terms of private saving rates. Tables 13 and 14 consider alternative specifications of the private consumption function. Table 13 removes the effect of changes in the ratio of children to adults, while table 14 presents a partial Ricardian offset in which private saving reacts to changes in public saving.

Table 11 assumes that the private saving rate is fixed at the 1997 level of 6.55 percent of private income. Thus, unlike the base-case scenario, the private saving rate is not affected by changes in the relative numbers of high-saving middle-aged people, heavy-spending young adults, or dissaving elderly. The table shows that the pri-

TABLE 9.
Projections of Key Economic Variables in Base-Case Simulation

Variable	1997	2000	2010	2020	2030	2040
National						
Labor per capita	0.508	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)
Capital per capita	$78,549	$82,159 (1.51%)	$100,553 (2.04%)	$121,211 (1.89%)	$136,479 (1.19%)	$144,874 (0.60%)
NNP per capita	$26,183	$27,520 (1.67%)	$32,372 (1.64%)	$36,399 (1.18%)	$40,305 (1.02%)	$44,665 (1.03%)
Rate of return	6.58%	6.61%	6.35%	5.93%	5.83%	6.09%
Annual wage	$41,363	$42,879 (1.21%)	$49,014 1.35%)	$56,441 (1.42%)	$64,154 (1.29%)	$71,857 (1.14%)
National saving rate	6.99%	7.81%	8.95%	7.01%	4.14%	1.72%
Household						
Private income per capita	$21,287	$22,393 (1.70%)	$26,504 (1.70%)	$30,447 (1.40%)	$34,963 (1.39%)	$40,039 (1.37%)
Private consumption per capita	$19,892	$20,705 (1.34%)	$24,105 (1.53%)	$27,899 (1.47%)	$32,114 (1.42%)	$36,731 (1.35%)
Private saving rate (as a percentage of private income)	6.55%	7.54%	9.05%	8.37%	8.15%	8.26%
Government						
Taxes*	35.81%	35.65%	35.30%	35.37%	35.93%	37.10%
Transfers*	14.98%	15.14%	16.03%	18.02%	20.53%	21.76%
Public saving rate*	1.66%	1.68%	1.54%	0.01%	–2.92%	–5.69%
Government debt*	32.33%	28.49%	17.98%	16.83%	36.86%	81.90%

Source: Authors' calculations.
Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.
*As a percentage of net national product.

vate saving rate is 2.5 percentage points lower in 2010 compared with the base case, because the effect of relatively more middle-aged savers has been removed. The private saving rate is still 1.7 percentage points below the base case in 2040, because the effects of relatively fewer young adults and children and relatively more elderly have been removed. With little change in the public saving rate, the national saving rate is thus 1.6 percentage points below the base case in 2040. Correspondingly, the capital stock per capita is 96 percent of the base-case level in 2010 and 86 percent of the base case in 2040. Because the capital stock is lower while labor supply per capita is unchanged from the base case, per capita income is lower in all periods. The lower capital-to-labor ratio implies a higher rate of return relative to wages. Per capita consumption is initially greater than the base case because of the lower saving rate, but it eventually ends up lower than in the base case once the effect of lower incomes dominates.

Table 12 alters the base-case distribution of private saving rates by age by differentiating only between adults between 20 and 64 and those 65 and older. The resulting pattern of saving rates by age is shown in table 4. These simulation results illustrate that, in this case, the evolution of the aggregate private saving rate reflects an increasing share of older adults who are lower-than-average savers (actually, slight dissavers). The positive effect on private saving caused by fewer of the youngest adults is removed. Even so, the story for the private saving rate is not bleak; demographic changes suggest an eventual drop of less than 1 percentage point. The public saving rate continues to be the driving force in terms of national saving, which falls dramatically, even becoming negative, by 2040. The 1 or 2 percentage point difference in the saving rate compared with the base case accumulates to a rather substantial difference in the capital stock per capita by 2040, 16 percent below the base case. As in the previous constant private saving case, the capital stock per capita is smaller while labor supply per capita is the same as in the base case; thus, per capita income and NNP are lower. Again, a lower capital-to-labor ratio compared with the base case implies a higher rate of return relative to wages. Private consumption per capita eventually falls relative to the base case, but not by much, because of the increasing share of dissavers.

Table 13 goes back to the base-case distinctions among different adult groups but removes the effects of children on the consumption function. The assumption is that changes in the number of children per adult will not affect household consumption per adult; that is, consumption associated with children displaces other consumption rather than saving. Without the effect of declining relative numbers of children reducing consumption, the private saving rate is lower relative to the base case, with the differences from the base case increasing over time as the relative numbers of children continue to fall. Despite this, the private saving rate stays above the 6.55 percent initial-year (1997) level because the

TABLE 10.

Projections under Alternative (Longevity-Adjusted) Labor Supply Assumptions

	Results under Alternative Assumptions:					Compared with Base Case (ratio, or difference for percentages)				
Variable	2000	2010	2020	2030	2040	2000	2010	2020	2030	2040
National										
Labor per capita	0.517 (0.58%)	0.538 (0.39%)	0.530 0.14%)	0.521 (–0.16%)	0.521 (–0.01%)	1.004	1.014	1.024	1.034	1.044
Capital per capita	$82,169 (1.51%)	$100,853 (2.07%)	$122,205 (1.94%)	$138,416 (1.25%)	$147,708 (0.65%)	1.000	1.003	1.008	1.014	1.020
NNP per capita	$27,601 (1.77%)	$32,762 (1.73%)	$37,165 (1.27%)	$41,523 (1.11%)	$46,405 (1.12%)	1.003	1.012	1.021	1.030	1.039
Rate of return	6.63%	6.41%	6.00%	5.92%	6.20%	+0.02%	+0.06%	+0.07%	+0.09%	+0.11%
Annual wage	$42,850 (1.18%)	$48,906 (1.33%)	$56,266 (1.41%)	$63,907 (1.28%)	$71,525 (1.13%)	0.999	0.998	0.997	0.996	0.995
National saving rate*	7.83%	9.01%	7.12%	4.27%	1.83%	+0.02%	+0.06%	+0.11%	+0.13%	+0.11%
Household										
Private income per capita	$22,460 (1.80%)	$26,826 (1.79%)	$31,094 (1.49%)	$36,035 (1.49%)	$41,637 (1.46%)	1.003	1.012	1.021	1.031	1.040
Private consumption per capita	$20,762 (1.44%)	$24,377 (1.62%)	$28,447 (1.56%)	$33,032 (1.51%)	$38,107 (1.44%)	1.003	1.011	1.020	1.029	1.037
Private savings rate (as a percentage of private income)	7.56%	9.13%	8.52%	8.33%	8.48%	+0.02%	+0.08%	+0.15%	+0.18%	+0.22%
Government										
Taxes*	35.65%	35.29%	35.35%	35.92%	37.11%	0%	–0.01%	–0.02%	–0.01%	+0.01%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	1.68%	1.53%	0.00%	–2.96%	–5.77%	0%	–0.01%	–0.01%	–0.04%	–0.08%
Government debt*	28.40%	17.79%	16.66%	36.75%	81.85%	–0.09%	–0.19%	–0.17%	–0.11%	–0.05%

Source: Authors' calculations.

Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.

*As a percentage of net national product.

TABLE 11.

Projections Assuming Constant Private Saving Rate

	Results under Alternative Assumptions					Compared with Base Case (ratio, or difference for percentages)				
Variable	2000	2010	2020	2030	2040	2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$81,962 (1.43%)	$96,294 (1.62%)	$111,485 (1.48%)	$122,369 (0.94%)	$125,212 (0.23%)	0.998	0.958	0.920	0.897	0.864
NNP per capita	$27,507 (1.66%)	$32,096 (1.55%)	$35,803 (1.10%)	$39,446 (0.97%)	$43,398 (0.96%)	1.000	0.991	0.984	0.979	0.972
Rate of return	6.62%	6.58%	6.34%	6.36%	6.84%	+0.01%	+0.23%	+0.41%	+0.53%	+0.75%
Annual wage	$42,859 (1.19%)	$48,598 (1.26%)	$55,517 (1.34%)	$62,787 (1.24%)	$69,818 (1.07%)	1.000	0.991	0.984	0.979	0.972
National saving rate*	7.08%	7.09%	5.67%	2.89%	0.08%	–0.73%	–1.86%	–1.34%	–1.25%	–1.64%
Household										
Private income per capita	$22,364 (1.66%)	$26,217 (1.60%)	$29,882 (1.32%)	$34,164 (1.35%)	$38,949 (1.32%)	0.999	0.989	0.981	0.977	0.973
Private consumption per capita	$20,898 (1.66%)	$24,499 (1.60%)	$27,924 (1.32%)	$31,925 (1.35%)	$36,397 (1.32%)	1.009	1.016	1.001	0.994	0.991
Private saving rate (as a percentage of private income)	6.55%	6.55%	6.55%	6.55%	6.55%	–0.99%	–2.50%	–1.82%	–1.60%	–1.71%
Government										
Taxes*	35.72%	35.46%	35.46%	36.04%	37.39%	+0.07%	+0.16%	+0.09%	+0.11%	+0.29%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	1.75%	1.73%	0.20%	–2.79%	–5.80%	+0.07%	+0.19%	+0.19%	+0.13%	–0.11%
Government debt*	28.43%	16.90%	14.29%	33.26%	78.65%	–0.06%	–1.08%	–2.54%	–3.60%	–3.25%

Source: Authors' calculations.

Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.

*As a percentage of net national product.

changing relative numbers of adults—an increase in middle-aged adults early on and a decrease in young adults later—is sufficient to keep the rate up. Private income per capita is lower than in the base case because capital income is lower, and this lower income means consumption per capita is virtually unchanged from the base case despite the relatively lower saving rates. Compared with the base-case simulations, national saving is not quite 1 percentage point lower by 2040, the capital stock is not quite 5 percent lower, and NNP per capita is virtually unchanged.

Table 14 shows the results of the partial Ricardian offset. In each period, private saving offsets half of the change in public saving from its initial-year (1997) rate. The private saving rate initially falls below the base case (while the public saving rate is rising), but then dramatically increases by 2040, to 11.75 percent of private income, in reaction to the sharp drop in the public saving rate after 2010. The national saving rate is correspondingly boosted relative to the base case, so that instead of eventually dropping to below 2 percent in 2040, it is propped up to over 4.5 percent. Compared

TABLE 12.

Projections Based on Constant Private Saving Rates for Adults Ages 20 to 64 and Adults Ages 65 and Over

	Results under Alternative Assumptions					Compared with Base Case (ratio, or difference for percentages)				
Variable	2000	2010	2020	2030	2040	2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$81,966 (1.43%)	$96,357 (1.63%)	$111,236 (1.45%)	$120,795 (0.83%)	$121,312 (0.04%)	0.998	0.958	0.918	0.885	0.837
NNP per capita	$27,507 (1.66%)	$32,101 (1.56%)	$35,787 (1.09%)	$39,345 (0.95%)	$43,128 (0.92%)	1.000	0.992	0.983	0.976	0.966
Rate of return	6.62%	6.58%	6.35%	6.43%	7.02%	+0.01%	+0.23%	+0.42%	+0.60%	+0.93%
Annual wage	$42,860 (1.19%)	$48,604 (1.27%)	$55,493 (1.33%)	$62,626 (1.22%)	$69,383 (1.03%)	1.000	0.992	0.983	0.976	0.966
National saving rate*	7.09%	7.09%	5.44%	2.38%	–0.59%	–0.72%	–1.86%	–1.57%	–1.76%	–2.31%
Household										
Private income per capita	$22,365 (1.66%)	$26,221 (1.60%)	$29,861 (1.31%)	$34,058 (1.32%)	$38,711 (1.29%)	0.999	0.989	0.981	0.974	0.967
Private consumption per capita	$20,894 (1.65%)	$24,501 (1.61%)	$27,993 (1.34%)	$32,045 (1.36%)	$36,458 (1.30%)	1.009	1.016	1.003	0.998	0.993
Private saving rate (as a percentage of private income)	6.57%	6.56%	6.26%	5.91%	5.82%	–0.97%	–2.49%	–2.11%	–2.24%	–2.44%
Government										
Taxes*	35.72%	35.46%	35.48%	36.09%	37.49%	+0.07%	+0.16%	+0.11%	+0.16%	+0.39%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	1.75%	1.73%	0.22%	–2.74%	–5.81%	+0.07%	+0.19%	+0.21%	+0.18%	–0.12%
Government debt*	28.43%	16.92%	14.23%	32.93%	78.27%	–0.06%	–1.06%	–2.60%	–3.93%	–3.63%

Source: Authors' calculations.

Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.

*As a percentage of net national product.

TABLE 13.

Projections Removing Effect of Children on Saving

	Results under Alternative Assumptions					Compared with Base Case (ratio, or difference for percentages)				
Variable	2000	2010	2020	2030	2040	2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$82,132 (1.50%)	$99,900 (1.98%)	$119,245 (1.79%)	$132,637 (1.07%)	$138,084 (0.40%)	1.000	0.994	0.984	0.972	0.953
NNP per capita	$27,518 (1.67%)	$32,330 (1.62%)	$36,281 (1.16%)	$40,078 (1.00%)	$44,244 (0.99%)	1.000	0.999	0.997	0.994	0.991
Rate of return	6.61%	6.39%	6.01%	5.96%	6.32%	0%	+0.04%	+0.08%	+0.13%	+0.23%
Annual wage	$42,877 (1.20%)	$48,951 (1.33%)	$56,260 (1.40%)	$63,793 (1.26%)	$71,179 (1.10%)	1.000	0.999	0.997	0.994	0.991
National saving rate*	7.71%	8.64%	6.57%	3.53%	0.89%	–0.10%	–0.31%	–0.44%	–0.61%	–0.83%
Household										
Private income per capita	$22,390 (1.70%)	$26,462 (1.69%)	$30,333 (1.37%)	$34,749 (1.37%)	$39,678 (1.34%)	1.000	0.998	0.996	0.994	0.991
Private consumption per capita	$20,733 (1.39%)	$24,174 (1.55%)	$27,969 (1.47%)	$32,181 (1.41%)	$36,750 (1.34%)	1.001	1.003	1.003	1.002	1.001
Private saving rate (as a percentage of private income)	7.40%	8.65%	7.79%	7.39%	7.38%	–0.14%	–0.40%	–0.58%	–0.76%	–0.88%
Government										
Taxes*	35.66%	35.32%	35.40%	35.99%	37.23%	+0.01%	+0.02%	+0.03%	+0.06%	+0.13%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	1.69%	1.57%	0.06%	–2.88%	–5.73%	+0.01%	+0.03%	+0.05%	+0.04%	–0.04%
Government debt*	28.48%	17.85%	16.43%	36.16%	81.32%	–0.01%	–0.13%	–0.40%	–0.70%	–0.58%

Source: Authors' calculations.

Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.

*As a percentage of net national product.

with the base case, the higher saving rate allows a larger capital stock by 2040 (nearly 5 percent over the base case) and just slightly higher NNP per capita, but at the cost of relatively lower consumption per capita (by 2.5 percent).

All of these simulations use a measure of private saving derived from the NIPA. However, if a different measure of private saving is used, one that treats the acquisition of durables as a form of saving (see appendix), the initial private saving rate is higher in aggregate and is more concentrated toward the younger adults (while dissaving is larger among those 65 and over). As a result, the projection of the private saving rate changes as well. As in the base case, under the durables-inclusive case, the private saving rate at first rises and later falls. By 2040, however, this alternative measure has fallen below its 1997 rate. Using the durables-inclusive saving measure, growth is generally higher over the entire period, but the decline in the growth rate over time is a bit larger.

Alternative Government Policies

Tables 15 through 17 illustrate the effects of alternative assumptions about government policy. In the first scenario (table 15), all levels of government adjust tax rates so as to balance the budget each year.[16] All tax rates are

TABLE 14.
Projections Assuming Partial Ricardian Offset

Variable	Results under Alternative Assumptions 2000	2010	2020	2030	2040	Compared with Base Case (ratio, or difference for percentages) 2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$81,793 (1.36%)	$98,062 (1.83%)	$117,222 (1.80%)	$134,765 (1.40%)	$151,971 (1.21%)	0.996	0.975	0.967	0.987	1.049
NNP per capita	$27,496 (1.64%)	$32,212 (1.60%)	$36,159 (1.16%)	$40,204 (1.07%)	$45,089 (1.15%)	0.999	0.995	0.993	0.998	1.009
Rate of return	6.64%	6.48%	6.09%	5.89%	5.86%	+0.03%	+0.13%	+0.16%	+0.06%	–0.23%
Annual wage	$42,842 (1.18%)	$48,772 (1.30%)	$56,070 (1.40%)	$63,994 (1.33%)	$72,538 (1.26%)	0.999	0.995	0.993	0.999	1.009
National saving rate*	7.10%	8.26%	6.99%	5.55%	4.61%	–0.71%	–0.69%	–0.02%	+1.41%	+2.89%
Household										
Private income per capita	$22,356 (1.65%)	$26,349 (1.66%)	$30,237 (1.39%)	$34,923 (1.45%)	$40,487 (1.49%)	0.998	0.994	0.993	0.999	1.011
Private consumption per capita	$20,833 (1.63%)	$24,210 (1.49%)	$27,724 (1.36%)	$31,469 (1.27%)	$35,774 (1.29%)	1.009	1.004	0.994	0.980	0.974
Private saving rate (as a percentage of private income)	6.59%	8.12%	8.31%	9.89%	11.64%	–0.95%	–0.93%	–0.06%	+1.74%	+3.38%
Government										
Taxes*	35.72%	35.36%	35.36%	35.80%	36.77%	+0.07%	+0.06%	–0.01%	–0.13%	–0.33%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	1.74%	1.62%	0.04%	–3.04%	–5.84%	+0.06%	+0.08%	+0.03%	–0.12%	–0.15%
Government debt*	28.39%	17.36%	15.79%	36.19%	82.06%	–0.10%	–0.62%	–1.04%	–0.67%	+0.16%

Source: Authors' calculations.
Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.
*As a percentage of net national product.

TABLE 15.
Projections under "Near Balanced Budget" Scenario

Variable	Results under Alternative Assumptions 2000	2010	2020	2030	2040	Compared with Base Case (ratio, or difference for percentages) 2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$81,919 (1.41%)	$98,923 (1.90%)	$119,805 (1.93%)	$142,479 (1.75%)	$170,503 (1.81%)	0.997	0.984	0.988	1.044	1.177
NNP per capita	$27,504 (1.65%)	$32,267 (1.61%)	$36,315 (1.19%)	$40,648 (1.13%)	$46,125 (1.27%)	0.999	0.997	0.998	1.009	1.033
Rate of return	6.63%	6.44%	5.98%	5.63%	5.34%	+0.02%	+0.09%	+0.05%	–0.20%	–0.75%
Annual wage	$42,855 (1.19%)	$48,857 (1.32%)	$56,312 (1.43%)	$64,701 (1.40%)	$74,204 (1.38%)	0.999	0.997	0.998	1.009	1.033
National saving rate*	7.33%	8.57%	7.86%	7.56%	7.70%	–0.48%	–0.38%	+0.85%	+3.42%	+5.98%
Household										
Private income per capita	$22,528 (1.91%)	$26,560 (1.66%)	$30,033 (1.24%)	$33,699 (1.16%)	$38,226 (1.27%)	1.006	1.002	0.986	0.964	0.955
Private consumption per capita	$20,826 (1.54%)	$24,151 (1.49%)	$27,527 (1.32%)	$30,999 (1.19%)	$35,171 (1.27%)	1.006	1.002	0.987	0.965	0.958
Private saving rate (as a percentage of private income)	7.56%	9.07%	8.35%	8.01%	7.99%	+0.02%	+0.02%	–0.02%	–0.14%	–0.27%
Government										
Taxes*	35.18%	35.23%	36.57%	38.75%	39.85%	–0.47%	–0.07%	+1.20%	+2.82%	+2.75%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	1.14%	1.10%	0.96%	0.92%	1.08%	–0.54%	–0.44%	+0.95%	+3.84%	+6.77%
Government debt*	29.46%	23.56%	20.89%	19.87%	18.08%	+0.97%	+5.58%	+4.06%	–17.0%	–63.8%

Source: Authors' calculations.
Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.
*As a percentage of net national product.

adjusted by the same percentage. In the first few years, as the government returns the surplus to taxpayers, tax rates are lower than in the base-case year. But ultimately, tax rates must be increased; by 2040, tax revenues are 2.75 percent of NNP—higher than in the base-case simulation. Compared with the base case, NNP per capita is slightly lower through 2020 (reflecting the reduced national saving rate from the tax cuts), but by 2040 it is 3.3 percent higher than in the base case. National saving rises because the tax increase raises public saving by much more than it reduces private saving. But even with higher NNP per capita, the taxes reduce per capita consumption relative to the base case after 2020. By 2040, consumption per capita is 4.2 percent below the base-case consumption level. The tax increases reduce the rate of growth of private consumption by about 0.30 percent per year between 2010 and 2030. While this is a fiscally sustainable policy, its benefits for living standards are far in the future.

Table 16 presents a scenario in which tax rates are raised all at once: Tax rates are set in 1998 to balance the budget in 2040. In 2000, tax revenues as a percentage of NNP are 2.3 percent above the base-case scenario, but by 2040 they have fallen below the base-case share of

TABLE 16.

Projections under "Balanced Budget in 2040" Scenario

Variable	Results under Alternative Assumptions					Compared with Base Case (ratio, or difference for percentages)				
	2000	2010	2020	2030	2040	2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$83,355 (2.00%)	$109,672 (2.78%)	$141,823 (2.60%)	$172,892 (2.00%)	$203,761 (1.66%)	1.015	1.091	1.170	1.267	1.406
NNP per capita	$27,598 (1.77%)	$32,931 (1.78%)	$37,545 (1.32%)	$42,231 (1.18%)	$47,776 (1.24%)	1.003	1.017	1.031	1.048	1.070
Rate of return	6.54%	5.93%	5.23%	4.82%	4.63%	–0.07%	–0.42%	–0.70%	–1.01%	–1.46%
Annual wage	$43,002 (1.30%)	$49,861 (1.49%)	$58,218 (1.56%)	$67,219 (1.45%)	$76,861 (1.35%)	1.003	1.017	1.031	1.048	1.070
National saving rate*	10.18%	12.01%	10.77%	8.79%	7.71%	+2.37%	+3.06%	+3.76%	+4.65%	+5.99%
Household										
Private income per capita	$21,734 (0.70%)	$25,813 (1.73%)	$29,800 (1.45%)	$34,412 (1.45%)	$39,569 (1.41%)	0.971	0.974	0.979	0.984	0.988
Private consumption per capita	$20,112 (0.37%)	$23,515 (1.58%)	$27,367 (1.53%)	$31,689 (1.48%)	$36,423 (1.40%)	0.971	0.975	0.981	0.987	0.992
Private saving rate (as a percentage of private income)	7.46%	8.90%	8.16%	7.91%	7.95%	–0.08%	–0.15%	–0.21%	–0.24%	–0.31%
Government										
Taxes*	37.93%	36.89%	36.38%	36.28%	36.42%	+2.28%	+1.59%	+1.01%	+0.35%	-0.68%
Transfers*	15.14%	16.03%	18.02%	20.53%	21.76%	0%	0%	0%	0%	0%
Public saving rate*	4.30%	5.03%	4.29%	2.34%	1.13%	+2.62%	+3.49%	+4.28%	+5.26%	+6.82%
Government debt*	23.64%	–12.68%	–43.29%	–57.38%	–54.42%	–4.85%	–30.66%	–60.12%	–94.24%	–136.32%

Source: Authors' calculations.
Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.
*As a percentage of net national product.

TABLE 17.

Projections Assuming Social Security and Health Transfers Grow with NNP

Variable	Results under Alternative Assumptions					Compared with Base Case (ratio, or difference for percentages)				
	2000	2010	2020	2030	2040	2000	2010	2020	2030	2040
National										
Labor per capita	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)	1.000	1.000	1.000	1.000	1.000
Capital per capita	$82,183 (1.52%)	$101,573 (2.14%)	$127,475 (2.30%)	$158,362 (2.19%)	$197,967 (2.26%)	1.000	1.010	1.052	1.160	1.366
NNP per capita	$27,521 (1.68%)	$32,436 (1.66%)	$36,762 (1.26%)	$41,505 (1.22%)	$47,504 (1.36%)	1.000	1.002	1.010	1.030	1.064
Rate of return	6.61%	6.30%	5.69%	5.17%	4.74%	0%	–0.05%	–0.24%	–0.66%	–1.35%
Annual wage	$42,882 (1.21%)	$49,112 (1.37%)	$57,006 (1.50%)	$65,065 (1.49%)	$76,424 (1.47%)	1.000	1.002	1.010	1.030	1.064
National saving rate*	7.91%	9.70%	9.72%	10.01%	10.54%	+0.10%	+0.75%	+2.71%	+5.87%	+8.82%
Household										
Private income per capita	$22,368 (1.66%)	$26,304 (1.63%)	$29,701 (1.22%)	$33,442 (1.19%)	$38,121 (1.32%)	0.999	0.992	0.976	0.956	0.952
Private consumption per capita	$20,680 (1.30%)	$23,912 (1.46%)	$27,182 (1.29%)	$30,638 (1.20%)	$34,873 (1.30%)	0.999	0.992	0.974	0.954	0.949
Private saving rate (as a percentage of private income)	7.55%	9.09%	8.48%	8.38%	8.52%	+0.01%	+0.04%	+0.11%	+0.23%	+0.26%
Government										
Taxes*	35.64%	35.18%	34.83%	34.49%	34.17%	–0.01%	–0.12%	–0.54%	–1.44%	–2.93%
Transfers*	15.04%	15.34%	15.67%	15.99%	16.14%	–0.10%	–0.69%	–2.35%	–4.54%	–5.62%
Public saving rate*	1.78%	2.32%	2.87%	3.25%	3.70%	+0.10%	+0.78%	+2.86%	+6.17%	+9.39%
Government debt*	28.39%	14.73%	–0.78%	–17.95%	–36.21%	–0.10%	–3.25%	–17.61%	–54.81%	–118.11%

Source: Authors' calculations.
Note: Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.
*As a percentage of net national product.

NNP. The public saving rate rises sharply between 1997 and 2010 and, though declining after 2010, remains positive throughout the period. The government debt is rapidly eliminated and the government sector finances part of the private capital stock. Relative to all the previous scenarios, interest rates are lower, the private capital stock is higher, and economic growth is faster, although growth in NNP per capita still declines after 1997. NNP per capita is 7 percent higher in 2040 than in the base case. Private consumption per capita drops immediately after the tax increase, but then increases slightly faster than in the base-case scenario between 2000 and 2040. By 2040, private consumption per capita is still lower than in the base case, but by less than 1 percent.

In the final scenario, illustrated in table 17, the growth of Social Security and government health transfers is reduced to the growth rate of NNP. This is accomplished by proportional reductions every year in Social Security and health transfers to each age group, relative to their initial-year levels. Some age-related transfers (for example, federal retirement programs) continue to increase as a proportion of NNP; overall, under this sce-

nario, government transfers as a share of NNP increase very slowly—from 15 percent in 1997 to just over 16 percent in 2040.

With transfers stabilized as a percentage of NNP, the national saving rate increases steadily from 7 percent of NNP in 1997 to 10.5 percent of NNP in 2040—about 8.8 percent of NNP greater by 2040 than the base case. The rate of return on capital drops from 6.58 percent to 4.74 percent. The higher saving rate, and the resulting growth in private investment, increases the growth rate of NNP. By 2040, NNP per capita is 6.4 percent higher than in the base-case scenario. As in the previous scenario, the government debt disappears and government begins to acquire private assets. But this tough restraint on transfer payments results in a steady drop in the growth rate in living standards. Consumption per capita is 5 percent less by 2040 than in the base-case scenario, in spite of the higher national income.

Assessment and Implications for Tax-Advantaged Saving and Capital Markets

Projected demographic changes associated with lower birth rates, aging baby boomers, and increased longevity influence the evolution of private consumption, labor supply, and government tax and transfer policies. Although the various scenarios illustrated above represent widely divergent paths for economic development, most have the following in common:

- Labor supply per capita declines after 2010.
- The growth rate in capital stock per capita declines after 2010 in all scenarios except two: annual balanced budget and fixed ratio of Social Security and health transfers to NNP.
- The growth rate in NNP per capita is slower after 2010 than before 2010.
- The rate of return on capital is lower in 2040 than in 1997 in all scenarios except in alternatives where the private saving rate is held fixed or depends only on distinctions between retirees and nonretirees. This means that the capital-to-output ratio increases and labor, not capital, becomes the relatively more scarce resource over time.
- The growth rate in private consumption per capita declines after 2010.
- The assumption of a 1 percent growth rate in total productivity makes output and living standards increase, even though adverse demographic factors (less labor supply and, in many scenarios, lower national saving rates) are contributing to slower growth rates.

The scenarios should be viewed as illustrations of the effects of demographic changes, not as reliable long-run economic forecasts. The projections are based on the assumption that behavior remains fixed within age groups. Yet, in the recent past, both workforce participation rates and saving rates have changed within age groups, and there could be more changes in the future. Moreover, changes in underlying trends in productivity growth and in the patterns of technological development or other unforeseen events (wars, financial panics, epidemics) could overwhelm the effects of changes in the size and age distribution of the population. Nonetheless, the demographic changes cited here are large and will have important implications for future policies.

The analysis presented in this paper focuses on the relationship between changing population characteristics and overall private saving rates and the economic implications of changes in saving. It does not specifically address the breakdown between household and business saving or the effect of various institutional arrangements (such as pension funds) or public policies (such as tax incentives) on the rate of private saving.[17] Gale and Sabelhaus (1999) report that net pension saving as a percentage of GDP has more than doubled between the 1960s and the late 1990s, even as the net private saving rate (as measured in the Flow of Funds Accounts of the Federal Reserve Board) has dropped from 17 percent to less than 10 percent of GDP. Their figures imply that saving in all retirement vehicles (including government pensions) has risen from under 12 percent of net private saving in 1960–69 to almost 50 percent of net private saving from 1995 through 1998.[18] The growing importance of pensions and other tax-favored retirement savings vehicles, combined with the apparent implication that demographic changes will not reduce—and may even increase—net private saving rates, suggests that saving from pensions and other tax-favored sources will continue to account for a large share of private wealth in the U.S. economy even as baby boomers retire.

A different perspective is supplied by Scheiber and Shoven (1994), who find that the pension system will cease to be a source of net saving after 2020. They consider the possibility that the withdrawal of pension assets to pay private retirement benefits could produce a substantial drop in prices of financial assets. This appears to contradict this paper's prediction of lower rates of return, which suggest an upward, instead of a downward, pressure on prices of financial assets. This paper has not attempted to reconcile these contradictory findings. However, two possibilities for this contradiction suggest themselves. First, while the saving rates are negative for households with heads over age 65, the implied dissaving

rate of these households is far lower (in absolute value) than it would be if they converted all their private (excluding Social Security) wealth to annuities and spent it down to zero over the course of retirement. Implicitly, at least some of the pension payments are being saved instead of consumed. Second, the projections imply rising net saving of the under-65 population because of the change in the age distribution within that group and the declining child dependency ratio.

However, our analysis—like that of Scheiber and Shoven (1994)—implies a large reduction in demand for private financial assets beginning in 10 to 20 years. The source of the projected decline is the rise in government deficits, which pulls private saving (including saving in pensions) out of equities and corporate bonds and into government securities. But the findings in this paper do not imply a resulting decline in equity prices, because the supply of financial assets, which reflects investment demand, is also projected to decline. The decline in investment demand is a result of the slowdown of labor supply growth, which will keep the yield on capital down (and its price up) even as the supply of funds to capital markets falls. Therefore, the results in this paper do not imply that demographic changes will produce a market meltdown between 2010 and 2040.

CONCLUSIONS

Demographic trends will have adverse effects on economic growth after 2010, due in large part to the slowdown in the growth of the workforce and the increase in spending on age-related government transfers. But the effects do not appear to be catastrophic. The economy will continue to grow, albeit at a slower rate. Capital will become relatively abundant, even in the face of lower national saving rates, because a smaller workforce requires less capital. The changing age composition of the population does not necessarily lower private saving rates as one might predict simply by comparing the saving rates of the under-65 population to those of the over-65 population. Instead, under certain assumptions, the private saving rate increases.

The projections are consistent with CBO's conclusion (shared with others) that current government fiscal policies are not sustainable. Adjusting fiscal policy now will produce a better long-run outcome than delaying tax increases or cuts in transfer payments until the budget moves into deficit. However, a more timely fiscal adjustment might be less politically attractive because it would lower private consumption for many years.

The projections presented in this paper suggest that the private sector of the economy will account for a larger share of the nation's saving in the future. Maintaining private saving in the face of potentially increased public dissaving will be critical for continuing future economic prosperity. While changing demographics may increase private saving, the government should also create appropriate incentives for private saving.

ENDNOTES

An earlier version of this paper was presented on September 17, 1999, at "ERISA after 25 Years: A Framework for Evaluating Pension Reform," a symposium sponsored by the Brookings Institution, the Stanford Institute for Economic Policy Research, and the TIAA-CREF Institute. The views in this paper represent those of the authors alone and do not necessarily reflect the views of the Urban Institute, its board, or its sponsors. We are grateful to Rudolph Penner, John Sabelhaus, Eugene Steuerle, and John Sturrock for comments and useful discussions and to Robert Howell for research assistance. We also acknowledge the assistance of Sandeep Solanki in developing an earlier version of the model used in this paper.

1. All projections in table 1 assume that population grows according to the midrange projections of the Board of Trustees (1999).

2. Quinn (1999) documents the century-long trend toward earlier retirement but argues that since 1985 the average retirement age has stabilized for men and increased slightly for women. In contrast, Costa (1998) anticipates that the trend toward earlier retirement is likely to continue.

3. Our assumption in calibrating the consumption function and projecting consumption over time is that the consumption needs of a child are 40 percent of the needs of an adult. This is a typical assumption in existing literature, based on empirical evidence from Lazear and Michael (1988) and Deaton and Muellbauer (1986).

4. We distribute aggregate capital income according to the distribution of personal wealth in order to attribute all capital income—personal and corporate—to households.

5. For example, Social Security data come from the Social Security Administration and health transfer data come from the Health Care Financing Administration. Some of the age-related patterns were obtained from the Congressional Budget Office. (We thank John Sturrock of the Macroeconomic Analysis Division of CBO for sharing these with us.)

6. See Bryant and McKibbin (1998).

7. For example, some economists have considered the possibility that baby boomers will be bigger savers when they are old than are the current elderly. See Borsch-Supan (1996).

8. We ran an alternative simulation where health spending per enrollee increases an average of 2 percentage points higher than the

growth of NNP/L for two decades (until 2020) and at the same rate as NNP/L afterward. In that case, health transfers rise from about 6 percent of NNP in the base-case year to nearly 14 percent in 2040, in contrast to their eventual rise to less than 9 percent using our standard assumptions. This difference translates quite directly into a similar percentage point difference in total transfers as a percent of NNP, but makes a much bigger difference for the public saving rate because of a spiraling debt effect.

9. The share of the population that is 85 and older will more than double, from 1.5 percent of the population in 1997 to 3.2 percent in 2040. Thus, aggregate health transfers will grow substantially, even if per capita costs rise only with productivity.

10. The key features of the models are similar to models developed by Aaron, Bosworth, and Burtless (1989) to investigate the long-run effects of Social Security reforms and the Congressional Budget Office (1997) to investigate the long-run effects of current budget policies. All three models are based on neoclassical production functions with inelastic factor supplies and an assumed exogenous rate of technological change. In all three models, the rate of national saving is a key factor in determining the evolution of the capital stock and therefore the path of national output. Our model differs from the models of Aaron et al. and CBO by explicitly incorporating effects of demographic changes on private saving. In addition, while our model lacks the explicit program detail in the CBO model, we, unlike CBO, consider the effects of alternative fiscal policy rules.

11. We measure output by net national product (NNP) instead of gross national product (GNP) or gross domestic product (GDP), which are more commonly used measures of national output. We use NNP because it corresponds more closely than GDP or GNP to the measure of total income that we allocate by factor shares and age groups to determine the evolution of age-related trends in income and saving. (NNP roughly equals national income plus indirect business taxes; we use NNP as the measure of pretax income and allocate indirect business taxes among age groups according to the allocation of taxable consumption by age.) One consequence of using NNP instead of GNP or GDP as the measure of output is that it makes capital's share of output approximately 10 percentage points lower (20 percent instead of 30 percent). In effect, we are allocating to capital only its net return (after subtracting depreciation) instead of its gross product; this corresponds to the pretax income that capital owners receive. In recent years, the ratio of NNP to both GDP and GNP has been very stable. For example, between 1990 and 1998, annual NNP has varied between 87.7 percent and 88.2 percent of annual GDP and between 87.5 percent and 87.8 percent of annual GNP.

12. Cutler et al. (1990) argue that aging of the population may increase the rate of growth of productivity, but we view this as an unsettled issue.

13. Because our model builds in some productivity growth by incorporating a projected improvement in worker quality in the labor supply projections, the assumed total factor productivity rate of 1 percent actually implies an overall productivity growth rate that is higher than 1 percent, when labor supply is measured as the number of person-hours. This suggests that our assumptions are not strictly consistent with CBO's assumption of an overall 1 percent growth rate in total factor productivity. Thus, we tested the sensitivity of the model to a lower assumed total productivity growth rate (0.5 percent) and found that lower productivity growth causes slightly lower capital-labor ratios and lower growth in NNP, wages, private income, and private consumption per capita. The effects are more pronounced in the later years of the simulation period. NNP, income, and consumption per capita in 2000 are about 1.5 percent lower compared with base-case simulations, but by 2040 they are about 20 percent lower. The qualitative story from the simulations is unchanged. CBO's newest version of their long-term model assumes a higher total factor productivity growth rate, reflecting recent experience of faster productivity growth.

14. We project consumption of non-health and health consumption for each age group as equal to:
1) $C_{nh} = \{[a_{nh} (N_{AE}/N_A)]/[1 + a_{nh}(N_{AE}/N_A)t_c]\} * (Y_p - M)$; and
2) $C_h = a_h(N_{AE}/N_A) * (Y_p - M)$;
where C_{nh} = non-health consumption, C_h = privately funded consumption of medical services, N_{AE} = the number of adult-equivalents in the population (adults plus 40 percent of children), N_A = the number of adults in the population, t_c = the tax rate on consumption, Y_p = private income, M = government health transfers (Medicare plus Medicaid), and a_{nh} and a_h are constants calibrated from 1997 data. Total consumption is equal to the sum of non-health consumption, privately funded consumption of medical services, and government health transfers. The equation for non-health consumption also includes a consumption tax term.(t_c) This is necessary because private income itself is a function of consumption taxes, which depend on consumption. Therefore, we transformed the equation to express consumption as a function of exogenous variables. The health consumption does not include this equation because it is assumed that sales and excise taxes do not apply to medical spending.

15. This estimate was calculated by taking a weighted average of shares of income types (taxable labor income, taxable capital income, and taxable nonhealth transfers) in each income group, multiplied by the average tax rate on taxable income in each income group.

16. We do not actually solve for the rates that balance the budget each year but instead vary rates so that they would have produced a balanced budget in the prior year. This results in a budget close to annual balance.

17. The issue of how tax incentives for retirement saving affect total private and national saving has been addressed by a number of analysts, including Engen, Gale, and Scholz (1996), Bernheim (1997), Hubbard and Skinner (1996), and Poterba, Venti, and Wise (1996). These various authors have not reached a consensus on the extent to which deposits in tax-exempt saving accounts add to net saving or merely displace saving in other forms.

18. Authors' calculations, based on data reported in Gale and Sabelhaus (1999), table 4.

REFERENCES

Aaron, Henry J., Barry P. Bosworth, and Gary Burtless. 1989. *Can America Afford to Grow Old? Paying for Social Security*. Washington, D.C.: The Brookings Institution.

Auerbach, Alan J., and Laurence J. Kotlikoff. 1987. *Dynamic Fiscal Policy* Cambridge: Cambridge University Press.

Bernheim, B. Douglas. 1997. "Rethinking Savings Incentives." In *Fiscal Policy: Lessons from Economic Research*, edited by Alan Auerbach. Cambridge: MIT Press.

Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds. 1999. *The 1999 Annual Report*. Washington, D.C.: U.S. Government Printing Office.

Borsch-Supan, Axel. 1996. "The Impact of Population Ageing on Savings, Investment and Growth in the OECD Area." In *Future Global Capital Shortages: Real Threat or Pure Fiction?* Paris: OECD.

Bosworth, Barry. 1996. "Prospects for Saving and Investment in Industrial Countries." In *Future Global Capital Shortages: Real Threat or Pure Fiction?* Paris: OECD.

Bosworth, Barry, Gary Burtless, and John Sabelhaus. 1991. "The Decline in Saving: Evidence from Household Surveys." Brookings Papers on Economic Activity, 1. Washington, D.C.: The Brookings Institution.

Brayton, Flint, and Peter Tinsley, eds. 1996. "A Guide to FRB/US." Working paper version 1.0, Macroeconomic and Quantitative Studies, Division of Research and Statistics.

Bryant, Ralph C., and Warwick J. McKibbin. 1998. "Issues in Modeling the Global Dimensions of Demographic Change." Brookings Discussion Papers in International Economics, No. 141. Washington, D.C.: The Brookings Institution.

Costa, Dora L. 1998. *The Evolution of Retirement: An American Economic History, 1980–1990*. Chicago: The University of Chicago Press.

Cutler, David, and Louise Sheiner. 1999. "Demographics and Medical Care Spending: Standard and Nonstandard Effects." Working paper. Washington, D.C.: The Brookings Institution.

Cutler, David, James Poterba, Louise Sheiner, and Lawrence Summers. 1990. "An Aging Society: Challenge or Opportunity." Brookings Papers on Economic Activity, 1. Washington, D.C.: The Brookings Institution.

Deaton, Angus S,. and John Muellbauer. 1986. "On Measuring Child Costs: With Applications to Poor Countries." *Journal of Political Economy* 94 (4): 720–44.

Engen, Eric M., William G. Gale, and John Karl Scholz. 1996. "The Illusory Effects of Saving Incentives on Saving." *Journal of Economic Perspectives* 10 (4): 113–38.

Gale, William G., and John Sabelhaus. 1999. "Perspectives on the Household Saving Rate." Brookings Papers on Economic Activity, 1. Washington, D.C.: The Brookings Institution.

Hubbard, R. Glenn, and Jonathan Skinner. 1996. "Asssessing the Effectiveness of Savings Incentives." *Journal of Economic Perspectives* 10 (4): 73–90.

Lazear, Edward P., and Robert T. Michael. 1988. *Allocation of Income within the Household*. Chicago: The University of Chicago Press.

Lee, Ronald, and Jonathan Skinner. 1999. "Will Aging Baby Boomers Bust the Federal Budget?" *Journal of Economic Perspectives* 13 (1): 117–40.

Leibfritz, Willi, Deborah Roseveare, Douglas Fore, and Eckhard Wurzel. 1996. "Ageing Populations, Pension Systems and Government Budgets—How Do They Affect Saving?" In *Future Global Capital Shortages: Real Threat or Pure Fiction?* Paris: OECD.

Poterba, James M., Steven F. Venti, and David A. Wise. 1996. "How Retirement Saving Programs Increase Saving." *Journal of Economic Perspectives* 10 (4): 91–112.

Quinn, Joseph. 1999. "Retirement Patterns and Bridge Jobs in the 1990s." Employee Benefit Research Institute (EBRI) Issue Brief No. 206. Washington, D.C.: EBRI.

Scheiber, Sylvester, and John Shoven. 1994. "The Consequences of Population Aging on Private Pension Fund Saving and Asset Markets." NBER Working Paper No. 4665. Cambridge, Mass.: National Bureau of Economic Research.

Social Security Administration Office of the Chief Actuary. 1997. *Social Security Area Population Projections: 1997*. Actuarial Study No. 112. Baltimore: Social Security Administration Office of the Chief Actuary.

Toder, Eric, and Sandeep Solanki. 1999. *Effects of Demographic Trends on Labor Supply and Living Standards*. Washington, D.C.: The Urban Institute. The Retirement Project Occasional Paper Number 2.

U.S. Bureau of the Census. 1997. *1965–1977 Current Population Survey (CPS) March Supplement*. Washington, D.C.: U.S. Bureau of the Census.

U.S. Congressional Budget Office. 1997. "An Economic Model for Long-Run Budget Simulations." CBO Memorandum, July.

APPENDIX

Simulations Based on an Alternative "Durables-Inclusive" Measure of Private Saving

The base-case simulation and the private saving alternatives considered in the main body of this paper are based on a standard National Income and Product Accounts (NIPA) definition of aggregate private saving. The NIPA definition starts with income measures and subtracts consumption to obtain saving. In the standard definition, consumer durables and owner-occupied housing are treated differently: Net purchases and major renovations of owner-occupied homes are treated as saving, but purchases of other consumer durables are counted as current consumption. In contrast to a NIPA-based approach, measurements of "flow-of-funds accounts" (FFA) are based on changes in the value of wealth holdings and debt, where it is standard to count acquisition of durables as saving. Gale and Sabelhaus (1999) explain that the NIPA and FFA measures differ in concept, but also in practice, because the accounts use different data sources and different measurement approaches.

Gale and Sabelhaus focus on how adjustments to make the NIPA definition of private saving correspond more closely to a wealth-based approach affect the aggregate private saving rate and on how private saving has evolved over the past few decades. One adjustment they make is to add investment in consumer durables—the difference between acquisition of durables and the annual consumption of the flow of services from those durables (depreciation plus foregone interest)—to personal (and hence private) saving. They conclude that counting durables as saving not only raises the aggregate saving rate (by about 2 percent of GDP or about 3 percent of disposable income), but also lessens the decline in private saving over time.

In addition to its effect on the average saving rate, inclusion of durables in saving also affects the distribution of saving rates by age because patterns of purchase (acquisition) and use (consumption) of durables differ among age groups. In general, younger people will have a relatively higher ratio of acquisition to consumption as they purchase new cars and other durables, while older people who are "downsizing" their homes and disposing of cars will have a lower ratio of acquisition to consumption. Because changing the measure of consumption alters the pattern of consumption by age, it will affect our predictions about how aggregate private saving will evolve over time as demographics change.

Thus, in this appendix we use data from the Survey of Consumer Finances (1998) and adjust our initial-year consumption data to accord with a flow-of-funds treatment of durables. We subtract durables purchases from personal consumption but add the flow of services from those durables back into consumption. (Effectively, this spreads out the consumption of durables more slowly over time instead of instantaneously at the time of purchase. To the extent that consumption of services is deferred past acquisition, durables are a form of saving.)

The effect of this adjustment on the initial-year aggregate private saving rate, and the distribution of private saving rates by age, is shown in table A1. Consistent with results in Gale and Sabelhaus, we find that the aggregate private saving rate in 1997 rises from 6.55 percent of private income to 9.55 percent under the "durables-inclusive" case. We also find that the distribution of saving rates by age changes significantly. From an annual accounting perspective, younger adults (those in the first two age groups, ages 20 to 44) are acquiring durables faster than they are consuming them, and hence the adjustment for durables raises their private saving rate. In contrast, older adults (45 and older) are consuming more than they are acquiring, so their saving rates are reduced. The adjustment is particularly significant for the 35- to 44-year-olds (upward) and the 65- to 84-year-olds (downward). Thus, in table A1 we also show how the shares of the population in those particular age groups change over time. These changes help explain the simulation results and how they compare with our base-case simulation.

The durables adjustment significantly boosts the saving rate of a group whose population share is generally falling over time (those ages 35 to 44), while significantly reducing the saving rate of a group whose population share is generally rising (older adults). Thus, in the simulation results shown in table A2, although initial private saving and national saving are higher than in the base case (table 9), the private saving rate ends up lower in 2040 than in 1997. Similarly, although national saving starts out higher by 3 percentage points compared with the base case in 1997, it ends up only 1.5 percentage points higher by 2040. Note that the durables adjustment did not affect the negative saving rate of the youngest adults (the 20- to 34-year-olds) very much. Hence, the story for the path of private saving is still optimistic relative to that for public saving, because having fewer young adults in the future helps prop up private saving.

Aggregate national saving is higher with the durables adjustment, compared with the base case, making the capital stock higher almost immediately (although over time it shows slower growth). A higher capital stock leads to a lower rate of return, which in turn reduces interest payments on government debt, which helps raise public saving. Thus, the durables-inclusive simulations show higher (less negative) public saving and lower government debt.

TABLE A1.

Comparing NIPA-Defined to "Durables-Inclusive" Saving Measures

A. Private Income Shares and Saving Rates by Age Category, 1997

Age	Share of Private Income (%)	Base Case with NIPA Definitions: Private Saving as Percentage of Private Income	Base Case with NIPA Definitions: Contribution to Aggregate Private Saving Rate	Adjustment for Durables as Saving: Private Saving as Percentage of Private Income	Adjustment for Durables as Saving: Contribution to Aggregate Private Saving Rate
20–34	19.8	–26.3	–5.21	–22.9	–4.53
35–44	26.0	11.1	2.89	28.2	7.33
45–54	23.8	24.6	5.85	21.9	5.21
55–64	13.1	23.1	3.03	19.7	2.58
65–74	9.40	2.63	0.25	–4.64	–0.44
75–84	5.77	–1.26	–0.07	–7.85	–0.45
85+	2.15	–8.75	–0.19	–10.4	–0.22
All	100.0	6.55 (average)	6.55 (sum)	9.55 (average)	9.55 (sum)

B. Additional Population Shares Affecting Difference from IPA-Defined Saving Story (percentage of total population)*

Age Group	*1997 (actual)*	2000	2010	2020	2030	2040
35–44	*16.1*	16.3	13.4	12.8	13.5	12.7
65–84	*11.0*	10.9	11.1	14.2	17.6	17.5

*See also table 6.

TABLE A2.

Projections Based on "Durables-Inclusive" Measure of Private Saving

Variable	1997 (actual)	2000	2010	2020	2030	2040
National						
Labor per capita	0.508	0.515 (0.46%)	0.530 (0.29%)	0.518 (–0.24%)	0.504 (–0.26%)	0.499 (–0.11%)
Capital per capita	$78,549	$84,066 (2.29%)	$108,408 (2.58%)	$134,007 (2.14%)	$154,628 (1.44%)	$169,504 (0.92%)
NNP per capita	$26,183	$27,645 1.83%)	$32,856 (1.74%)	$37,127 (1.23%)	$41,310 (1.07%)	$46,071 (1.10%)
Rate of return	6.58%	6.49%	5.98%	5.47%	5.27%	5.36%
Annual wage	$41,363	$43,074 (1.36%)	$49,748 (1.45%)	$57,571 (1.47%)	$65,754 (1.34%)	$74,118 (1.20%)
National saving rate*	9.42%	10.20%	10.59%	8.41%	5.65%	3.38%
Household						
Private income per capita	$21,287	$22,486 (1.84%)	$26,849 (1.79%)	$30,964 (1.44%)	$35,667 (1.42%)	$40,921 (1.38%)
Private consumption per capita	$19,255	$20,141 (1.51%)	$23,928 (1.74%)	$27,938 (1.56%)	$32,293 (1.46%)	$37,118 (1.40%)
Private saving rate (as a percentage of private income)	9.55%	10.43%	10.88%	9.77%	9.46%	9.29%
Government						
Taxes*	35.81%	35.64%	35.32%	35.38%	35.85%	36.78%
Transfers*	14.98%	15.14%	16.03%	18.02%	20.53%	21.76%
Public saving rate*	1.66%	1.71%	1.70%	0.26%	–2.52%	–4.87%
Government debt*	32.33%	28.32%	16.82%	13.99%	31.49%	71.60%

Source: Authors' calculations.

Note: As a percentage of net national product. Numbers in parentheses indicate annualized growth rate since prior year shown, or, for 2000, since 1997.

THE RETIREMENT PROJECT

Occasional Paper Number 6

URBAN INSTITUTE

2100 M Street, N.W.
Washington, DC 20037

Phone: 202.833.7200
Fax: 202.429.0687

e-mail: paffairs@ui.urban.org
http://www.urban.org

Nonprofit Org.
U.S. Postage
PAID
Permit No. 8098
Mt. Airy, MD