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# *The Baby Boom, the Baby Bust, and Asset Markets*

***by Timothy Cogley and Heather Royer***

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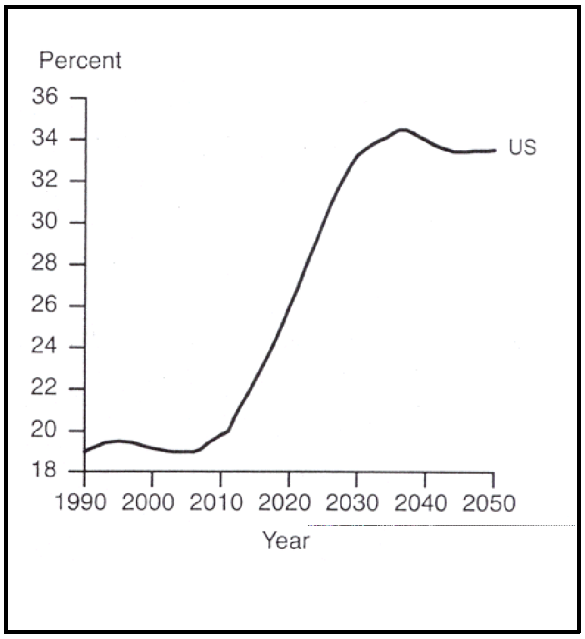
In about 10 to 15 years, the first wave of post-war baby boomers will begin to retire, and we will start to see a large generational shift from young to old. This generational shift is illustrated in Figure 1, which shows the expected path of the so-called "old-age dependency ratio," which is defined as the number of people aged 65 and older divided by the working population (those aged 20 to 64). This ratio will begin to increase sharply when the baby boomers first begin to retire and will climb from 20% currently to nearly 35% by the year 2035. In other words, when the last of the baby boomers reaches retirement age, there will be only three workers for each elderly person, compared with five workers now. This shift will be brought on not only by the sheer number of boomers but also by their increasing longevity. At the same time, we can expect to see a thinning in the ranks of the young, as many boomers delayed childbearing or chose to have fewer children or none at all.

The prolonged graying of America, with an escalating ratio of elderly to young people, will have severe consequences for pay-as-you-go public retirement programs such as Medicare and Social Security. Simply put, if there are no changes in these programs, there won't be enough working Americans available to put money into them to support the ever growing populace of retirees. Intermediate projections suggest that Social Security will face bankruptcy in about the year 2030, and some figures place insolvency about a decade sooner. Cuts in benefits, tax increases, massive borrowing, lower cost-of-living adjustments, later retirement ages, or a combination of these elements will be necessary to sustain the programs.

Because of doubts about the future of Social Security, it may be prudent for households to prepare for retirement by increasing their own personal savings. Venti and Wise (1996) report that older Americans already have begun to do so. For example, they report that the personal retirement assets of those aged 65 to 69 is already significantly larger than what previous generations had set aside for retirement, and that the average has more than tripled since 1984. In addition, Venti and Wise project that the personal financial assets of those who will be 76 in 2025 will be roughly double that of those who were 76 in 1991. Research by economists in the Congressional Budget Office (1993) also reports that baby boomers have begun to accumulate more assets than prior generations.

**FIGURE 1**
**Old-Age Dependency Ratio in the United States**




Because baby boomers will have to rely more heavily on personal savings to prepare for their retirement, they have an interest in how capital markets will fare as they approach their golden years. While strains on public retirement programs are well-known and much documented, the growing ratio of old people to young also has implications for returns on private savings. In particular, the imbalance in the ratio of generational cohorts may also adversely affect returns on private savings.

## Implications for Baby Boomers' Retirement Plans

To understand the relation between demography and capital markets, it is useful to think about the Life Cycle model of consumption and saving. Roughly speaking, the Life Cycle model states that people work and save when they are young and live off the proceeds when they retire. A typical Life Cycle profile is illustrated in Figure 2, which plots wealth as a function of age. In this figure, a person starts to work and save at age 25. His initial income is normalized to 1 (i.e., the units of wealth are a year's income), and we assume that real income grows at a rate of 1.8% per year (the average annual growth rate of per capita income over the last 120 years). We also assume that our hypothetical consumer saves 10% of his income and invests it in a mix of stocks and bonds that earns a real return of 5% per year. He works until age 65, at which time he begins to
sell off his assets and live off the proceeds. The key feature of the figure is that wealth has a hump shape over the life cycle. It peaks at retirement age and then begins to decline. In other words, older people tend to be net sellers of financial assets.

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In an economy with a stable age distribution, this would have no effect on capital markets. When each cohort reached retirement age, it would sell its assets to younger cohorts who were accumulating wealth, and with steady population growth there would always be enough of the latter to absorb the sales of the former. But what happens when population growth isn't steady and the economy's age distribution isn't stable? In particular, what happens when the old-age dependency ratio rises, and there are proportionally fewer young savers to buy up the assets of the older retirees? In this case, by the law of supply and demand, one would expect the price of assets to fall. As aging baby boomers begin to sell their financial assets, they will presumably be selling to the next waves of savers, the so-called Generation Xers and Yers, which are significantly smaller population cohorts. With relatively fewer buyers than in the past, boomers may find themselves selling into a weak market when they retire.

Is there any empirical support for this prediction? Long-run forecasting is extremely difficult, and we won't know for sure until baby boomers actually begin to retire. But baby boomers have affected the economy at every stage of their life cycle, in ways more or less in accordance with the Life Cycle Hypothesis, and its success in other contexts lends some credence to our conjecture about retirement.

For example, some versions of the Life Cycle model predict that people will invest differently at different stages in their lives. When people are young and starting families, one would expect them to invest heavily in housing, and the arrival of a large cohort at that stage of their life cycle should raise house prices. Mankiw and Weil (1989) and Bakshi and Chen (1994) studied this implication of the model and reported that there was an increase in housing prices between 1970 and 1980, when the first wave of baby boomers were in their 20s and early 30s.

Similarly, when people grow a bit older and begin to think about retirement, one would expect that they would begin investing more in financial assets. The arrival of a large cohort at that stage of the life cycle should raise the price of financial securities. The first wave of baby boomers reached age 35 in 1981, which coincides roughly with the beginning of the long bull market in stocks (again, see Bakshi and Chen). This may reflect (at least in part) the predicted Life Cycle effects.

## International Diversification?

There is a possible way out. Capital markets are integrated internationally, and it may be possible for aging boomers to avoid losses if large numbers of young investors can be found elsewhere in the world. That is, aging boomers in the U.S. needn't sell exclusively to young people in the United States. They can sell to anyone throughout the world. Thus, U.S. demographics aren't necessarily decisive; world demography matters more. The key issue concerns the extent to which aging patterns are synchronized or asynchronized across countries. U.S. demographics can be diversified internationally if the aging patterns are asynchronized, so that some other country's boomers are young when our boomers are old, but they can't be diversified if all populations are graying simultaneously.

Unfortunately, demographic trends in industrialized nations suggest a synchronization across countries. For example, Figure 3 superimposes old-age dependency ratios for Germany, Japan, France, Italy, and the U.K. on that for the U.S. Populations are aging in all these countries, and, in fact, all will have far greater dependancy ratios than the United States. This may seem surprising, because unlike the United States these countries did not experience large increases in fertility in the 1950s and early 1960s. Why then are their populations aging? In Japan there was an increase in fertility, but it peaked earlier than in the U.S., and their boomers are now older than ours. In other countries, such as France and Germany, the population is aging because there was a sharp decline in fertility from the 1970s through the 1990s. In any case,

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**FIGURE 2**
**A Typical Life Cycle Wealth Profile**

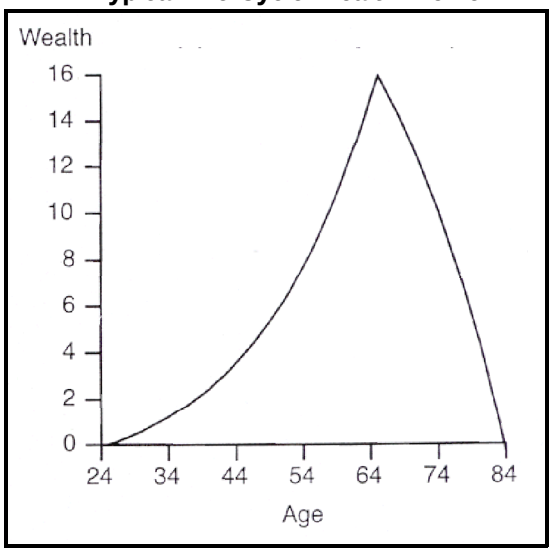
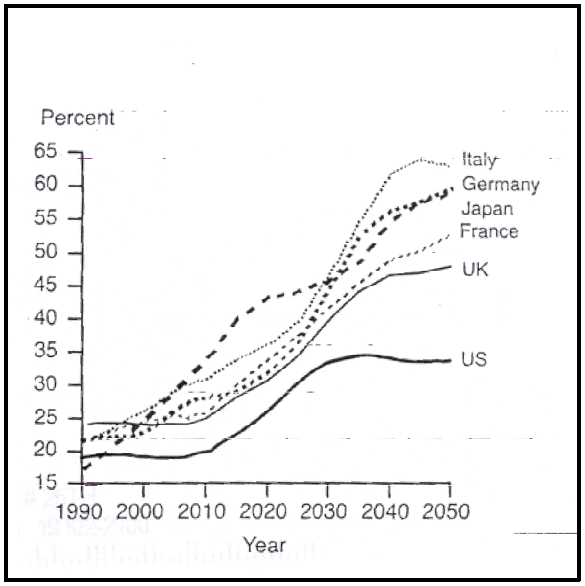



**FIGURE 3**
**Old-Age Dependency Ratios in Various Countries**



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because the demographic profiles are synchronized, it seems unlikely that investors in these countries will be net buyers of capital when aging Americans begin to sell. If anything, this figure suggests that international linkages among developed countries are likely to amplify life cycle effects in the United States.

What about developing countries? Demographers project that their old-age dependency ratios will also rise, but expect the increase to occur roughly 50 years later than in the industrialized world. Since their demographic profiles differ from the developed world's, perhaps aging boomers in the latter can sell to younger boomers in the former. But will they have the means to buy? Capital tends to be scarce in developing countries, and unless they can grow rich in the next 25 years, it seems unlikely that they will be in a position to become net lenders to the developed world.

## Other Considerations

The looming crunch might be slightly eased under several scenarios. For example, educated baby boomers may choose to stay in their careers longer, working past the traditional age of retirement; they need not sell their assets if they earn steady paychecks. In addition, the period over which the Baby Boom generation is expected to retire spans about 30 years. Capital markets might have time to adjust to the gradual decline in supply of funds for capital investment. For example, if Gen-Xers, Yers, and Zers were to anticipate further cuts in Social Security benefits, they might save a higher fraction of their incomes, and this would compensate for the fact that there are relatively few of them. Despite such possibilities, the surging old-age dependency ratio remains a significant generational challenge, not just for Social Security, but perhaps for private retirement plans as well, in ways we are just beginning to explore.

*Timothy Cogley, Senior Economist*
*Heather Royer, Research Associate*

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# *Subjective Value at Risk*

***by Glyn Holton***

**Editor's Note:** *The following article originally appeared in the August 1997 issue of* Financial Engineering News *and is reprinted with permission.*

Value-at-Risk (VaR) is becoming somewhat of a revolution. Around the globe, organizations are racing to implement the new technology. Pundits propose extending VaR to other risks, including credit risk and operational risk [1]. Some even suppose that all the risks of an organization should be summarized with a single risk measure [2].

It is the nature of revolutions that there be a backlash. One has begun. Critics suggest that VaR may be ineffective for assessing risks other than market risks [3]—or that it fails even with market risk [4]. Others have noted disturbing inconsistencies between risk estimates produced by different implementations of VaR [5].

If the VaR revolution is to succeed, it must be tempered by such concerns. After all, VaR is only a tool. All tools have limitations. For example, a hammer can drive nails, but it cannot drive screws. Saying that the hammer is limited is different from saying it is flawed.

To understand the limits of VaR, we need to explore what it means to "quantify" risk. Let's start by defining risk. Risk is exposure to uncertainty. Accordingly, risk has two components: (1) uncertainty; and (2) exposure to that uncertainty.

A synonym for uncertainty is ignorance. We face risk because we are ignorant about the future—after all, if we were omniscient, there would be no risk. Because ignorance is a personal experience, risk is necessarily subjective. When we put a number on risk, that number says as much about us—how little we know—as it says about the world around us.

Suppose you are in a casino. A man rolls a die behind a screen. If the result is a 6, you are going to lose $100. Behind the screen, the man sees the result of the die toss, but you have not yet seen it. In this example, the outcome is certain. It has already been determined. Uncertainty exists only in your head—but the risk is real until you see the die.

Let's try to quantify your risk in this example. To characterize the risk, we need to describe the uncertainty as well as your exposure to that uncertainty. Obviously, your exposure is $100. That is the amount you stand to lose. But what is your uncertainty— what is the probability that you will lose $100?

If you say it is one chance in six, I am sorry. You are wrong. I forgot to mention that the die is 10-sided. This illustrates an important point. Whenever we try to quantify risk, we are describing our own understanding of a situation. Often, there will be aspects

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