

Demographics and Capital Market Returns

Robert D. Arnott and Anne Casscells

By 2010, longevity in the United States will have increased by nearly 15 years since 1940 but the retirement age for full Social Security and Medicare benefits will have increased by only a single year. As those of us in the Baby Boom approach “normal” retirement age, the population will contain nearly twice as many elderly people (over 65) relative to “normal” working-age people (age 20–65) as society has ever seen.¹ The simple fact is that moving from the current level of just under 3 workers per retiree to just over 1.5 workers per retiree is a likely formula for inter-class and intergenerational rebellion; therefore, something will have to give.

Demographic Reality

The demographic patterns that have been evolving over the past 60 years have implications for retirement plans and for the financial markets—of not only today but also the decades ahead. The first element of the demographic problem is the increasing population over 65. In 1940, there were comparatively few retirees per worker, largely because most people—particularly, men, who predominated in the work force in the 1940s—did not even reach age 65 as shown in **Figure 1**. In contrast, in 2000, the average person lived to age 76.6, some 11 years longer than the normal retirement age. The current generation of retirees has been extremely fortunate. For the first time in history, not only do most of them live long enough to retire, but also, for those who do, that retirement lasts an average of 17.5 years.²

Because further improvements in medical technology will increase life expectancy, the average person in 2050 should live 16.3 years longer than the normal retirement age of 65—some 40 percent longer than today’s figure of 11.6 years.³ Either the average person will be retired for 40 percent longer in 2050 than today, meaning a 40

percent increase in the dependency ratios from longevity alone, or the average person will work several years longer than today.⁴

The second element of the demographic problem is the falling number of workers who provide the goods and services for the retirees (and for their own families). As **Figure 2** indicates, today’s work force, and tomorrow’s retirees, are the products of the fertility levels of decades ago. The aging of the U.S. Baby Boom generation means not only more elderly people but also fewer people in their prime working years. Panel A compares the population distribution of young people under age 20 with the average fertility rate 0–20 years earlier, and Panel B compares the population of working-age people of 20–65 with the fertility rate 20–65 years earlier. The fertility ratio is the ratio of children born per woman of childbearing age. Because some children die before they reach adulthood, a ratio of roughly 2:1 is the minimum required to sustain the population.

The lagged fertility rates show how prolific prior generations were in creating potential workers and eventual retirees. As Panel A shows, high fertility from 1946 to 1960 led to plenty of young people in the 1950–80 period as a percentage of the population. Panel B shows that the boom also created plenty of working-age people for 1980–2015. Low fertility from 1972 to 1988, however, will lead to a nosedive in the number of working-age people just as the boomers are hoping to retire.

The proportion of the population over 65 will soar from 12 percent today to 20 percent in 2030—because of both the Baby Boom of 1946–1958 and, not incidentally, the Baby Bust of 1965–1990. The number of people over 65 will steadily increase between 2011 and 2023, whereas the proportion of the population between 20 and 65 will steadily decrease from 2000 until 2055.

Can society tolerate a rise of 60 percent in the proportion of the population that is retired over the next 30 years? Not likely. As we can infer from Panel A in **Figure 3**, in 1950, there were 7.3 working-age people for each person over 65; now, the ratio is 4.7 to 1, and it is scheduled to drop to 2.7 to 1 by 2035.⁵ The nearly doubling between now and 2035 of the over-65 crowd relative to the working-age population is the basis for one often expressed concern about aging boomers: Since 1950, Social

Robert D. Arnott is chairman of First Quadrant, LP, and of Research Affiliates, LLC, Pasadena, California. Anne Casscells is a managing director at Aetos Capital, LLC, Menlo Park, California.

Note: This article was accepted for publication prior to Mr. Arnott’s appointment as editor of the Financial Analysts Journal.

Figure 1. Life Expectancy, 1940–2050

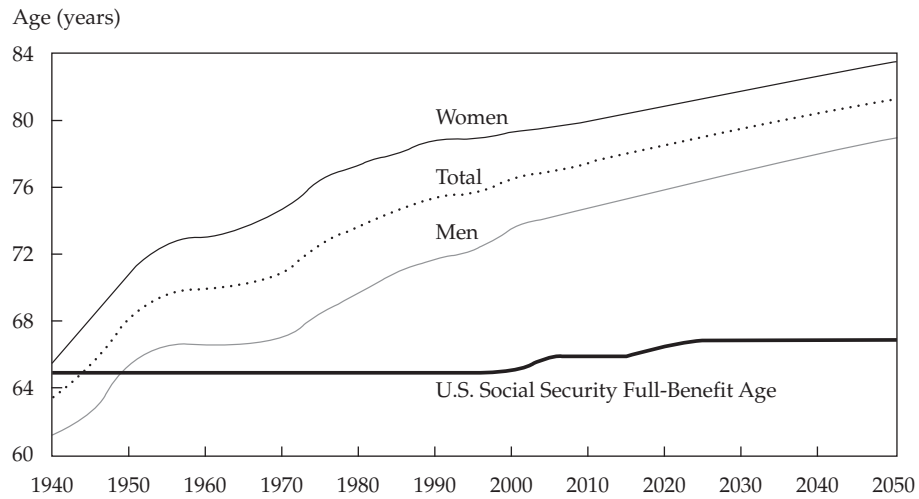


Figure 2. Fertility Rates vs. Population, 1960–2050

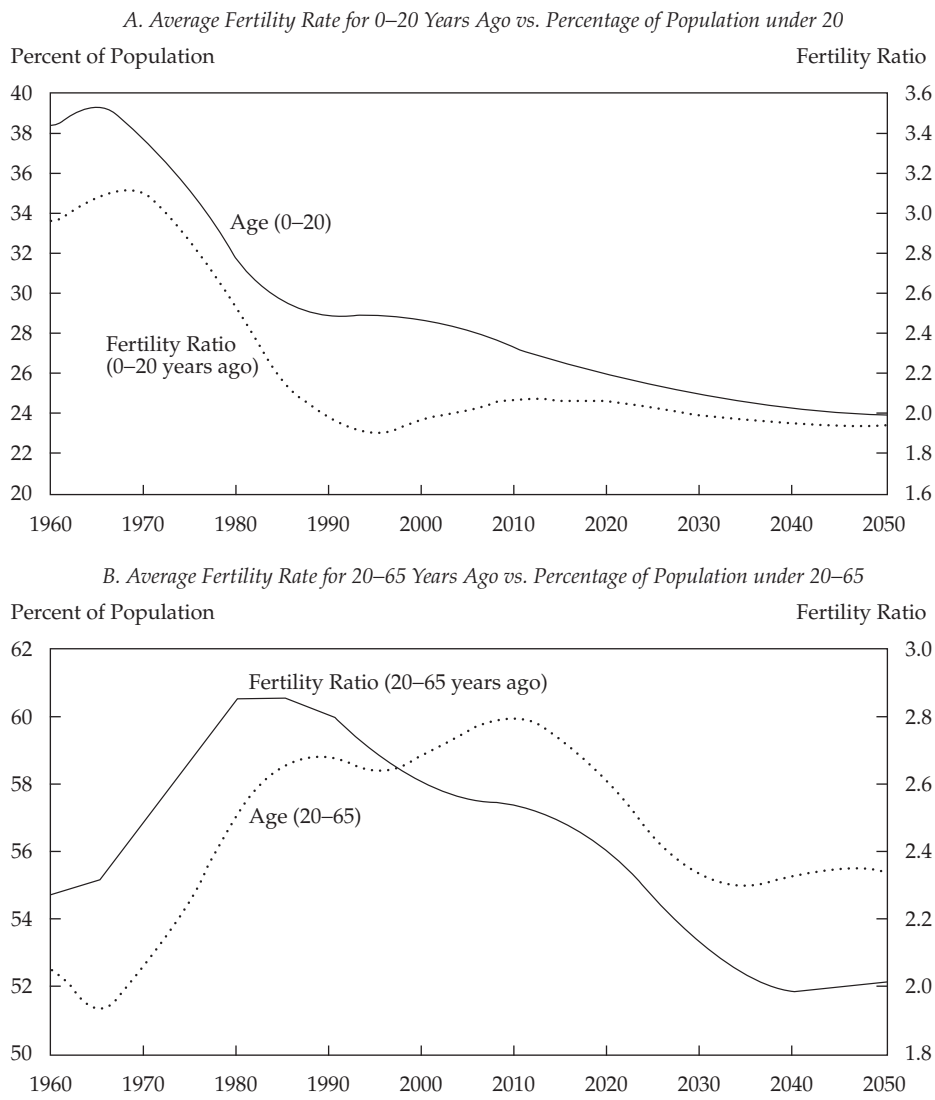
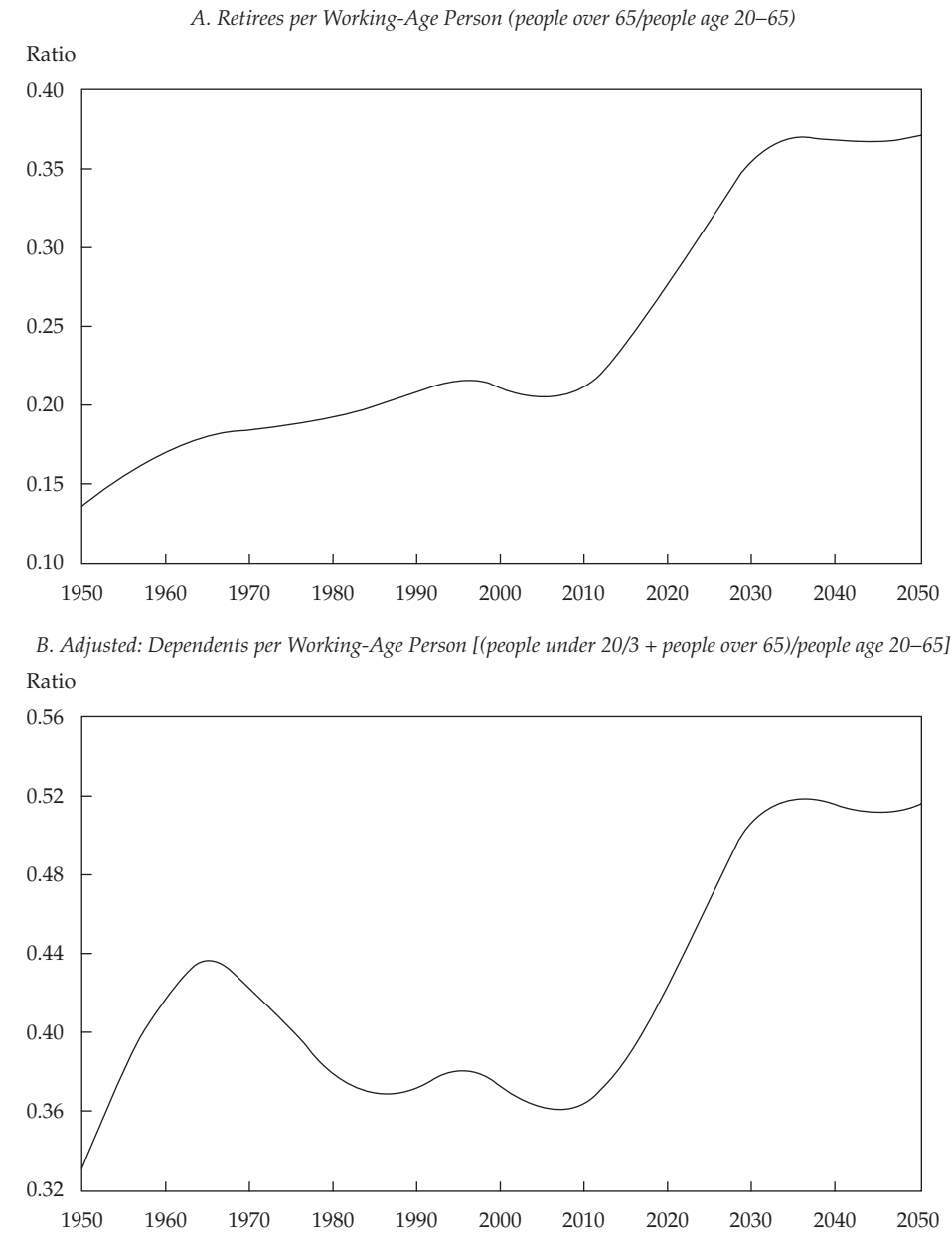


Figure 3. Dependency Ratios, 1950–2050



Security tax rates have more than doubled. If nothing changes, what happens to Social Security taxes if the ratio of people over 65 relative to workers nearly doubles between 2005 and 2035?⁶

The ratio of retirees to workers dramatically increased from 1945 to 2000 with no deleterious effects on the economy, although the Social Security tax burden did rise considerably. Indeed, people retired younger and younger during this span. Why were no social shocks associated with this previous rise in the ratio of retirees to working-age people?

The answer to this puzzle is surprisingly simple: Workers support not only retirees but also

children, which produces a second dependency ratio, the *aggregate* ratio of how many dependents each worker must support. A worker can support more retirees if there are fewer children to feed, and vice versa. So, although the proportion of retirees in the population has steadily grown over the past 40 years, the proportion of the population in their working years has also steadily risen because the number of children per working-age person fell more than twice as fast as the number of retirees was rising. While the elderly were becoming an increasing portion of the population, the boomers left childhood and the percentage of children fell, so in the aggregate, the demand from dependents

of all categories for the goods and services workers produced actually fell, even as the number of retirees rose.

The offset has not, however, been exactly one for one. We calculated an “adjusted” dependency ratio based on an important aspect: The average person over 65 consumes far more in goods and services (roughly three times as much) in a given year than the average youth under 20. Indeed, the aggregate expenses associated with the average youth barely matches the medical expenses alone of the average retiree above 65. Thus, the adjustment to the dependency ratio is to count the cost of each child at one-third that of each retiree, which produces the picture shown in Panel B of Figure 3. With this adjustment, the ratio tumbles from 0.44 in 1960 to 0.36 in 2008, then exceeds 0.50 by 2030.

Implications for Asset Returns

The steady fall in the adjusted dependency ratio afforded workers the resources to invest and was thus among the important factors fueling the extraordinary bull market of 1975–1999. During the past 20 years, the ratio of dependents to workers actually fell, and those who “looked ahead” saw more of the same in the coming 10–20 years. As a consequence, financial assets soared relative to the cost of goods and services. Unfortunately, the opposite is likely to be true as the ratio reverses over the next 30 years.

More retirees than ever before selling assets to a proportionately smaller roster of potential buyers (workers and their pension plans) than ever before equals pressure on asset values. Buyers will want total return, including income and growth; sellers will favor a fixed income and fixed purchasing power.⁷

The selling pressure, however, is not likely to affect all assets uniformly. Retirees favor some assets more than others. They tend to rely less on growth assets, such as stocks, and favor fixed-income assets. The very last assets retirees will want to sell are those that provide a fixed purchasing power, such as TIPS (officially, Treasury Inflation-Indexed Securities). Indeed, retirees may liquidate other assets in order to buy bonds and TIPS as a way of improving the reliability of their retirement income and reducing their portfolios’ risks.

The simple mechanisms of supply and demand should lower the return on assets: A larger group of retirees than ever before will be selling to a proportionately smaller working population than ever before. So, what the retirees wish to sell will already be priced lower, in real terms, by the time they wish to sell it. Demographics probably played

a key but underrecognized role in creating the stock market boom of 1975–1999 and, ultimately, sowing the seeds of death for the equity risk premium.⁸ Now, demographics will no doubt put a lid on asset returns for the coming quarter century. One consequence will be an increase in risk premiums required by the next generation and delivered to them by the outsized boomer generation.

Goods and services that retirees want—notably, in the health care, leisure, and service industries—probably will experience material inflation. And the higher costs should be reflected in higher wages, which will be needed to attract workers to the professions that serve the expanding population of retirees. Thus, the outcome could be a surge in real wages in the service sector and a continuing surge in medical costs.

These implications for capital market returns and prospective inflation (stated here in their strongest terms) stem from the most basic law of economics: Supply and demand must match. Prices are set to equate supply and demand; no policy choices can alter this relationship. Retirees demand goods and services; workers supply them.

When should the impact of demographics on asset values begin to take effect? The ratio of retirees to workers begins to rise in roughly 2008–2010 and starts to soar around 2015. So, overt selling pressure on risky assets should begin in perhaps 10 years—if the prospective retirees and the capital markets themselves do not seek to anticipate the future. Therefore, the sensible approach is to deem that a demographic crisis, which begins in earnest in fewer than 10 years, is already beginning to have an impact on the capital markets. The problem is now, not 10 years from now.

“Solutions” to the Dependency Ratio Problem

Figures 1, 2, and 3 depict a worst-case scenario. A number of policy changes and economic realities could change the dependency ratios. The “solutions” that have been proposed fall into several categories—financial, macroeconomic, and demographic.

Financial Solutions. To provide for the retirement of the boomers, we can save more money, increase Social Security taxes, or raise the rate of return on the Social Security Trust Fund by investing it in stocks and corporate bonds.

■ *Aggressive saving.* Suppose we save more aggressively. We have seen a test of this solution in Japan. Their Baby Boom was 10 years earlier but somewhat smaller than ours. To suggest that demographics was the sole force behind the immense

Japanese bull market of 1960–1989 or the fierce bear market since then would be naive, but if an aging population saves aggressively, as has happened in Japan for decades, and if that aging population seeks to sell its substantial assets to a shrinking population of workers, a sharp drop in asset values should be expected.⁹

Of course, savings are relevant to a solution of the financial problems that will be caused by deterioration in the dependency ratio. More savings mean more investment, which is usually a good thing, but more savings also mean less consumption, which can lead to recession or even worse (as in the case of the Great Depression). Also, if you save more than the authors do, then you can retire sooner than we can retire, but if we all save more, we bid against each other for goods and services. More would-be retirees will still be looking to unload financial assets, and fewer workers will be providing those goods and services.

■ *Increased postboomer savings.* Suppose the postboomers notice that the boomers are retiring very late and incorrectly ascribe that trend to the boomers' failure to save aggressively. Then, postboomers may choose to save much more aggressively than their parents, thereby bidding up the values of the assets that the boomers want to sell to fund their retirements. This outcome could mitigate the demographic crisis, shifting some of the burden for the crisis from the boomers to the postboomers. It could have detrimental economic consequences, however, if the increase in savings by the postboomers causes consumption to fall too abruptly.¹⁰

■ *Raising Social Security taxes.* Suppose the demographic crisis is really a Social Security crisis. If so, a solution would be to boost Social Security taxes. Workers would then be taxed more heavily than ever before in order to subsidize more retirees than ever before. Surely, the result would be intergenerational conflict. The work force would begin to resent the burden, workers would vote according to their own interests, and the Social Security "deal" would change. The age of full benefits might change, or benefit levels might be reduced.¹¹ Failing such a change, a high tax burden would be likely to discourage work and investment and depress economic output, reducing the pie for all.

■ *Investing Social Security in the market.* Investing Social Security assets in the stock market or in corporate bonds is also unlikely to solve the underlying demographic problem. Financially, earning superior investment returns has the same result as aggressive savings: an increase in the amount of financial assets that can be exchanged for goods and services at the time of retirement.

Even if the Social Security assets (whether invested by the Social Security Administration or by individuals) grow to a very large amount of money, these assets must be exchanged for goods and services at the time those goods and services are produced. An imbalance between the number of workers and retirees will allow workers to require more in the way of financial assets to be exchanged for a given unit of labor. Either labor costs become inflated, or the price of financial assets is reduced (i.e., the prices of stocks and bonds fall.) The sheer force of this imbalance has the potential to depress investment returns in the future.

■ *Critique of financial solutions.* Unfortunately, none of these suggestions will work because none changes the basic demographics: The country needs more workers to produce the goods and services for themselves, their children, and the retirees. And we need fewer nonworking consumers.

If we mistake a demographic problem for a financial problem and seek to pursue financial solutions, either savings will rise and spending will drop or taxes will rise and consumption will drop. Either way, we risk serious economic consequences—and without resolving the basic demographic problem.

Why can't savings help? To assert that increasing the pot of money available to support retirees will make no difference to the problem runs counter to intuition. But money is merely a means of exchange. At the microeconomic level, what matters is whether I have more money than you to spend in retirement. At the macroeconomic level, the amount of money (or financial assets) is irrelevant; what matters is the amount of goods and services produced and how they are allocated among working and nonworking people. Retirees use money from the sale of financial assets and other assets as the means of exchange to acquire goods and services. With few exceptions, goods and services cannot be saved in advance of retirement. As the proportion of retirees to workers increases, the demand for some goods and services will increase relative to supply, which should boost the cost of the goods and services that retirees want. Similarly, because retirees must sell financial and other assets to pay for their goods and services, when the proportion of workers to retirees falls, demand for these assets relative to supply falls, which should cut the price of the assets that retirees want to sell. Thus, the simple operation of supply and demand will improve the terms of exchange for workers (who are scarce). The result will be that a dollar will buy less in goods and services than it did when there were more workers relative to the number of retirees.

Macroeconomic Solutions. To ameliorate the demographic problem, the economy could move (or be moved by government policies) in several directions—improvements in productivity, an increase in Third World trade, and/or reallocation of the work force.

■ *Improved productivity.* In addition to the misconception that financial solutions will work is the misconception that improved productivity will afford us the opportunity to enjoy many more retirement years than our parents and grandparents did. Improvements in productivity are part of the normal evolution of a healthy economy, but the benefits of productivity are usually shared among the generations.

Rising productivity improves the quality of life for everyone. Our own efforts to improve productivity have not been intended to improve our retired parents' lives, nor have they been intended to afford our parents the opportunity to retire early. They have been intended to improve the quality of life for ourselves and for everyone. Retirees, however, do adjust their quality-of-life expectations to reflect past and present improvements in productivity. Boomers will want to retire on schedule, with a quality of life that reflects productivity gains; postboomers will also want to enjoy an improving quality of life—not spend the proceeds of productivity gains on retirees. So, productivity gains may help our collective quality of life but are not likely to alter the age at which we retire by more than a modest amount.

■ *Increased Third World trade.* Figures 1 and 2 treat the U.S. economy as if it were a closed economy, as if retirees traded goods, services, and assets only with others in the United States, but of course, we are a very open economy. So, perhaps trade with developing economies could help relieve the demographic problem.

The demographic crisis in Japan, the United States, and Europe is not mirrored in the world population. If the Third World experiences rapid economic development and if trade barriers tumble, allowing the developed countries to purchase goods and services from a booming Third World economy, the demographic problem will be mitigated. The emerging markets can produce goods at favorable prices and, with improving economics, can potentially increase their demand for the capital assets that retirees will be selling. The opportunity here is huge, but the likelihood that emerging markets can evolve rapidly enough to make a material difference is low. Rapidly growing economies tend to need to *import* capital to support their growth rather than exporting it via the purchase of others' financial assets.

Moreover, the “consumption basket” for retirees contains comparatively fewer imports than our economy as a whole because we cannot import most goods and services that retirees want—in medical care, golf memberships, housing. For these goods and services, we are indeed dealing with a largely closed economy. In addition, to the extent that retirees do consume imported goods, the goods tend to come largely from other developed nations, which face an even more severe demographic problem than the United States faces.¹²

Nor is it realistic to suppose that Third World economies can buy large incremental amounts of U.S. retirees' assets. These nations are already net buyers of U.S. financial assets, so dramatically increasing their purchases of our stocks and bonds would meet resistance.

Additionally, although the United States is part of an increasingly open global economy and Third World countries are a rapidly growing part of world trade, most of our international trade is with the developed, high-wage economies.

Finally, the assumption that developing countries with younger demographic profiles will gladly accept terms of trade that are unfavorable to them is unrealistic. Just as the shortage of workers in the United States will improve worker bargaining power as financial assets are exchanged for goods and services, so the bargaining power of workers in other countries should improve. The price of goods we buy from them should rise, or the price they are willing to pay for our financial assets should fall.

■ *Reallocation of the work force.* Only a modest fraction of the U.S. work force is dedicated to the consumer goods that retirees are likely to demand. A reallocation of the work force from production of capital goods and business services to consumer goods and consumer services would, again, mitigate the problem. Historically, the U.S. work force has been able to transform quite dramatically in spans measured in decades. For example, witness the transition from an agrarian work force to an industrial work force to a services-dominated work force in just over a century.

The reallocation of the work force is perhaps the least-discussed and best solution to the demographic problem, but it would still require a willingness among the postboomers in unprecedented numbers to serve the boomers in their collective retirement. Wages would have to rise in the consumer services industries to attract workers, which would make those goods and services more expensive, thus making retirement less affordable.

Demographic Solutions. What is the worst-case future? Suppose the boomer generation retires

“on schedule” at slightly over age 65 and then, at some stage, the 1.5 people producing the goods and services for themselves, their children, and each retiree cannot produce sufficient goods and services to meet the aggregate demand. Then, the workers producing the goods and services will feel terribly burdened by the requirement that they support so many other people. Moreover, market forces are likely to restore a ratio of workers to retirees not far from today’s ratio. Three demographic solutions to the problem could help restore that ratio: immigration, emigration by retirees, and a substantial rise in the retirement age. A common denominator in all of these solutions is (1) more workers and (2) fewer retirees.

■ *Increased immigration.* If immigration becomes more aggressive, if we bring in only the workers we need and minimize the number of dependents they can bring, the country will have more workers to provide goods and services. The dependency ratio will improve. Immigration policies could be modified to allow an influx of young workers into the labor pool necessary to serve the needs of retired boomers. The United States is fortunate, in comparison with Japan or Western Europe, because it has considerable experience in absorbing and integrating immigrants.

However, increasing immigration is a difficult way to fix the demographic problem. Suppose that, instead of holding retirement constant at 65 years old, we held the various dependency ratios fixed. How many immigrants would be needed between now and 2030 for dependency ratios of 2030–2050 to match the dependency ratios of 1980–2000? To maintain the average dependency ratios of 1980–2000, immigration would have to increase by approximately 118 million people born between 1985 and 2010 and arriving by 2030, about 4 million a year—that is, 4 million beyond the 1 million a year that are already assumed in the data of the Social Security Administration. If the immigrants brought nonworkers, their parents over 65 or their children under 20, we would need correspondingly more immigrants in the working-age range to keep dependency ratios steady.

Such a massive scale of immigration is not plausible. Increasing immigration fivefold and adding 118 million immigrants during the next 30 years would be highly disruptive to society.

■ *Increased retiree emigration.* Emigration of retirees to nations that have no demographic crisis and have a lower cost of living could help. If a retired couple cannot afford to retire to La Jolla, California, perhaps they can afford to retire to Costa Rica. One emigrating retiree is as significant for the dependency ratios (as far as goods and

services are concerned) as roughly three working-age immigrants. So, emigration would be roughly four times as efficient as immigration in keeping the dependency ratios down.

Nevertheless, to improve the ratios, emigration on a massive scale would be needed. If 120,000 retirees left the United States every month for the next 30 years, that would suffice: The dependency ratios would remain stable.

■ *Raising the retirement age.* This solution is the one we think most likely to occur. If we wanted dependency ratios to match their 1980–2000 average, how long would people have to delay retirement? In other words, if the recent and current retiree burden is comfortable for society, as would appear to be the case, what would the retirement age be for the burden to remain exactly as comfortable as it has been for the past 20 years?

The disturbing answer is that, to sustain the dependency ratios of 1980–2000, the retirement age would have to rise to 72 or 73 by 2030.¹³ We found the following:

- From 1980 to 2000, the people over 65 constituted an average of 12 percent of the population. What retirement age would lead to a retirement community amounting to a fixed 12 percent of the population?¹⁴ The answer is that the people born after the 1950s will have to retire at age 72 if we are to keep a steady 12 percent of the population retired.
- If the ratio of retirees to working-age people is held constant (which makes far more sense than using a fixed retiree percentage), then from 1980 through 2000, this dependency ratio averaged 21 percent. For it to have been constant at 0.21 retirees for each working-age person, the retirement age would have been steady at 63–65.5 years of age from 1960 until 2010. To keep this ratio fixed at 0.21 into the future, the normal retirement age would have to soar from 65 to 73 between 2005 and 2035.
- When we counted each person under 20 as one-third the burden of each retiree, this adjusted dependency ratio averaged 0.38 from 1980 through 2000. If we assume that society is comfortable carrying 0.38 adjusted dependents for each working-age person, then the boomer generation will see the normal retirement age rise by eight years, from 64 to 72, between 2009 and 2035.

These kinds of rises in acceptable retirement age occur regardless of how much boomers save or how heavily we tax the next generation in Social Security taxes. Therefore, the forces of supply and demand are likely to make retirement unaffordable for enough of the population that the adjusted

dependency ratio will be not much higher than what we experienced over the past 20 years. Perhaps society will tolerate something higher, but society is unlikely to adjust easily to a rapid and dramatic rise in the ratio of dependents to workers.

Postponing Retirement and the Markets

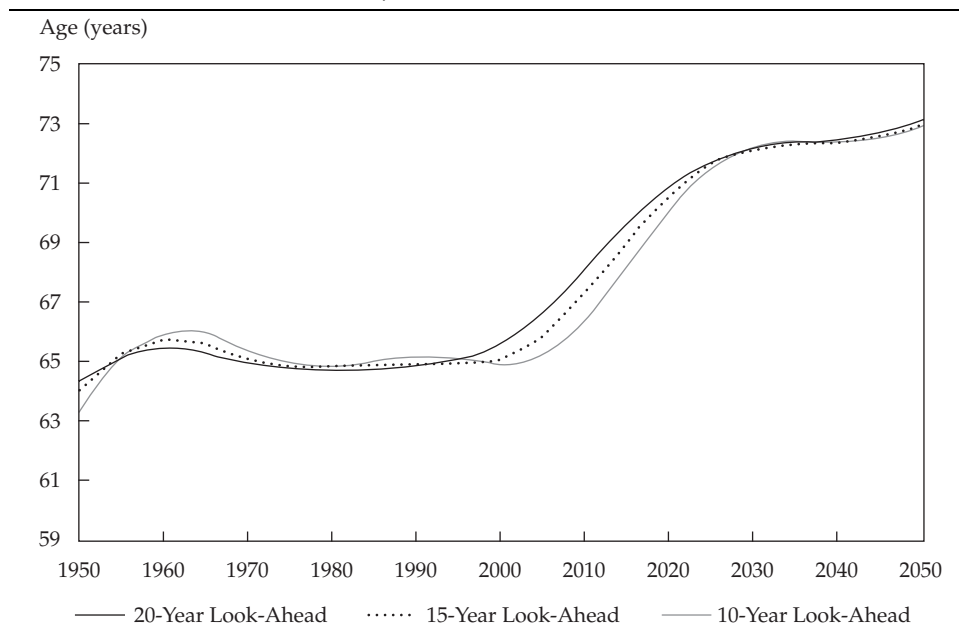
Each of the dependency ratios suggests that the problem of deferring retirement plans is not going to start until after 2010 and will not be a serious issue until perhaps 2020—which is hardly good news to many of us—but the reality is that someone who is retiring needs to pay attention to more than the immediate dependency ratio when she or he retires. If they want to maintain their living standards, people need to be alert to the dependency ratio for the remaining 15–20 years (or more) of life after retirement. Sensible 65-year-olds consider not only their resources today and the costs of goods and services today when they are deciding whether they have the resources to retire; they also bear in mind the purchasing power of their assets over the coming 10–20 years. So, sensible 55-year-olds are already beginning to focus on whether they have the resources and the asset mix to protect their retirement plans. In that case, the capital markets (i.e., investors at large) are already beginning to think about the impact of future retirees' plans on asset valuations. Indeed, we are already reading

newspaper accounts indicating that retirees and near retirees are reassessing their means in light of stock market losses and reduced return expectations for the future and are concluding they must work a few more years.

Figure 4 looks at retirement ages from this perspective under the assumption that the dependency ratio cannot rise substantially. The graph combines the two important dependency ratios from Figure 3—the ratio of retirees to workers and the adjusted dependency ratio that adds one-third of the young population to the retirees—and it “looks forward” at any moment to the demographic outlook over the next 10, 15, and 20 years. This perspective, in effect, holds constant the average of the two dependency ratios and averages them over the next 10–20 years.

Do investors plan ahead for 20 years? Some do, some don't. Many people, however, do plan ahead for 10 years. If we look ahead, averaging the dependency ratios for today, 5 years, 10 years, 15 years, and 20 years hence, the midpoint of the next 20 years is only 10 years away; so, even the longest 20-year look-ahead does not assume as much of a crystal ball on the part of investors as it might seem at first glance. Note that Figure 4 shows remarkably little difference between anticipating dependency ratios over the next 10 years or the next 20 years. To be sure, the rise in the normal retirement age starts 2.5 or 5 years later if we use, respectively, 15 or 10 years of look-ahead, but otherwise, the curves are

Figure 4. Retirement Age with Look-Ahead, 1950–2050
(if average of retiree-only dependency ratio and adjusted dependency ratio is held constant)



nearly identical. The laws of supply and demand, setting the price of both the goods and services that we will all want to buy and the assets that the retirees will be selling, should respond to this sort of future-expectations horizon.

The model in Figure 4 suggests that the normal retirement age hit a low point of 64.8 from 1980 to 1990 and is already, at 66 years today, in the early stages of an upswing. It reaches approximately 68 in 2010, exceeds 70 before 2020, and steadies at 72 in 2030. Figure 4 depicts what the boomer generation faces if we want to afford our own retirements with a reasonably static dependency ratio.

Even this outcome is conditional on the life expectancy assumed by the U.S. Social Security Administration. In 1940, our forebears worked for 40 years to have a 40 percent chance of a retirement that lasted an average of 12 years. Given the probabilities of survival, that pattern is equivalent, on average, to 40 years of work for 5 years of expected retirement. Today, many people believe that to work 40 years to retire for an additional 20 years is sensible! Even with a prosperous economy, this expectation is probably unreasonable. If medical advances allow us to live longer than the expectations underlying Figure 1, however, we must expect to work longer than even the ages suggested in Figure 4.

Moreover, if we accept the look-ahead assumption of Figure 4, this increase has already begun; the market is already pricing the goods and services that retirees will want to buy and the assets that retirees will want to sell for the expected remaining life of a retiree, rather than pricing one magic dependency ratio number when people hit age 65.

Conclusion

Several of the solutions we have discussed might ameliorate the scenario that we describe. But aside from a rising retirement age, none of them, individually, is likely to make a large difference in the problem. An average retirement age of 72 or 73 is the worst scenario, however, that boomers face. The most likely scenario is that the burden will be shared between the generations, so the normal retirement age will increase while the dependency burden of retirees on society also increases. Also, liberalized immigration policies will help ease this burden.

Even so, most people born after 1945 will be unable to retire before roughly age 70. Some may retire quite a bit earlier, as a result of aggressive saving, but at the cost of others retiring quite a bit later. This age will increase in the decades ahead if

the rapid rise in life expectancy in the 20th century continues.

The good news is that those who are already near retirement need only extend their working lives by a few years and those who are younger will have some time to adjust to the fact that their retirement is more likely to be after age 70 rather than age 65. In addition, most of us can expect to be healthier and more vigorous in our 70s and 80s than were previous generations. Fifty years ago, most people did not even live to age 65, so retirement at 65 was a "right" only if you were lucky enough to make it that far. Because of the tremendous advances in health care, most of us will live almost two decades longer, and delaying retirement a few years may be a small price to pay for the additional life and vigor.

One way or another, our society will face some difficult choices as the proportion of workers to retirees shrinks. Poorly crafted reforms could cause great damage to society. To the extent that today's workers are misled and told to expect the rest of society to support them for 20 years or more in retirement after just 40 years in the work force, we could face serious policy gridlock when those promises come due. For example, if tax burdens are increased significantly, economic output will contract and the pie will shrink for everyone. If an inflationary policy is pursued to reduce the value of defined retirement benefits, we risk revisiting some of the economic imbalances of the 1970s. Even a dramatic increase in the savings rate by those worried about funding their retirement will not be beneficial if it causes the economy to contract, as seems to be happening in Japan.

Something has to give: We must have more workers and fewer retirees in the decades ahead than is possible if the boomers retire at an average age of 65. The outcome of the demographic crisis is likely to be poor asset returns, rising costs of goods and services, and changing Social Security policies, in a mix that forces the boomer generation to retire, on average, at 70 or a bit older. The solution may include relaxing of immigration policies and encouragement of retiree emigration, but increased savings in the aggregate will not reduce the need for later retirement, because the need arises from a demographic, not a financial or macroeconomic, problem.

We are grateful for the suggestions and counsel of Cliff Asness, Bill Bernstein, Peter Bernstein, Michael Brennan, Max Darnell, Phil Moore, Jorge Schroeder, and Jill Westbrook, to name a few.

Notes

1. The authors are in the latter part of the Baby Boom, so boomers are referred to as "we."
2. The average life expectancy of 76.6 years takes into account many who die before they reach 65. If those who fail to survive to age 65 are excluded, those who reach retirement at age 65 have a *remaining* life expectancy of 17.5 years.
3. Life expectancy has risen faster in the past 50 years than the line to 2050 shows in Figure 1, so this estimate may prove to be conservative.
4. The dependency ratio is the ratio of those who produce no goods or services (and are thus dependent on others) to those who provide the goods and services for all. "Dependents" can be narrowly defined to include only retirees (those above 65) or more broadly defined to include young people and/or disabled people.
5. These figures are the reciprocal of the numbers on the graph. After 2035, the ratio plateaus until 2050 and then starts to deteriorate again.
6. Consider also that the work force does not consist of everyone between 20 and 65. It excludes those who choose not to be part of the paid work force (e.g., the 40 percent of stay-at-home spouses), the disabled, and those who are temporarily unemployed, whether by choice or by circumstance. The full-time work force is not quite two-thirds of the working-age population. So, the ratio is actually worse than we have described.
7. The implications for the real estate market are similarly powerful. How many 60-year-olds with an empty nest at home will want to stay in the five-bedroom, two-story house in which they raised their children? How many of their children will want, given today's smaller families, to buy such a house from them?
8. See Arnott and Ryan (2001) and Arnott and Bernstein (2002).
9. Although the data are incomplete, many retirees in Japan are apparently finding that they cannot stay retired and are reentering the work force.
10. Japan, with its excess of savings and a deficit of consumption, appears to be experiencing this problem.
11. One of the most interesting dynamics today, one that we have chosen not to explore, is what happens when more and more older voters strenuously resist changes to the Social Security "contract."
12. Some demographic studies suggest that the population of Western Europe and Japan will have a median age of 50 or more by 2050. Imagine retiring at age 65 in a society where half of the population is over 50! Imagine relying on imports of goods and services from such a society for the needs of our own retirees.
13. This result held regardless of which dependency ratio we used (retirees to workers, retirees plus youth to workers, or the adjusted ratio of Figure 3, Panel B).
14. This metric is clearly simplistic because it suggests that people could have retired at age 60 in 1950 as easily as they can today at age 65.

References

- Arnott, Robert D., and Peter L. Bernstein. 2002. "What Risk Premium Is 'Normal'?" *Financial Analysts Journal*, vol. 58, no. 2 (March/April): 64–85.
- Arnott, Robert D., and Ronald Ryan. 2001. "The Death of the Risk Premium: Consequences of the 1990s." *Journal of Portfolio Management*, vol. 27, no. 3 (Spring):61–74.