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If Economic Growth Falls to 1.4%, What Happens to the Stock Market?

Answer: 1.5% Average Real Returns in the Next 20 Years, 3.2% in the Next 75.

a report by John Mueller
Senior Vice President and Chief Economist
Lehrman Bell Mueller Cannon, Inc.

for the National Committee to Preserve Social Security and Medicare
Washington, D.C.
October 1997

Summary

Those who seek to "privatize" Social Security -- replace pay-as-you-go retirement benefits with mandatory financial savings accounts -- claim that future returns on financial assets will be much higher than the return on Social Security. The long-term real return on Social Security must equal the rate of economic growth -- which Social Security actuaries project will fall, from 3.2% in the last 70 years to 1.4% in the next 75. The average annual real return on the stock market since 1926, they point out, was 7.4%.

In two separate papers, we showed that, 1. the "privatizers" ignore the existence of volatility risk: adjusted for risk, the average real rate of return on common stocks since 1926 was far below the rate of economic growth; and 2. there are strong theoretical reasons to think that this will always be the case.

The current paper shows that using past market returns to forecast the future requires two extreme assumptions: 1. that Social Security is affected by economic growth, but the stock market is not, and 2. that Social Security is affected by demographic changes, but the stock market is not. The paper shows that the return on the stock market, apart from random variation, is largely determined by precisely the three factors which the "privatizers" ignore: the rate of economic growth, the varying size of generations, and the market's volatility risk. The paper shows how to construct a projection for financial asset returns consistent with the Social Security actuaries' economic and demographic projections. The actuaries' projections imply that the same factors that drove average real stock market returns up to 10% in the past 20 years will drive returns down to about 1.5% in the next 20 years -- almost exactly like the periods from 1901 to 1921, from 1928 to 1948, and from 1962 to 1982. The same projections imply an average real return on the stock market of 3.2% over the next 75 years.

Conclusion: Under any consistent set of assumptions, the average risk-adjusted return on pay-as-you-go Social Security remain far above the average risk-adjusted returns on financial assets.

1100 NORTH GLEBE ROAD, SUITE 1060, ARLINGTON, VA 22201
(703) 243-6955 Fax (703) 841-9146

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1. When Can We Use the Past to Forecast the Future?

Those who seek to end pay-as-you-go Social Security often compare past returns on financial assets with projected future returns on pay-as-you-go Social Security.

In the past, the "privatizers" agree, the average return on Social Security -- about 9% -- was much higher than the average returns on common stocks.[1]

But future returns on Social Security, the "privatizers" argue, will be far lower than in the past. Therefore, they say, future retirees would be better off if pay-as-you-go Social Security were abolished and replaced with financial savings accounts.

If we believed that the future will resemble the past (apart from random variations), then past returns on financial assets would be our best guide to future returns. In that case, we would have to conclude that Social Security will outperform financial assets in the future, because it always did so in the past.

But the "privatizers" insist that the future will be very different from the past. First, they point out, Social Security's extraordinary returns in the past were partly due to the startup of a pay-as-you-go retirement system, which will not be repeated. Second, they say, the retirement of the Baby Boom will result in a sharp decline in the ratio of workers paying taxes to retirees receiving benefits. Finally, they point out, in a "mature" pay-as-you-go retirement system, the average return of benefits from paying payroll taxes is equal to the rate of economic growth -- but the projected demographic bust implies much slower economic growth.

If we accept these assumptions, we can no longer assume that the average future returns on financial assets will equal average returns in the past. Otherwise, we would have to

make at least three[2] peculiar assumptions: first, that Social Security is affected by the rate of economic growth, but financial assets are not; second, that the return on Social Security is affected by demographic changes like the Baby Boom, but financial assets are not; finally, that the return on financial assets is unaffected by the return on alternate investments like Social Security.

2. The Systematic Behavior of Financial Markets

Using past returns to forecast the future requires certain basic assumptions, which are squarely contradicted by the assumptions just described. This renders useless certain techniques (like "Monte Carlo" simulations, which are much in vogue at the moment), because the basic requirement for projecting past financial returns into the future is that the past variation in returns must be random.

Although there is a great deal of randomness in day-to-day and month-to-month variations in asset returns, the longer-term behavior of financial assets over the past century has been quite systematic.

This is obvious, for example, when we consider asset returns in 20-year periods. (The typical family has an average of about 20 years in which its retirement savings can earn a return on investment.[3])

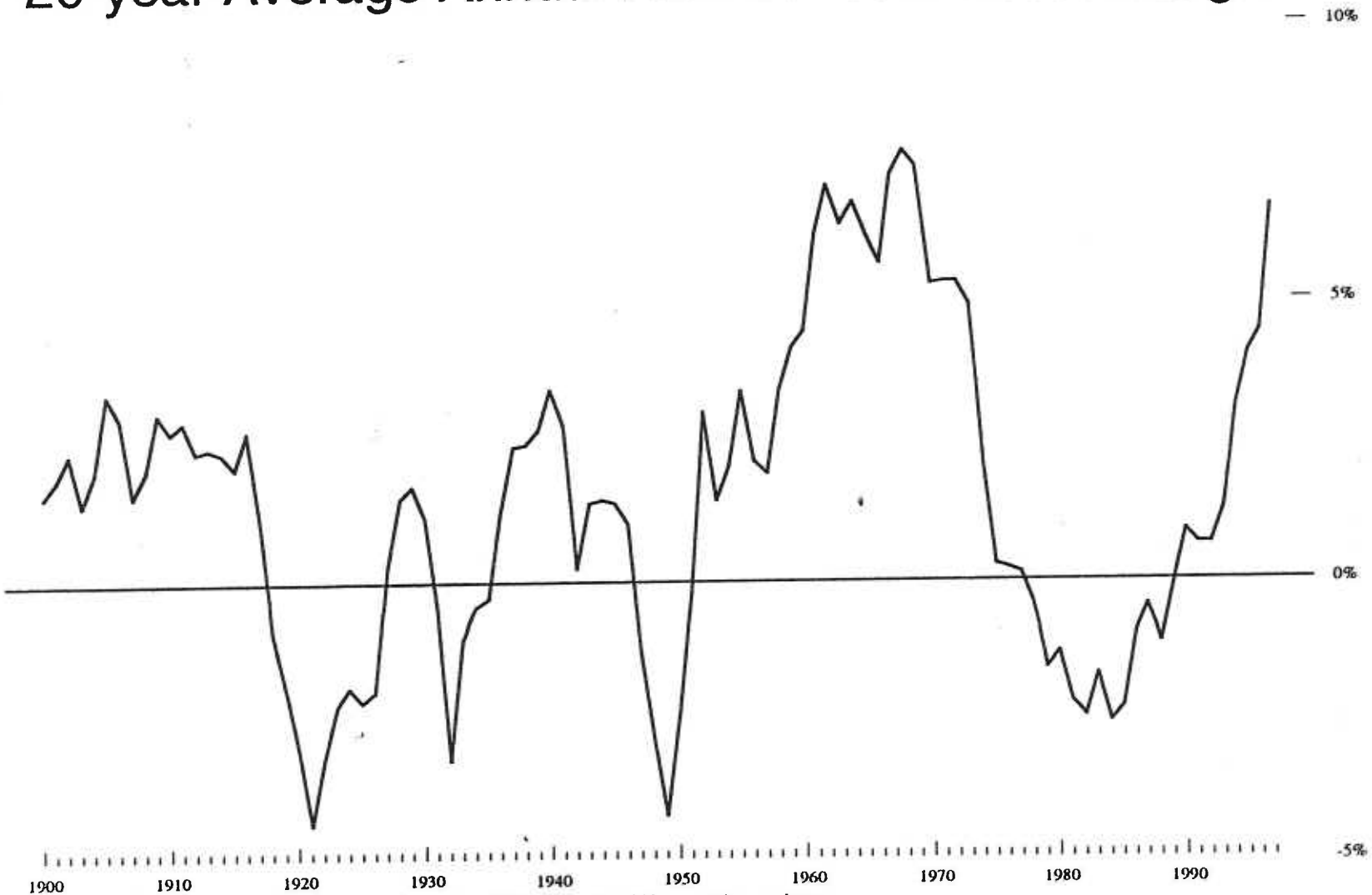
Since 1900, the 20-year average annual real change in the stock market was negative about one-third of the time (Graph 1). And this did not occur randomly, but in four periods of several years each. The 20-year average real total return (that is, the return if all dividends are reinvested in the stock market) fell to about zero during three 20-year periods in the past century -- from 1901 to 1921, from 1928 to 1948, and from 1962 to 1982 (Graph 2). In each case, these lows were interspersed with periods in which stock returns peaked at rates about twice the long-term average -- again for several years at a time.

In other words, there is evidence of a pronounced stock market cycle.

We see a similar non-random pattern in bond returns. Since 1945, the 20-year average annual real return on long-term government bonds was negative almost exactly two-thirds of the time -- in fact, for 33 straight years (Graph 3). During the same half-century, the 20-year average real total return on long-term corporate bonds was negative almost exactly half the time -- for about 25 almost uninterrupted years. Measured net of management fees (but before taxes), corporate bonds also yielded a negative return for 33 years straight (Graph 4).

It's curious that the "privatizers" now ignore all this. Martin Feldstein used to remark rather often about the inordinate length of these financial losing streaks.[4]

20-year Average Annual Real Stock Market Change



Standard & Poor's 500 index (Cowles Commission Index before 1926), deflated by CPI: geometric annual mean.
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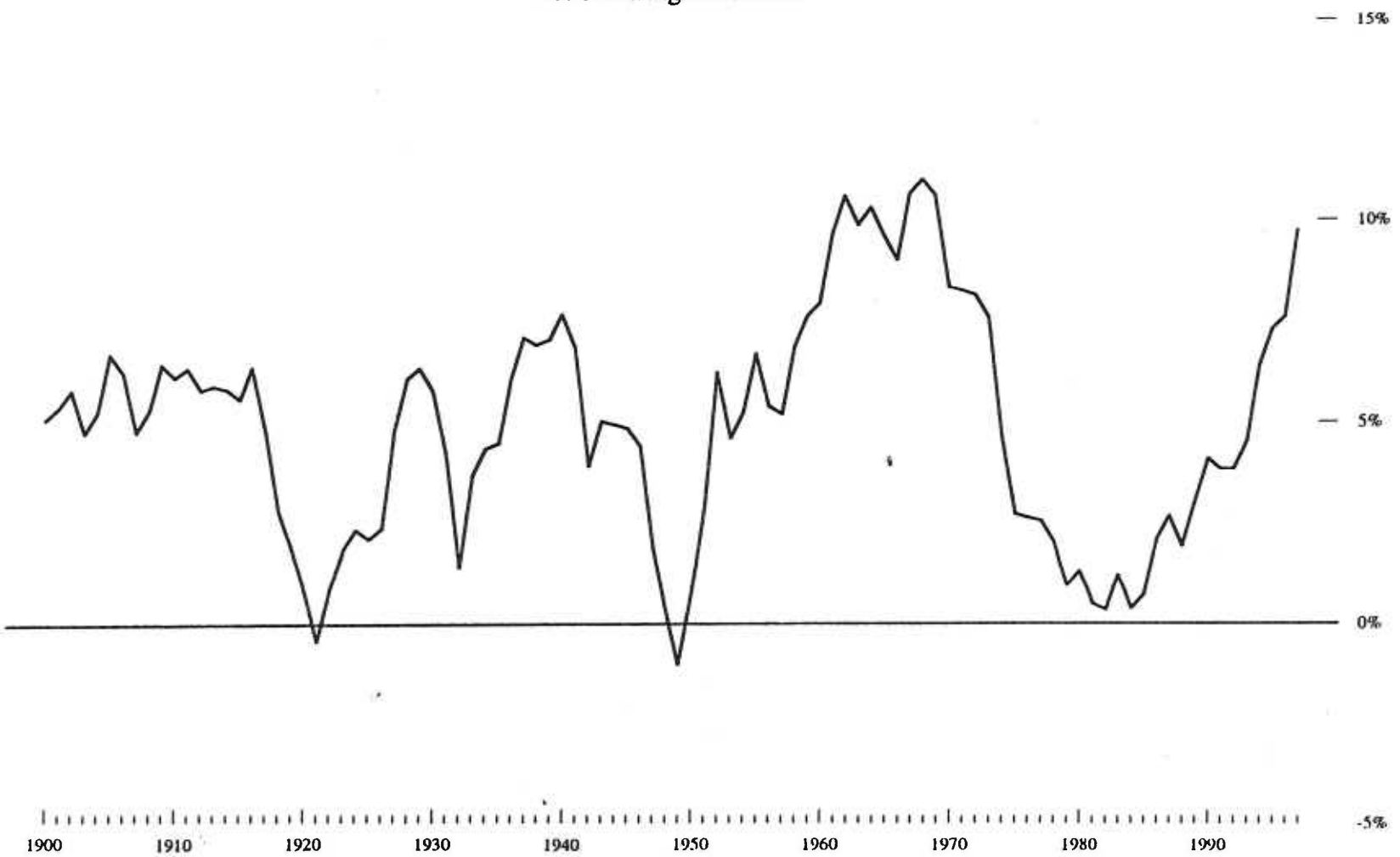
GRAPH 1

Real Stock Market Total Return: 20-Year Annual Average

net of management fees



GRAPH 2

Standard & Poor's 500 index (Cowles Commission Index before 1926), deflated by CPI: geometric annual mean.

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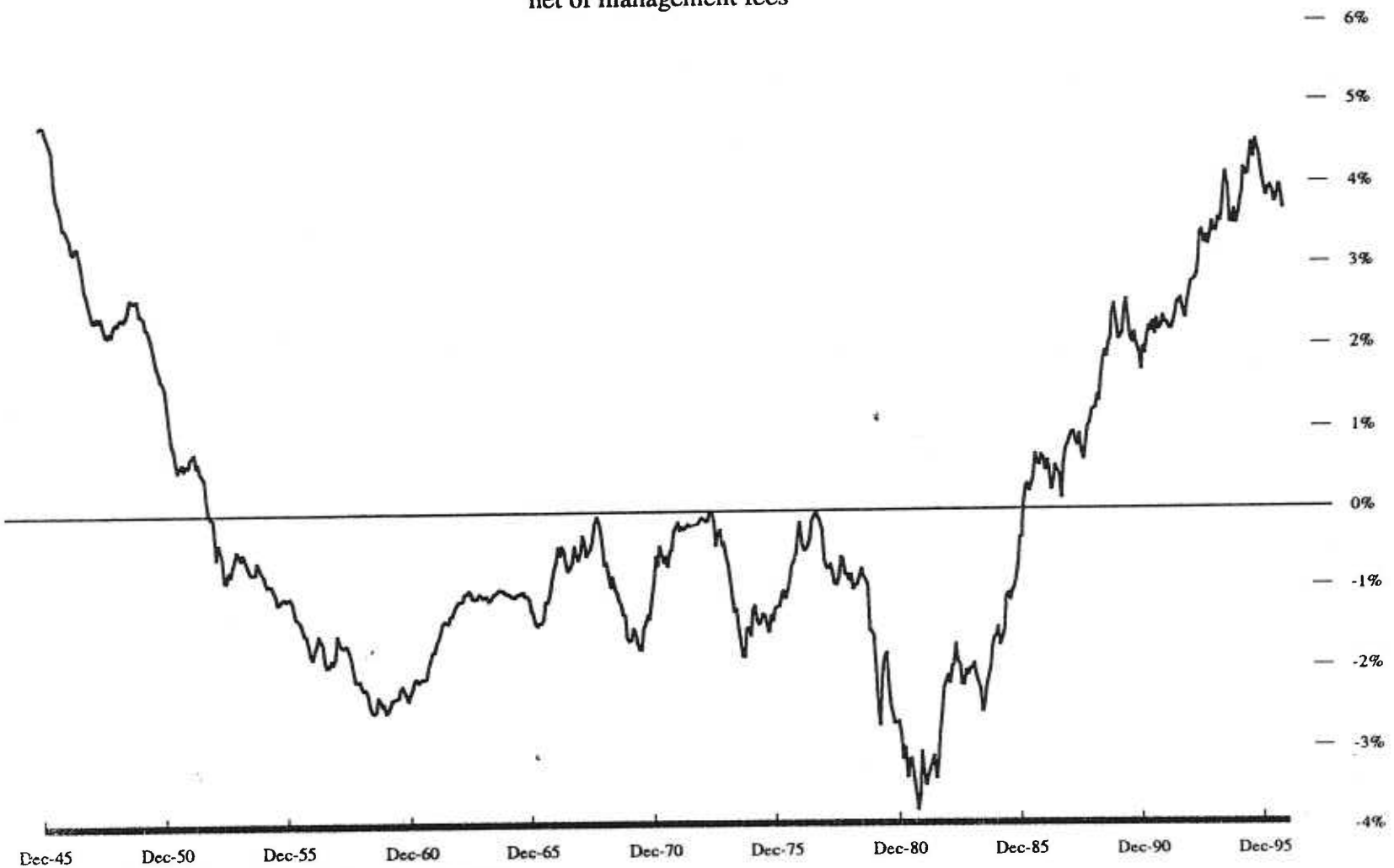
Real Corporate Bond Return: 20-Year Annual Average

net of management fees



GRAPH 3

Source: financial data, Ibbotson Associates; fees, Morningstar, Inc.

CPI-adjusted long-term corporate bond total return, 20-year annual geometric average.

Real Government Bond Return: 20-Year Annual Average

net of management fees

Source: financial data, Ibbotson Associates; fees, Morningstar, Inc.

CPI-adjusted long-term government bond total return, 20-year annual geometric average.

GRAPH 4

Before projecting the past into the future, therefore, we must first account for this systematic behavior. The current paper will show that the non-random long-run return of the stock market is largely a function of three factors: the rate of economic growth, the relative size of subsequent generations, and the stock market's volatility -- precisely the three factors which the "privatizers" ignore.

If future economic growth and demographic trends are as adverse as projected, so will be the performance of the stock market. In the future as in the past, pay-as-you-go Social Security will continue to outperform financial assets.

3. Economic Growth and the Stock Market

Measured by its "standard deviation," the stock market has been about four times as risky as the economy since 1926.[5] Because of people's natural aversion to risk, this higher volatility is the main reason why the risk-adjusted return on the stock market has been much lower than the rate of economic growth.

It might seem, then, that any change in the rate of economic growth would cause the stock market to decline or accelerate by some multiple. But this is not the way things work. Short-term fluctuations of the stock market are a multiple of variations in economic growth. But the long-term influence seems to be almost exactly 1 for 1. We will therefore begin by dividing the total return of the stock market by gross domestic product. This index will show how the stock market performs relative to the economy. It also has the advantage of telling us how the stock market performs relative to pay-as-you-go Social Security.[6]

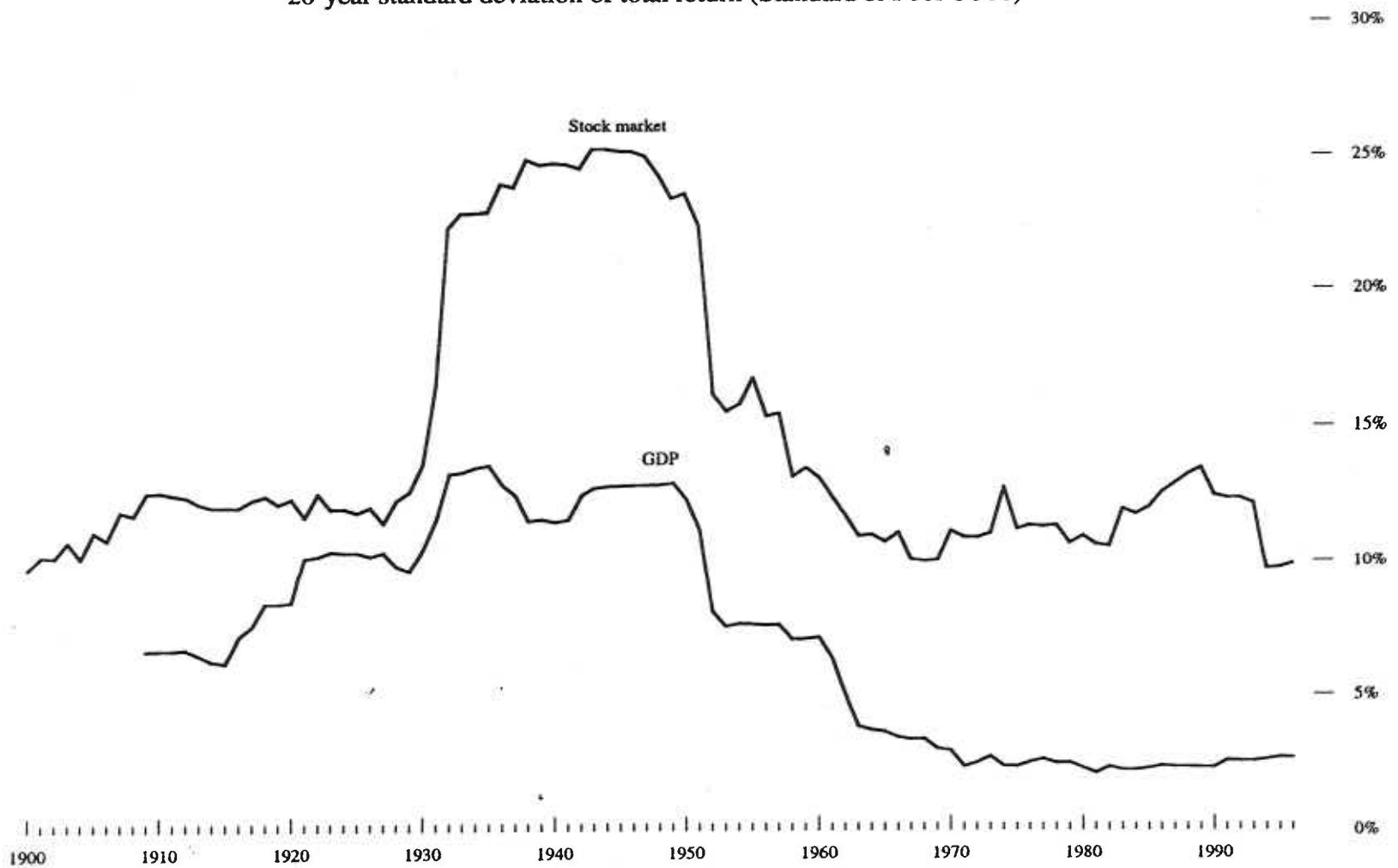
Apart from the pronounced waves which we are trying to explain, the stock market's total return rises relative to the economy at a constant rate of about 2-1/2%. This rate is precisely equal to the risk premium of the stock market vs. the economy, during relatively quiet periods -- the average volatility in stock returns since 1880, excluding the turbulent years between the start of the Great Depression and the end of the Korean War.

Since the Korean War, the annual stock market total return fluctuated about 12 percentage points above or below average; while growth of the economy fluctuated about 3 percentage points from the average. (Graph 5) This difference in "normal" volatility implies that, for the median investor -- someone who is neither terribly conservative nor overly speculative -- the "risk premium" in the total return of the stock market, compared with the economy (or with Social Security), is just under 2-1/2%.[7]

This is interesting but also curious. Standard portfolio theory assumes that higher stock market risk[8] is rewarded by a higher return. That implies that the average rate of return on the stock market ought to be proportional to the average volatility of returns. If so, stock market returns ought to have been higher when the market was more volatile, and lower when the market was less volatile. Exactly the reverse is true. The return on the

Perceived Risk: Stocks vs. GDP

20-year standard deviation of total return (Standard & Poor's 500)



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GRAPH 5

stock market has been sharply lower, immediately after 20-year average volatility was higher than average, and the return was sharply higher, immediately after volatility was lower than normal.

This means that the stock market rewarded investors for what we might call "normal" risk, but penalized those who assumed "abnormal" risk by remaining fully invested in stocks.

The principle is essentially the same as the difference between "systematic" and "unsystematic" risk in the theory of equity diversification. In portfolio theory, the "unsystematic" risk assumed by an investor as the result of failing to diversify his equity holdings (among different companies and different sectors) is not rewarded with a higher return, because such risk could have been avoided. Only the "systematic" risk to which a diversified stock portfolio is subject is rewarded, in this theory.

But the same is true to a certain extent of the stock market as a whole, because equities comprise only one of several alternate classes of financial investments. Exposure to abnormal variations in stock market risk could be avoided by holding less risky assets.

We can get an idea of this shifting among asset classes, in response to perceived changes in stock market risk, by comparing the 20-year average volatility of stock market returns with the short-term interest rates (in this case, the yield on high-quality 6-month commercial paper). Whenever stock market volatility rose above the "normal" average, the commercial paper rate declined, and whenever stock market volatility fell below the "normal" average, the commercial paper rate rose. (Graph 6)

We will consider the effect of "abnormal" risk shortly. For now, we note that when we adjust for GDP growth and for "normal" stock market risk, we find that the total return of the stock market fluctuates in waves compared with the economy. (Graph 7) Most of these waves are associated with demographic changes.

4. Demographics and the Stock Market

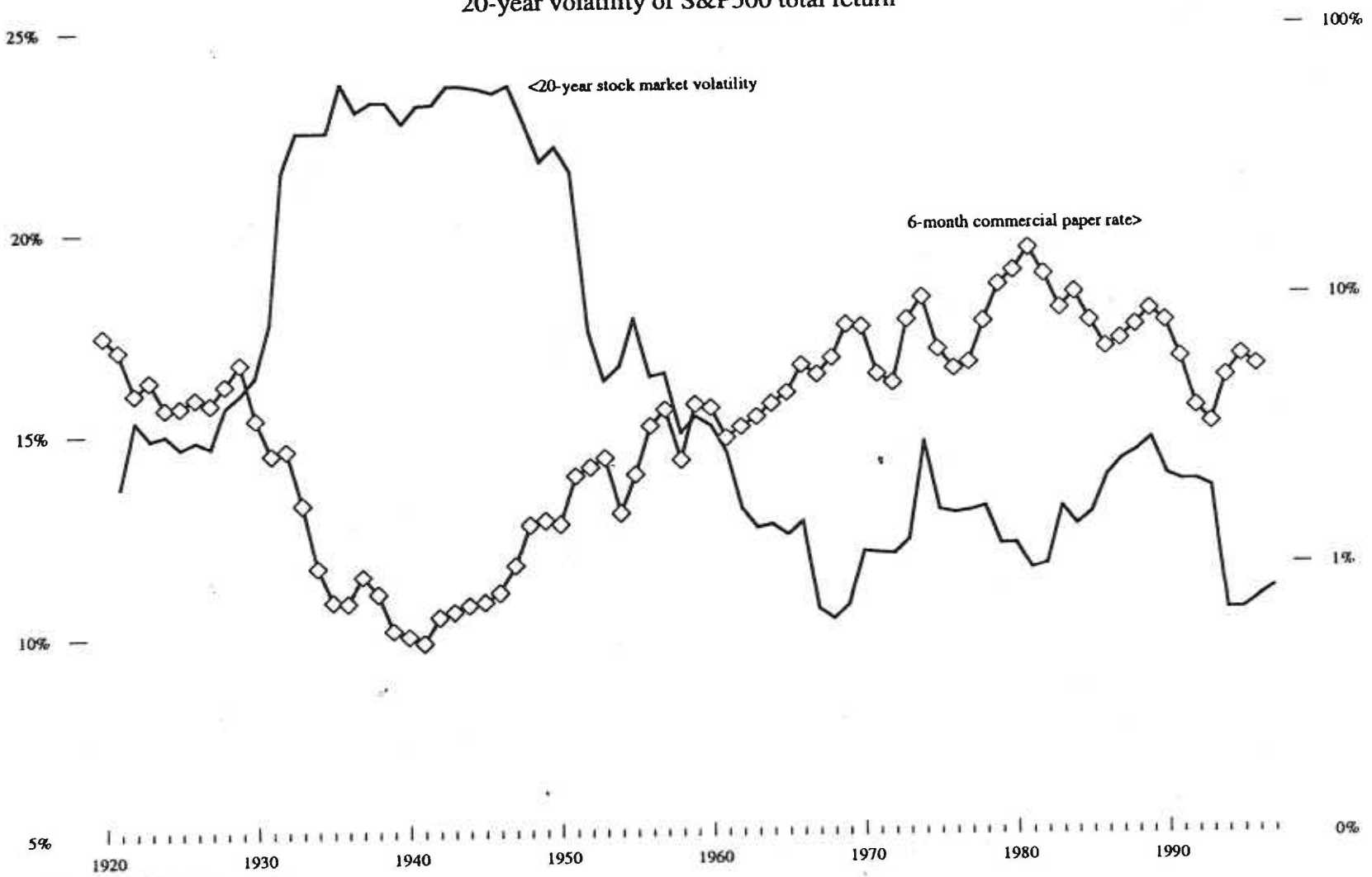
This brings us to the second remarkable assumption of the "privatizers": that the stock market is not affected by the differing sizes of generations.

The omission is curious, because the "privatizers" also argue that the future return on Social Security will be adversely affected by the relative size of the "Baby Boom." With more retirees and fewer workers, they argue, the system will not be able to support growth of benefits at the same rate as in the past.

What they don't explain is why the stock market is not affected by exactly the same demographic changes. After all, there will be fewer workers producing profits, but more retirees trying to live on those profits -- and, later on, there will be fewer investors to sell their remaining assets to.

Perceived Stock Market Risk vs. Short-term Interest Rates

20-year volatility of S&P500 total return



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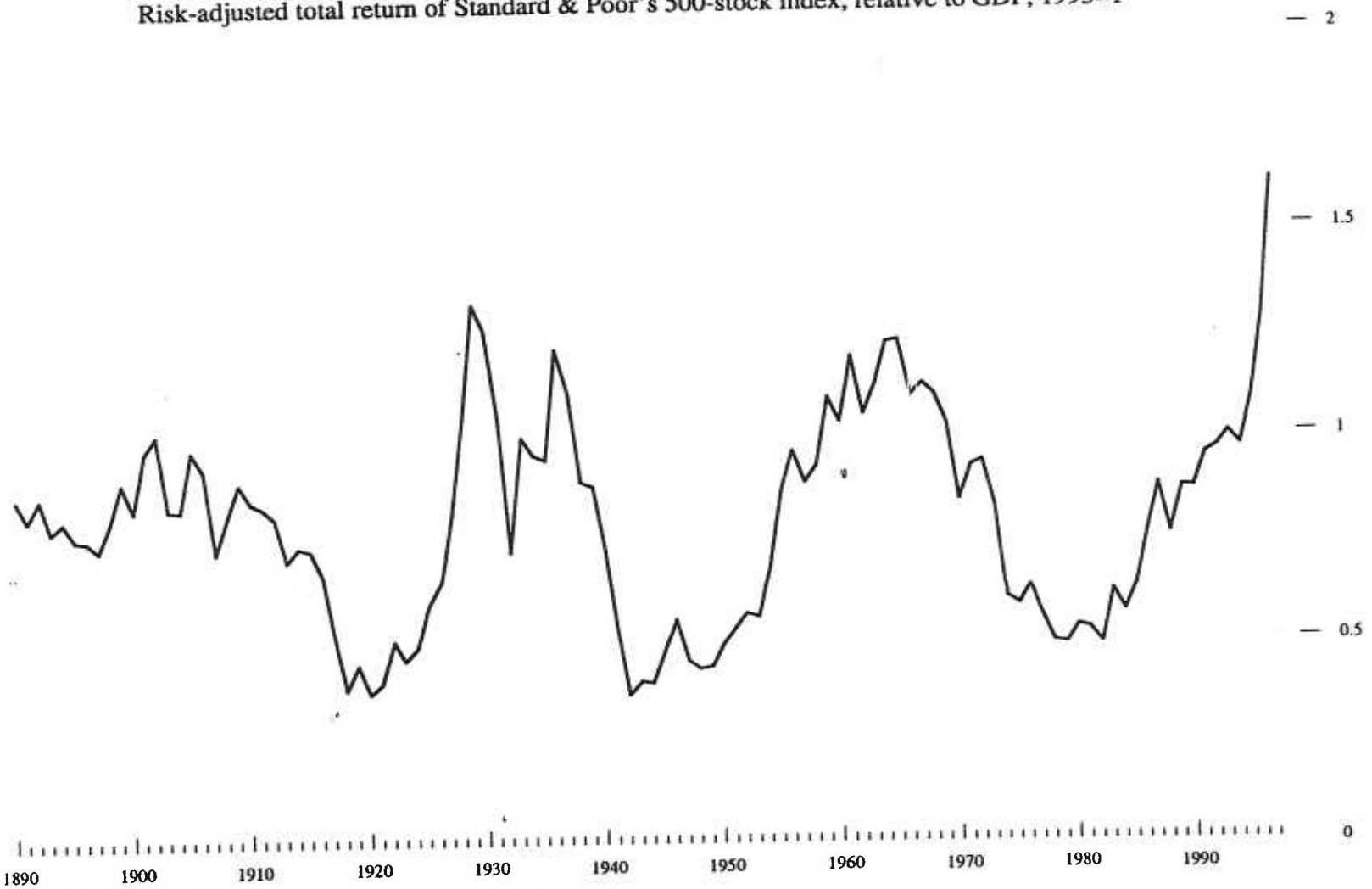
GRAPH 6

Risk-adjusted Relative Stock Market Return

Risk-adjusted total return of Standard & Poor's 500-stock index, relative to GDP, 1993=1



GRAPH 7

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Risk premium derived from normal volatility at 95% confidence level: approx. 2-1/2%.

We can view this demographic reality by comparing the relative size of subsequent generations. A convenient way to do this is to compare the ratio of 44-year-olds to 22-year-olds[9] (Graph 8).

If we compare the risk-adjusted return of the stock market, relative to the economy, with the relative size of successive generations, we find that there is, on average, a one-for-one relation between the two (Graph 9). A smaller generation receives a stock-market return higher than the rate of economic growth, and a larger generation receives a return that is lower. Even the year-to-year correlation between the two has been remarkable since about 1960. From 1962 to 1982, the risk-adjusted stock market underperformed the economy by more than half -- almost exactly the same proportion in which the ratio of 44- to 22-year-olds was falling. Since 1982, the stock market (adjusted for risk) has risen about three times as fast as the economy -- almost exactly the proportion by which the ratio of 44- to 22-year olds was rising.

Generation size, therefore, explains the rest of the trend of the stock market's risk-adjusted total return, relative to GDP (Graph 10). Apart from changes in generation size, the stock market return, adjusted for "normal" risk, has on average been about the same as the growth rate of the economy.

However, this still leaves part of the stock market's ups and downs unexplained. The remaining variation is smaller and has no trend, but is not completely random: it has remained above or below average for several years at a time. Can we explain why?

5. Abnormal Stock Market Volatility and Stock Market Performance

The main reason for the remaining variation in the stock market's total return becomes apparent when we compare this "demographically adjusted" pattern with earlier changes in the volatility of the stock market.

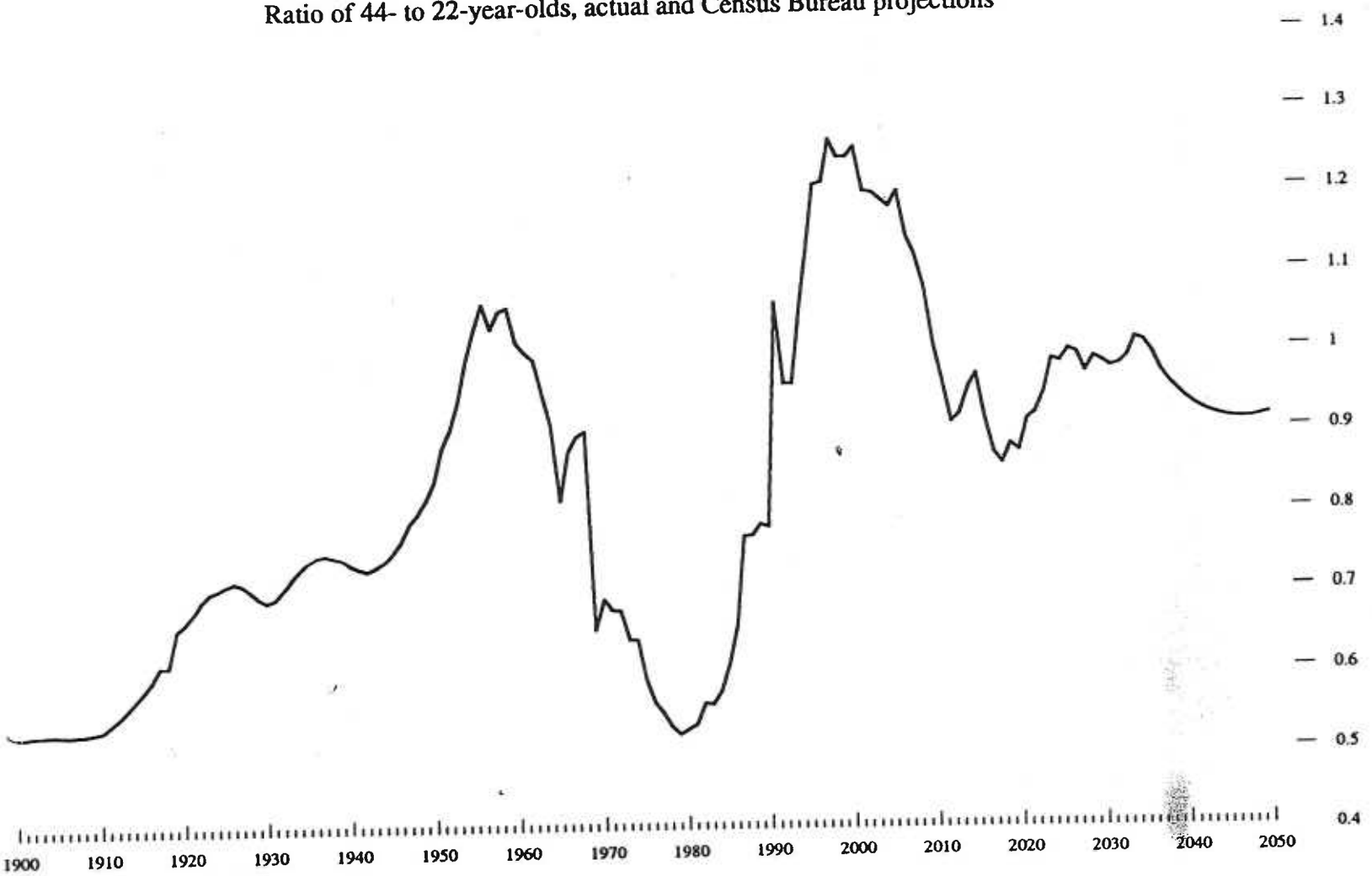
So far we have assumed there is such a thing as a "typical" stock market investor, and that the volatility of the market remains about the same. But in fact investors are not required to invest in stocks, and as we have already seen, the volatility of the market is not constant. (Graph 11)

In fact, investors enter or leave the stock market systematically, and out of or into other investments, in response to changes in "perceived risk" -- approximated by stock market volatility during the preceding generation.

From Graph 12 we can see that the market trades at a premium immediately after periods of lower-than-average volatility, and trades at a discount immediately after periods of higher-than-average volatility. Investors who are not normally in the stock market enter the market when perceived risk is below normal, while the "typical" stock market investor tends to leave the market when perceived risk is above normal.

Relative Generation Size

Ratio of 44- to 22-year-olds, actual and Census Bureau projections



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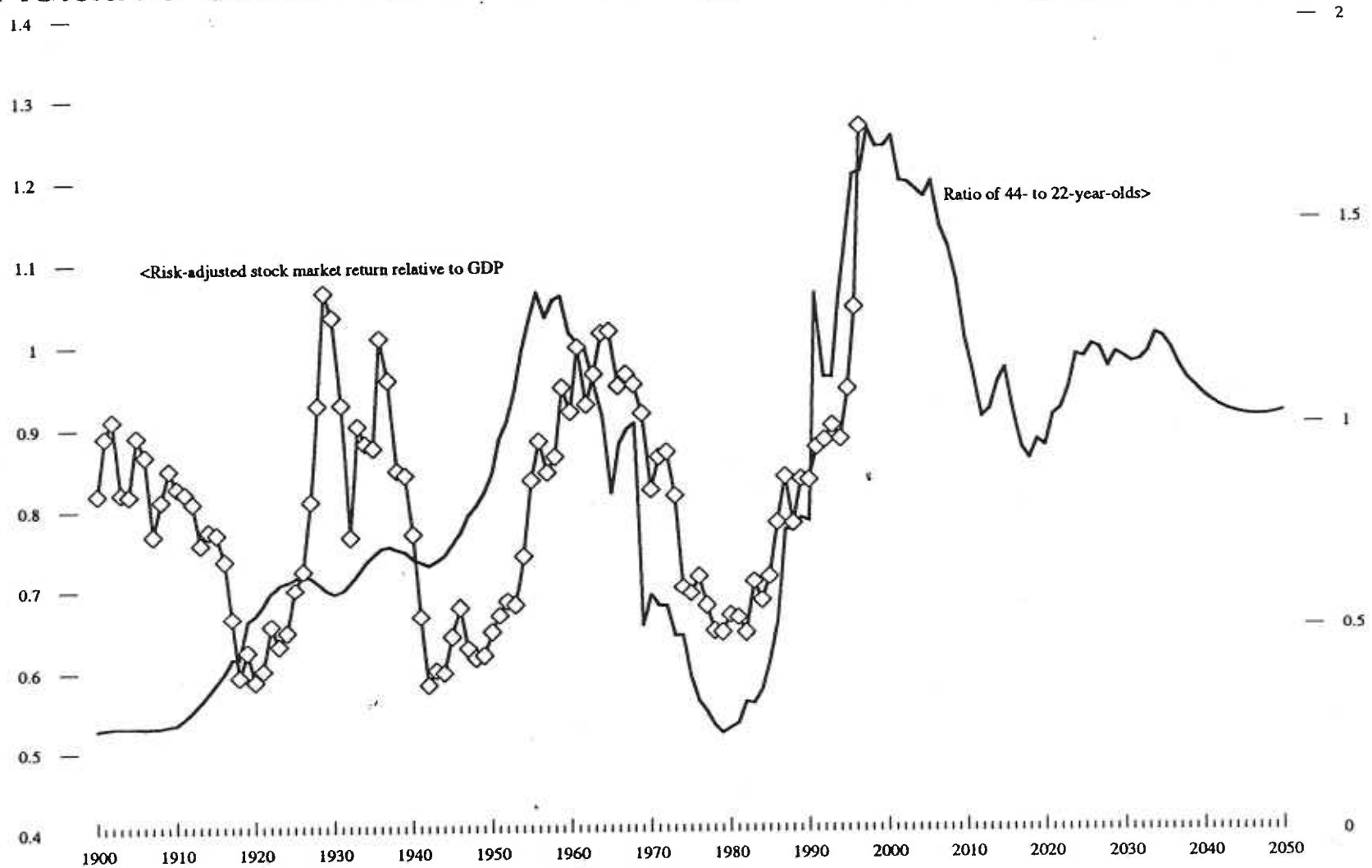
GRAPH 8

Relative Generation Size vs. Relative Stock Market Return



GRAPH 9

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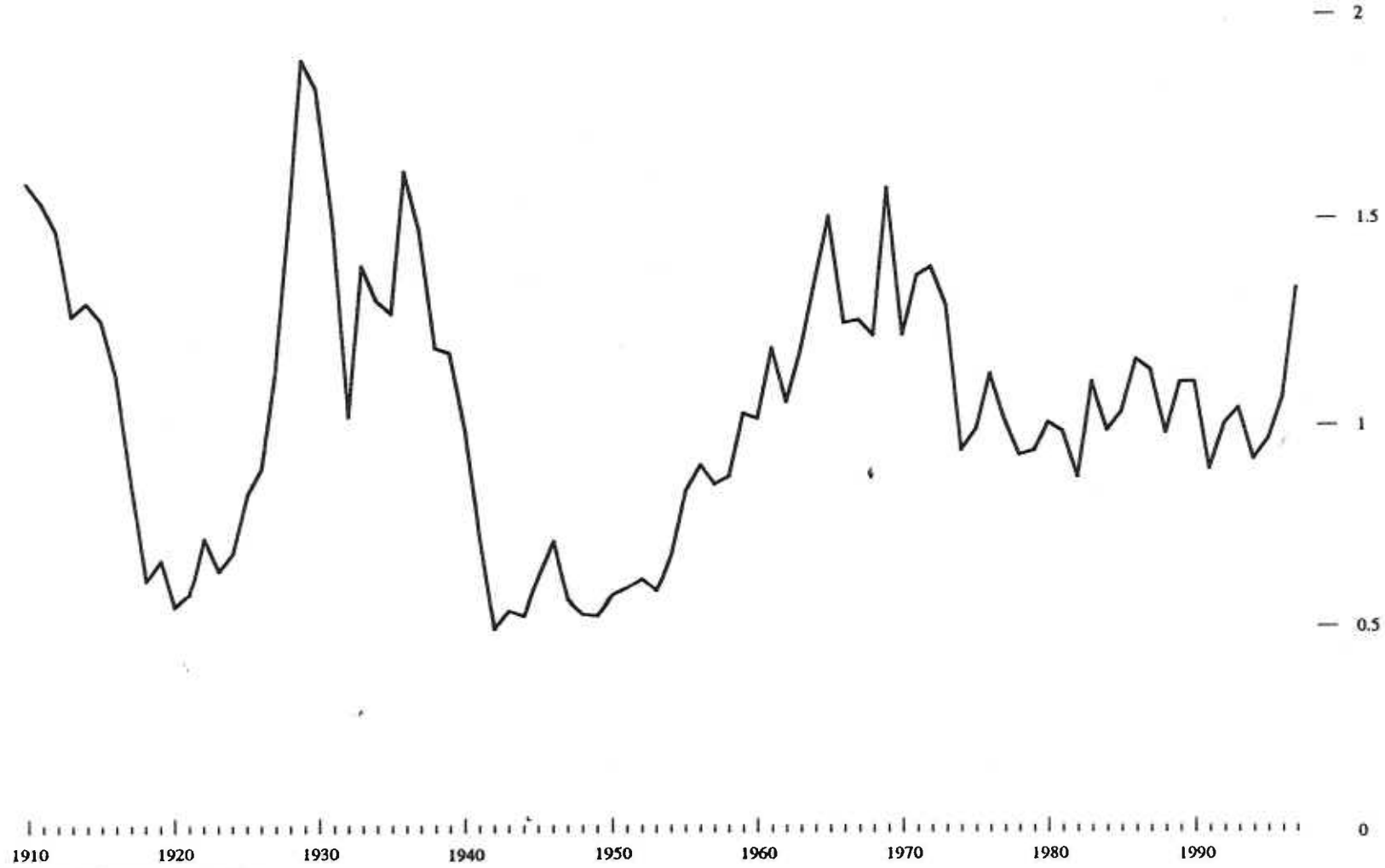
Relative stock market return: S&P500 total return/GDP, adjusted for normal volatility risk, 1993=1; population data: Census Bureau.

Demographically Adjusted Relative Stock Market Return

1993=1



GRAPH 10

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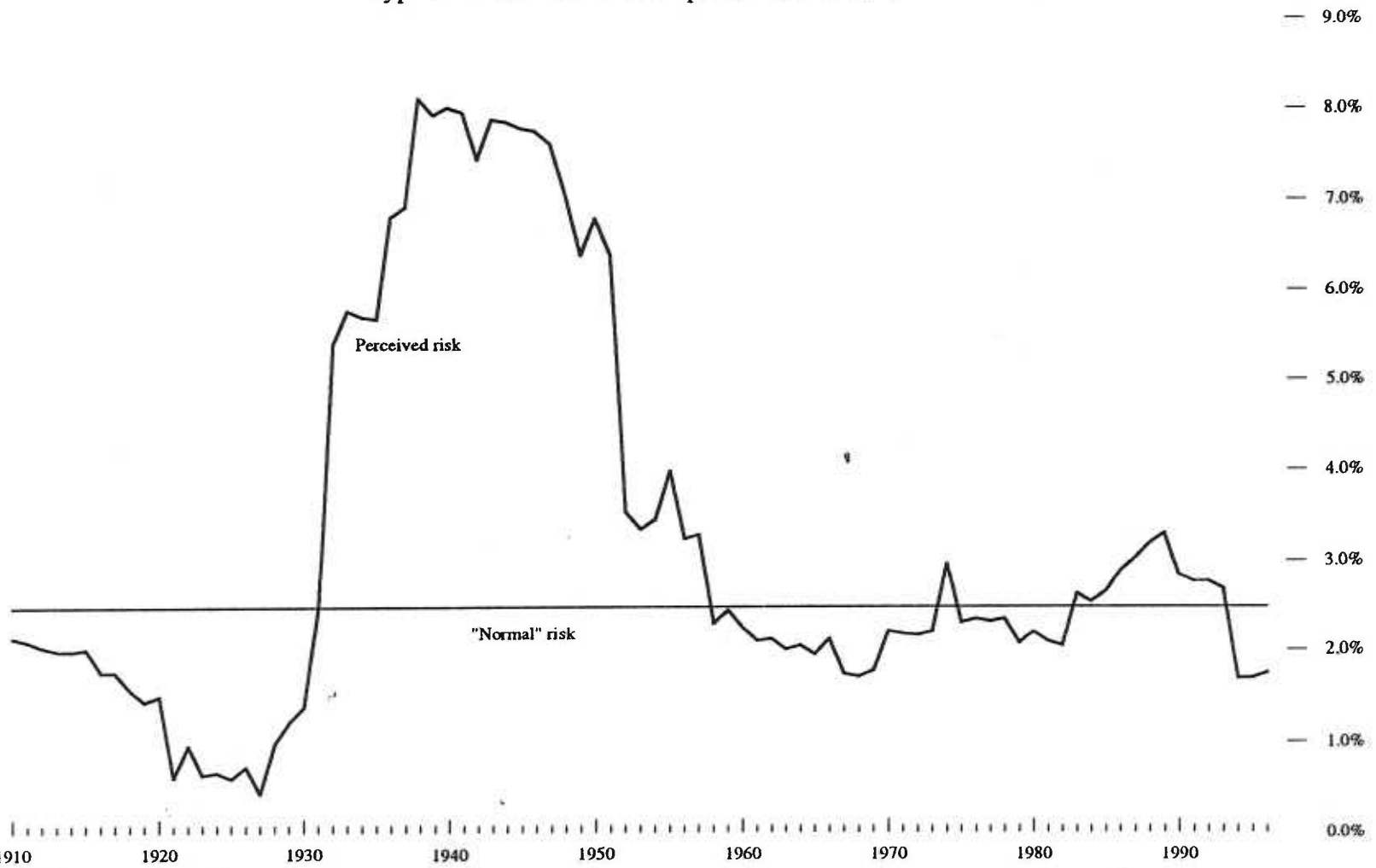
Adjusted stock market return: S&P500 total return/GDP, adjusted for normal risk and generation size

Normal vs. Perceived Stock Market Risk Premium

Typical investor's stock risk premium over GDP



GRAPH 11

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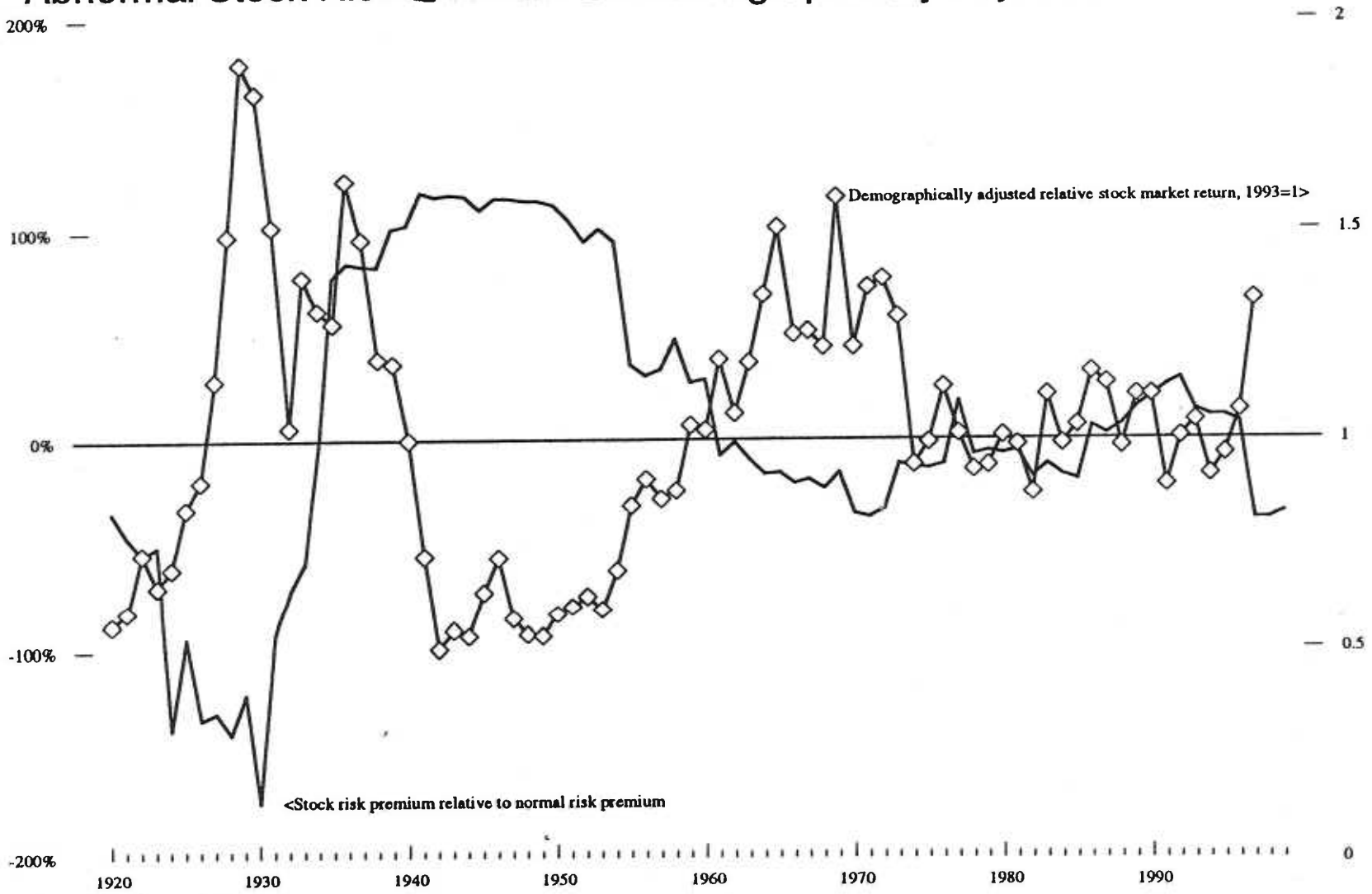
Perceived risk = typical investor's risk premium based on previous 20-years' volatility of S&P500 vs. GDP; normal risk: premium based on constant (approx. 12%) volatility.

Abnormal Stock Risk Premium vs. Demographically Adjusted Stock Return



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Adjusted stock market return: S&P500 total return/GDP, adjusted for normal risk and generation size; 1993=1

GRAPH 12

For example, inexperienced investors flooded into the stock market during the 1920s when its relative volatility was at an all-time low[10]. But even "typical" stock investors left the stock market during and after the Great Depression, when perceived risk hit an all-time high. During the 1990s (as in the 1960s) below-average volatility has drawn more risk-averse investors into the stock market. But such investors, by waiting to buy until volatility had already fallen, have therefore paid a premium proportional to their degree of risk aversion. This implies that, should stock-market volatility rise back even to normal levels, such investors will again be willing to sell at a discount to avoid the rise in perceived risk.

6. 75-Year Stock Market Futures

By combining the factors we have examined -- economic growth, generation size, and stock market volatility -- we can devise a simple model that can tell us about the stock market's likely future performance relative to the economy.[11] Such a model seems able to explain most of the stock market's past variation. (Graph 13).

The evidence suggests that the tremendous rise of the stock market since 1980 is due primarily to the relative rise in the number of Baby Boomers saving for retirement. This has bid up stock prices to the benefit of their parents' generation, which bought stocks while prices were relatively low. A smaller but still significant part of the rise is due to the below-average volatility of the stock market during the last generation. Just as in the 1920s, this decline in volatility has attracted more risk-averse investors into the stock market, because they perceive stock market risk to be lower than the historical norm.

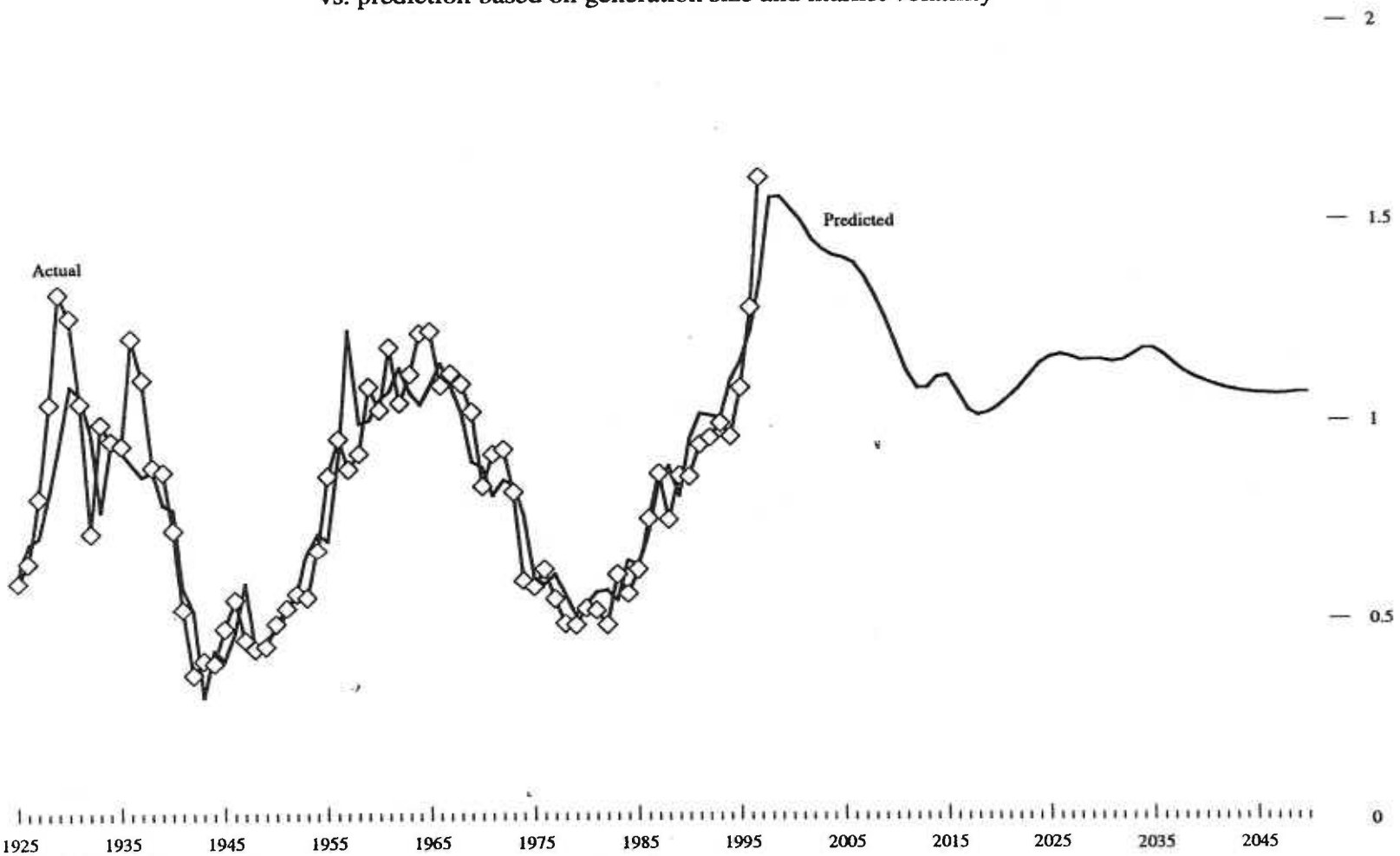
What does this analysis imply for the future performance of the stock market? The same factors imply that the stock market's total return will peak relative to the economy before the year 2000, and decline sharply thereafter. Even if volatility remains at current below-normal levels, demographic projections suggest that the stock market will under-perform the economy by about one-third for the first two decades of the 21st century. If volatility rises above normal, the decline will occur more quickly.

Based on current Census Bureau projections of generation size, the stock market's risk-adjusted relative return should then fluctuate around the lower level -- that is, once again keep pace with the economy -- until at least the year 2050.

From 1926 to 1996, common stocks yielded an average real return of about 7.4%, while real GDP grew at about a 3.2% rate. The Social Security Administration's actuaries project an average real GDP growth of about 1.4% over the next 75 years. Consistency with these assumptions requires that the stock market's real total return should average about 3.2% over the next 75 years. But for the first 20 years, the average real return on the stock market would be much lower than this -- about 1.5%. (Graph 14) This is because most of the adverse demographic trends are concentrated in this period.

Stock Market Return Relative to GDP

vs. prediction based on generation size and market volatility



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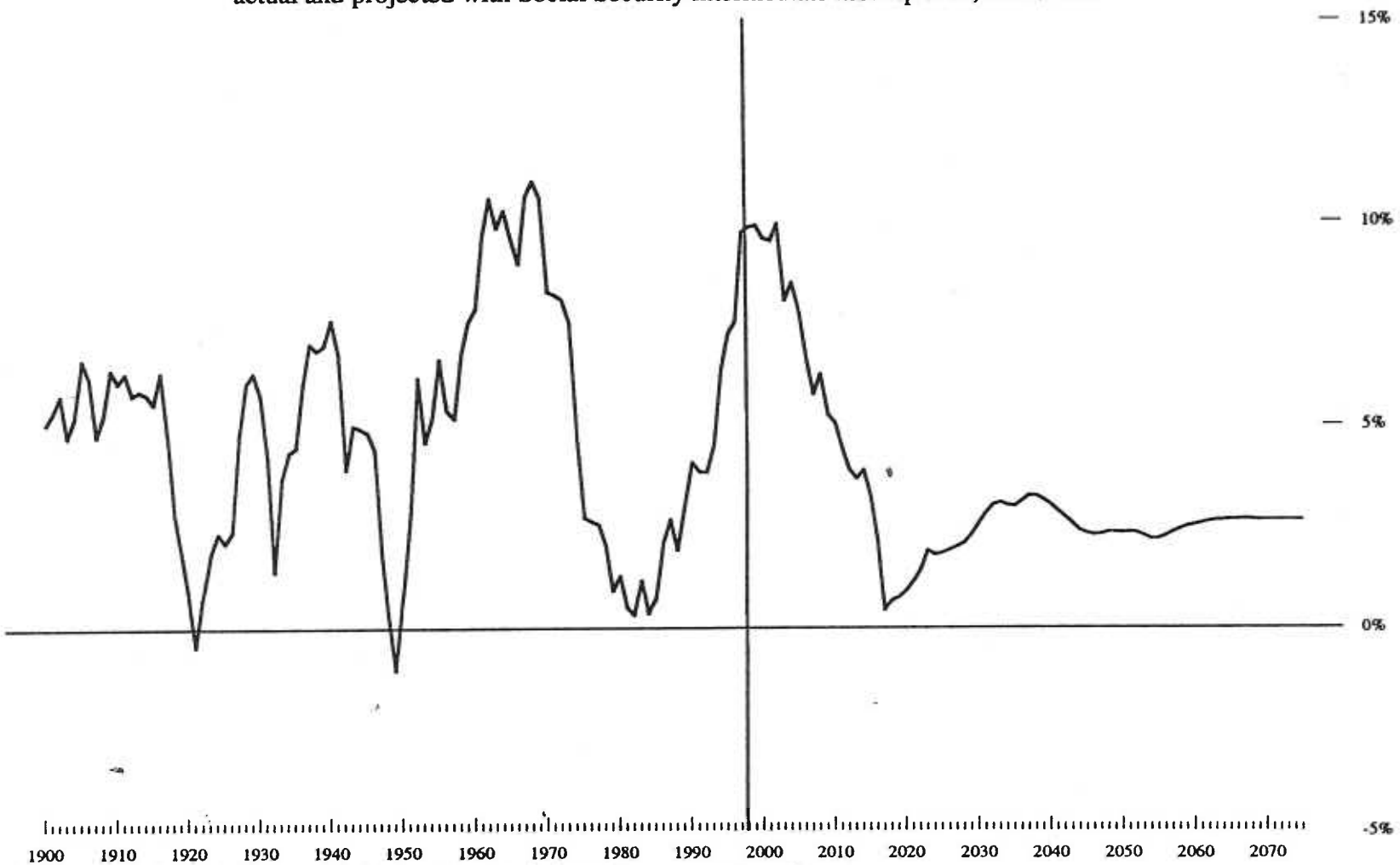
Relative stock market return: S&P500 total return/GDP, adjusted for normal risk; 1993=1

GRAPH 13

Real Stock Market Total Return: 20-Year Annual Average

actual and projected with Social Security intermediate assumptions, net of fees



Standard & Poor's 500 index (Cowles Commission Index before 1926), deflated by CPI: geometric annual mean.

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GRAPH 14

Our analysis also allows us to construct an investment "frontier" -- the probable combinations of average real return and average risk on various investments -- consistent with the Social Security actuaries' assumptions. For any set of consistent assumptions about future growth of GDP and future demographic trends, there must also be a unique and consistent relationship among the returns and risks on different investments, including stocks, bonds and Social Security.

If the rate of economic growth and the average yield of the stock market decline, the yield of every other class of financial investment should also decline. However, the *relative* risks and returns of the various investments available should not change. Treasury bills over the next 75 years are unlikely to yield more than common stocks, for example.

Since the actuaries' projection does not envision another Great Depression, double-digit average inflation, or a world war, we will (perhaps optimistically) assume that the average volatility in the economy and in financial markets will be "normal" -- much lower than from 1926 to 1996, and resembling the much quieter period since about 1950: 3% average volatility for real GDP, and 13% for the inflation-adjusted stock market (in both cases, the lowest risk for the longest period ever observed).

Graph 15 shows the investment "frontier" from 1996 to 2075 under these assumptions. As Graph 16 shows, steady-state Social Security still increases the future return on retirement saving for the typical investor, compared with the choices that would be available under a "privatized" retirement system.

7. Conclusion: Keep Social Security Pay-As-You-Go.

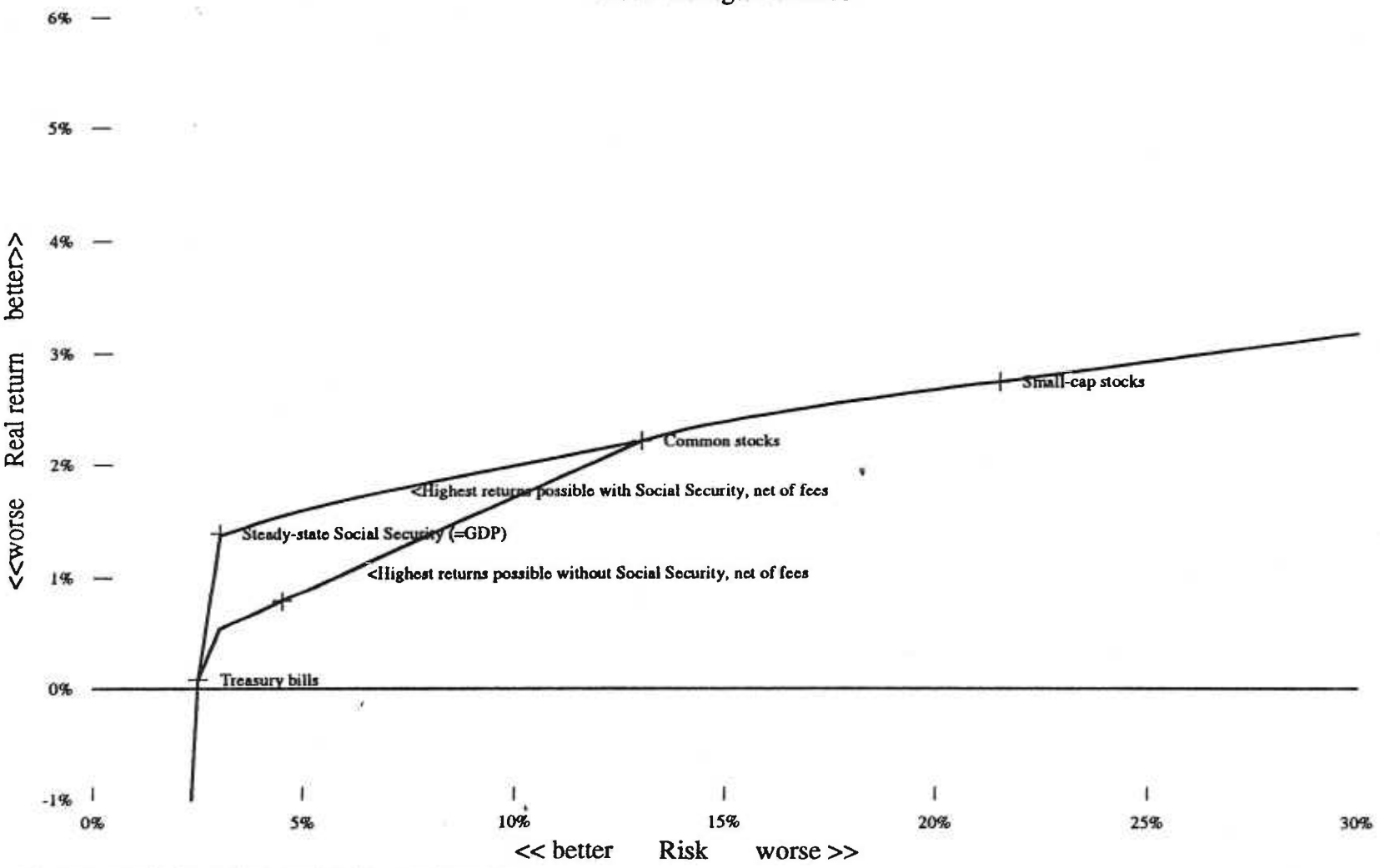
It may seem strange to speak of the stock market's performance over the next 75 years. Yet, as we have seen, it is easier to explain the long-term effect of fundamental changes than to predict year-to-year market fluctuations -- precisely because the long-term changes are systematic, while the short-term changes are more random.

Moreover, a 75-year stock market forecast is necessarily contained in the argument for "privatizing" Social Security. But the forecasts of the "privatizers" are internally inconsistent: their projections for the stock market do not agree with their projections for the economy.

The evidence argues against privatizing Social Security. For those already retired, the benefit "return" on Social Security contributions has been much higher than the return from the stock market. In the future, as long as our assumptions are internally consistent, the total risk-adjusted return on U.S. retirement saving will be higher if the Social Security retirement program is maintained on a pay-as-you-go basis, than if Social Security were "privatized."

Investment Possibilities with and without Social Security: 1997-2075

net of management fees



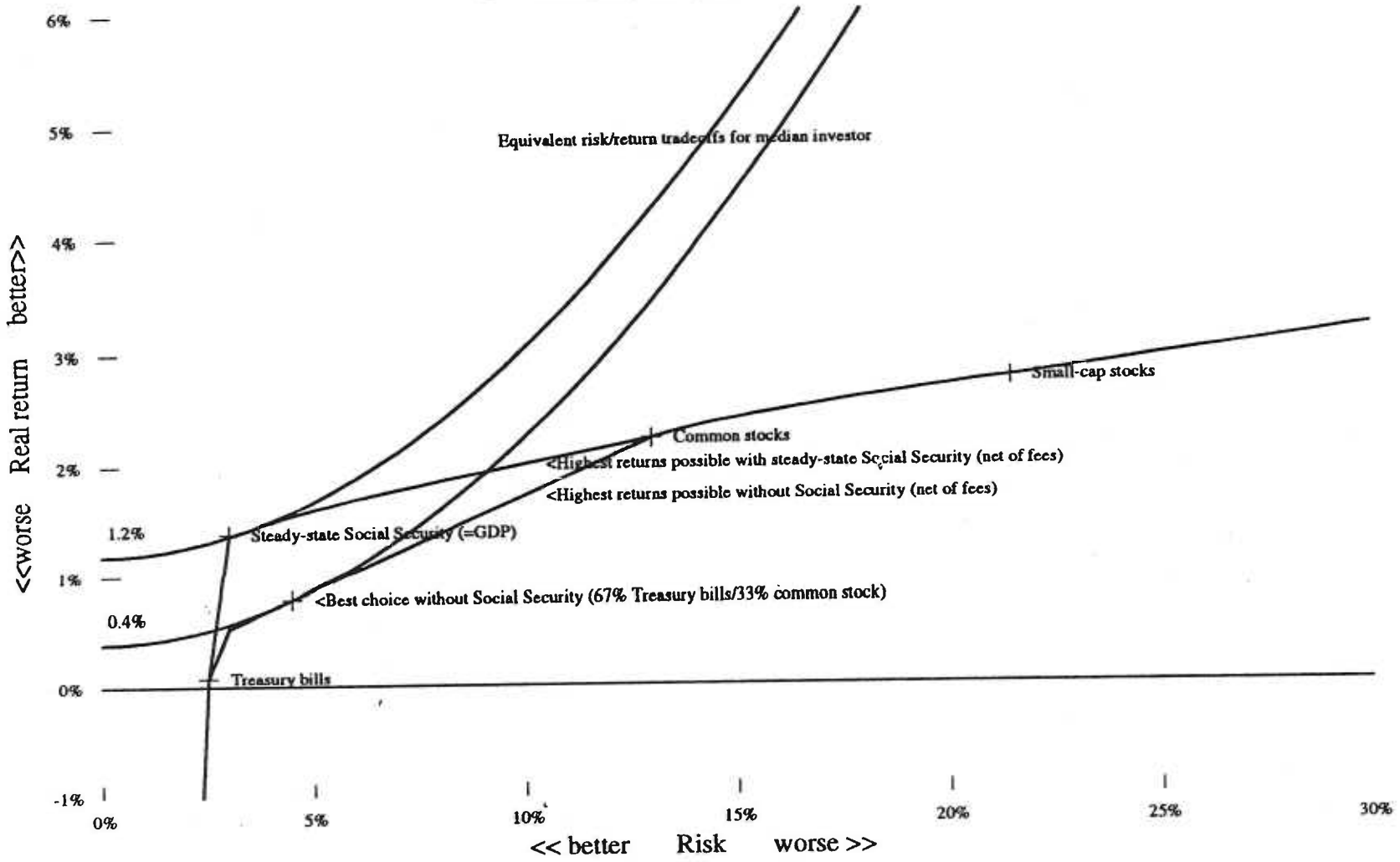
"Efficient frontiers" calculated by Lehrman Bell Mueller Cannon, Inc.

Risk = standard deviation of annual returns; return = CPI-adjusted geometric annual mean

GRAPH 15

How Social Security Raises Risk-Adjusted Returns: 1997-2075

for median investor, net of management fees



Investment frontiers & risk premia calculated by Lehrman Bell Mueller Cannon, Inc.

Risk = standard deviation of real annual returns; real return = CPI-adjusted geometric annual mean

GRAPH 16

Endnotes

1. Duggan et al. (1993).

2. As we noted in two separate papers, the "privatizers" also ignore volatility risk and the existence of "human capital." Their argument also assumes that people are forward-looking in their expectations about Social Security, but backward-looking in their expectations about financial assets.

3. For someone who begins saving at age 25, saves an equal amount each year for 40 years, and retires at age 65, savings will earn a return for an average of 20 years. For most people, most of the saving occurs between the ages of 45 and 65, after children are grown, which shortens the average considerably. On the other hand, part of the saving earns a return after age 65 until it is spent. Hence a 70-year average rate of return would make sense only for someone who retired at age 165, not age 65.

4. As Martin Feldstein observed in 1979: "Last year, the National Bureau of Economic Research released a study of the impact of inflation on the taxation of capital gains. In this study, Joel Slemrod and I looked first at the experience of someone who invested in a broad portfolio of securities like the Stardard & Poor's five hundred securities in 1957, held it for twenty years and sold it in 1977. An investor who did that would have been fortunate enough to have his investment slightly more than double during that time. Unfortunately, the price level also doubled during that time. In terms of actual purchasing power, the investor had no gain at all on his investment. And yet of course the tax law would hold him accountable for a tax liability on this nominal gain." Feldstein (1979), 3.

5. The 1926 starting date is often chosen because the current Standard & Poor's 500-stock index dates from that year. However, a comparable series going back to 1870 was compiled by the Cowles Commission. Where necessary (for example, in calculating "perceived" risk), this paper uses the full series.

6. The point that the return on a mature pay-as-you go retirement system like Social Security is linked to the growth of the economy was first made by Samuelson (1958) and confirmed by Aaron (1966). It is accepted by "privatizers" like Feldstein (1994) and Ferrara (1985). A pay-as-you-go pension like Social Security is linked to labor compensation, which grows at almost exactly the same rate as the economy. However, the return is also affected by changes in aggregate contributions and benefits as shares of the economy and by the relative number of workers and beneficiaries. For an even-handed discussion of the influence of economic and demographic assumptions, see General Accounting Office (1997). The volatility risk for Social Security is a bit lower than for the economy. Social Security is tied to labor compensation, which grows at the same average rate, but vary less than the rest of national income.

7. This calculation treats post-Korean War average volatility of nominal GDP (about 3.1%) and stocks (about 11.9%) as "normal." The "normal" stock risk premium, compared with the economy (or with Social Security), is therefore about $[.5(1.119^2) + .5/(1.119^2)] - [.5(1.031^2) + .5/(1.031^2)] = 2.35\%$. This applies to the "typical" stock market investor, though the average risk premium for all investors must be higher, because many are more risk-averse and don't invest in stocks.

The standard deviation of annual returns on common stocks (measured by the Standard & Poor's 500 stock index) has averaged about 20% since 1926, which would yield a risk premium for the typical investor of about 7%. That by itself would explain the entire difference in return between the stock market and the economy.

However, as we will see, this is not the way the stock market actually works. The 20% standard deviation includes the extremely high volatility during and after the Great Depression. But the stock market has not in fact rewarded abnormally high volatility with abnormally high returns. On the contrary, returns have been abnormally low after volatility was abnormally high, and abnormally high after volatility was abnormally low. The stock market rewards "normal" volatility, but not abnormal variations above or below this level. A reason for this is suggested below: investors systematically alter their portfolios in response to changes in perceived risk, measured by volatility over the previous generation.

8. Actually, the theory distinguishes between "systematic" and "unsystematic" risk. What is being discussed here is "systematic" risk, which means risk that cannot be removed by diversifying one's portfolio. "Unsystematic" risk is risk that can be avoided through diversification, so the market does not reward someone who takes on more "unsystematic" risk -- for example, putting all his money into a single stock -- because such risk could be avoided by holding a number of different stocks, as well as stocks of different kinds.

9. The reason for choosing 22 years is that this is the median age of marriage for women in the past century. The age has fluctuated between 20 and 24 with no apparent long-term trend. Twenty-two years is therefore approximately the biological length of a generation. When women are about age 22, households are formed. From age 22 to age 44, parents devote their resources to raising children. At about age 44, children begin to leave home and parents begin saving for their own retirement. At about age 66, parents begin to retire -- though the retirement age is rising with increases in longevity. Apart from the varying number of births in each year, the relative size of generations is affected by changes in life expectancy and net immigration.

10. The relative volatility declined, not because the volatility of the stock market was lower before the Depression than since the Second World War, but because the volatility of the economy was higher. This is presumably because the economy has diversified over time from agriculture and manufacturing toward services.

11. The model extrapolates the risk-adjusted return of the stock market, measured relative to the economy, based on its past relation to generation size and perceived risk (proxied by actual stock market volatility in the previous 20 years). As Graph 13 shows, the fit is good. In technical jargon, the R^2 is about .85, the t-statistics are highly significant, and the unexplained residual shows relatively little autocorrelation. Assumptions about future generation size are based on current Census Bureau projections, while volatility in the stock market is assumed to remain at current (below-average) levels.

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