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Social Security Reform: The Effect of Economic Variability on Individual Accounts and Their Annuities

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Summary

Whether proposed as a supplement or as a replacement of part or all of Social Security, individual accounts are a major issue in the debate about reforming the program. The debate usually focuses on philosophical and budgetary issues about the nature of the program and its future role, and on how individual accounts could be financed. However, there is another issue that tends to arise late in the discussion: how would such accounts be disbursed? Because of concern that many recipients could exhaust their accounts and end up with inadequate income, it is often stipulated or suggested that individual accounts be converted into a lifetime annuity – a stream of payments that continue for as long as the recipient lives.

Converting individual accounts into annuities, particularly ones that would duplicate Social Security's inflation protection, would create its own issues. Typically, an annuity's value is a function of the account assets, the expected lifetime of the annuitant(s), the rate of return, subsequent inflation, and administrative costs. Existing annuity arrangements usually set the rate of return at an interest rate that is fixed at the time of retirement, and almost never offer full inflation protection. Thus, the value of the annuity is subject to multiple variables, most of which depend on economic circumstances. This report examines the potential variability caused by economic conditions by projecting the value of annuities from individual accounts as a proportion of Social Security benefits promised under current law. It does so by duplicating the year-to-year economic conditions (wage and price growth, interest rates, and the return on the S&P 500 stock index) that occurred in the last 76 years. The annuities examined assume workers would pay 2% of their pay into individual accounts for periods of 10, 20, 30, and 41 years (41 years representing a full career).

The results show that the value of individual accounts is highly sensitive not only to investment performance during the accumulation phase but also, if converted to an annuity, to the rate of interest prevailing at the time of retirement. The greatest disparity in annuity values found in this study is for workers who invested entirely in stocks for 20 years. If the economic conditions were the same as in 1955-1974, their annuities would replace 5.7% of their Social Security benefit. However, if the economic conditions were the same as in 1980-1999, their annuities would replace 39.8% of their Social Security benefit, seven times as much. If, instead, workers invested throughout a full career, the maximum disparity would be less (a factor of 4.3, instead of 7). The degree of volatility would be lower if the interest rate for the annuity were variable instead of fixed. Adding bonds to the portfolio also would help to limit volatility in the values of the annuities, but over any appreciable period of time these values would be lower than those produced by an all-stock portfolio.

These results could be interpreted to support both sides of the privatization debate. Opponents could point out that the substantial volatility illustrates the risks and uneven treatment that individual accounts would impose on Social Security recipients. Supporters could claim that, even though there is volatility, in the large majority of cases individual accounts would provide workers with annuities that would be higher than what Social Security would provide under current law.

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Introduction

Whether proposed as a supplement or as a replacement of part or all of Social Security, individual accounts are a major issue in the debate about reforming the program. The debate is deeply philosophical, as it concerns the fundamental nature and purpose of the nation's primary income replacement system for workers and their families when they retire, become disabled, or die. Proponents of individual accounts stress that the Social Security system is not only facing serious long-range financial problems, but also that its inherent rate of return, i.e., the value of its benefits compared to the value of the taxes paid to support it, is very low compared to the value of the benefits that would be provided if those taxes were invested directly in financial markets. Opponents dismiss this "moneysworth" argument as irrelevant to the basic social purposes of the program and maintain that creating individual accounts would be too costly, too risky and would benefit mainly the financially better-off.

There is much literature on these philosophical issues.[1] There is also ongoing research into the practical issues involved in creating and administering individual accounts.[2] A less-studied issue that blends philosophical and practical considerations is how the proceeds of such individual accounts would or should be disbursed.

Ordinarily, retired workers have a choice of how to receive income from arrangements that accumulate savings for retirement. For example, they can choose to receive a lump sum or periodic payments from a defined contribution pension plan or an Individual Retirement Account (IRA). However, Social Security was designed as a "social insurance" system that provides benefits that do not directly represent personal savings but, provided eligibility requirements are met, are a right to a monthly stream of payments for as long as an eligible recipient lives. Furthermore, unlike private assets, by law Social Security benefits receive annual cost-of-living adjustments that maintain their purchasing power. Thus, supporters of Social Security maintain that it provides a reliable bedrock of protection that is not eroded by inflation or ever depleted, thus reducing poverty, and its demeaning consequence of reliance on welfare, among the elderly. The concern expressed by these supporters

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[1]For example, see CRS Issue Brief IB98048, *Social Security Reform*, by Geoffrey Kollmann; and GAO Report AIMD/HEHS-00-29, *Social Security: Evaluating Reform*.

[2] For a discussion of these issues see GAO Report HEHS-99-122, *Social Security Reform: Implementation Issues for Individual Accounts*.

is that individual accounts could not provide similar protection, as people could outlive the assets in their accounts because of poor or unlucky financial management, inflation, or underestimation of their lifespan. In response to this concern, an approach included in many privatization proposals is to mandate that the value of the account at retirement be used to purchase an annuity that would provide a monthly benefit for the rest of the recipient's life.[3]

While annuitization might address the philosophical question of how to protect recipients from the risk of outliving their assets, it raises some practical issues. The level of the "annuity" Social Security provides is defined in law and is indexed to inflation. Annuities provided in the private sector generally are not indexed to inflation, and the amount of the annuity is dependent on demographic[4] and economic factors. The economic factors are the value of the account and the prevailing rate of interest on the date of annuitization, and the rate of inflation experienced after retirement. All else held equal, the variations in these economic factors can cause significant differences in the value of the annuities recipients could receive from individual accounts.

The purpose of this paper is to focus on the effect of economic variability on individual account annuities. In doing so, it takes no position on individual accounts. Rather, it attempts to portray the range of effects that economic variability could have on the annuities individual accounts could provide.

This analysis uses a model that CRS developed to calculate the value of Social Security benefits under current law and potential individual account balances and their annuity values. Both types of calculations are dependent on economic factors, such as wage and price levels, and the rates of return on investments. Both also are affected by demographic factors, such as the probabilities of survival for different age cohorts. In order to use an extant annuity system as an example, the report examines the design and features of the Thrift Savings Plan (TSP) available to federal workers. The TSP is cited by proponents as an exemplar of how individual accounts could be administered.[5]

The economic factors on which the value of an annuity is dependent are variable to an unknown degree. For purposes of analyzing the effects of Social Security reform, the accepted convention is to use the demographic and economic assumptions contained in the intermediate projections of the Social Security Board of Trustees, and the CRS model uses them accordingly. In one sense, it is almost imperative, because the Trustees' intermediate projection is the yardstick that Congress traditionally uses to judge not only the financial condition of the Social

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[3]Ten of 15 Social Security reform bills in the 106th Congress, and eight of the nine introduced in the 107th Congress, proposed that all or part the disbursements from individual accounts be in the form of an annuity.

[4]The rate of mortality is particularly important because the cost of an annuity depends in part on how long a recipient can be expected to collect benefits.

[5]Four of the Social Security reform bills in the 106th and 107th Congresses state that the annuitization of individual accounts should be in accordance with requirements applied to the federal Thrift Savings Plan.

Security program, but also the effect of reform measures on the program's cost. However, beyond the first few years, the Trustees' intermediate assumptions for future economic conditions settle into a constant pattern and do not reflect the year-to-year variability that inevitably would occur. Thus, using the Trustee's long-range assumptions to project the effect of individual accounts, and of the annuities potentially payable from them, gives no indication of the effect economic variations would have on account and annuity values.

There is no clear standard by which to predict future variations in economic conditions. To postulate one would be subjective, and could be open to criticism that the choices made were designed to prove a particular point. However, there is one way to restrict these choices, and that is to replicate year-to-year economic conditions that occurred in the past. The past obviously does not predict the future, but it does represent what is possible because it actually happened. Therefore, to give an indication of the possible effects of economic variations on individual accounts and the annuitization thereof, this report examines what would happen if economic conditions during different historic time periods were to recur in the future.[6]

This method has been used by others to support both sides of the privatization debate. Proponents of individual accounts tend to point out that historically the stock market has outperformed other investments and maintain that, if workers' Social Security taxes had instead been invested in a broad stock portfolio, they would have provided much higher benefits than provided to Social Security recipients today. Opponents tend to point out that investment in the stock market carries risk and that its performance has been inconsistent, illustrating that the value of the amount accumulated in an individual account would have varied widely because of vagaries in the past performance of financial markets. This report uses these historical approaches by modeling the effect of economic performance not only on the annuities produced by these accumulations, but on Social Security benefits as well. This procedure allows the value of the account annuities to be measured relative to current-law Social Security benefits, so that the variations in the value of the annuities are portrayed not only as matters of degree but also as the extent to which the annuities would supplement or replace current-law Social Security benefits.

Comparisons of individual accounts to Social Security naturally tend to focus on the effects on workers who have contributed to the account throughout their career. However, if a system of individual accounts were created, there would be a long period during which older workers would not have much time to contribute to the accounts. To show the effects of shorter time periods over which to pay into an individual account, this paper illustrates what annuities could be if workers paid 2% of their pay[7] into individual accounts for periods of 10, 20, 30, and 41 years (41 years representing a full career).

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[6]This approach is similar to one used by Gary Burtless in 2000. See Burtless, Gary. *Social Security Privatization and Financial Market Risk*. Center on Social and Economic Dynamics Working Paper No. 10, February 2000, available at [www.brookings.org]. The results presented in this report are consistent with those portrayed in Mr. Burtless' paper.

[7]This percentage is often specified in reform proposals and was suggested by the President in his 2000 campaign.

Background

Social Security has projected long-range funding problems. According to the latest estimates of the Social Security Board of Trustees, in 2041 its trust funds will be depleted. At that point its incoming tax receipts would be sufficient to cover only 73% of its benefits and even less in later years.[8] The actual fiscal pressure Social Security will place on the government will arise sooner, in 2017, when Social Security's annual tax revenue begins to lag its annual cash outlays.

The primary reason for this long-term trend is demographic: increasing life expectancy and low birth rates are creating an older society. The looming retirement of the post-World War II baby boom will accelerate this aging process. By 2025 the number of people 65 and older is predicted to rise by 74%. In contrast, the number of workers whose taxes support the system is projected to grow by only 14%. As a result, the ratio of workers supporting each recipient is projected to fall from 3.4 today to 2.3 in 2025.

In response to these projections, an assortment of measures designed to solve the financing problem have been proposed by various authors, commissions, think tanks, and lawmakers. Many of these proposals include the creation of personal accounts as a supplement to or partial replacement of Social Security. Their proponents say that individual accounts would give workers more ownership and control of the assets they will need in retirement and would produce a higher value than the Social Security benefit the accounts would supplement or replace, because the rate of return would be substantially higher than that provided by the current Social Security system.

These proposals often provide for placing these assets in the stock market, usually in funds indexed to reflect the overall rate of return for a broad portfolio of stocks, such as the Standard and Poor's (S&P) 500.[9] Because over long time periods stocks have produced a high overall return, standard portrayals of the value of individual accounts projected over a worker's career usually show impressive accumulations by the time a worker retires. For reasons mentioned in the introduction, many proposals provide that these accumulated assets be annuitized.

What Is an Annuity?[10]

An annuity, from the Latin *annuus,* meaning yearly, is an amount payable yearly or at some other regular interval over an agreed-upon period of time. In the current context, an annuity is the product of a contract between an individual and an insurer (e.g., an insurance company or the government) in which the individual purchases the

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[8]Intermediate projections of the *2002 Annual Report of the Board of Trustees of the Old Age, Survivors, and Disability Insurance Trust Funds*, April 9, 2002.

[9]One of the two stock-index funds offered by the federal TSP, the "C fund," is indexed to the S&P 500.

[10]The following description borrows in part from a report by the Congressional Budget Office entitled *Social Security Privatization and the Annuities Market,* February 1998.

right to a stream of future payments. A "life annuity" provides payments for as long as the annuitant lives, thus insuring that the individual will never be without income. The insurer assumes the risk that the person will live a long time, but can do so by pooling many annuitants together, thereby offsetting the probability that some annuitants will live longer than expected with the probability that some will die sooner than expected. Private insurers also charge a premium to account for risk and to provide a profit.

There are different types of life annuities. Annuities can be purchased to protect only the individual (an individual annuity) or to protect a spouse if the individual dies first (a joint annuity). The amount of the periodic payment can be fixed or variable. A fixed annuity guarantees a constant payment amount. A fixed "graded" annuity provides a guaranteed minimum payment that increases by a set percentage each year, and is usually used as a hedge against inflation. An "indexed annuity" provides a payment that is periodically adjusted to reflect the actual rate of inflation. Social Security, with its annual cost of living adjustments, is an indexed annuity. Heretofore, indexed annuities have been virtually unavailable in the private sector.[11] Variable annuities provide payments that rise and fall over time based on the performance of the portfolio in which they are invested. Sometimes they guarantee a minimum payment with the possibility of an additional benefit payment that depends on the portfolio's performance.[12]

The cost of purchasing an annuity depends on several factors: the rate of return the insurer expects to receive on its investments; the probability of annuitants surviving in each subsequent year; the cost of administering the annuity accounts; and the profit sought by the insurer. However, in the context of Social Security reform, the issue would not be phrased in terms of the costs of purchasing an annuity, but rather, given the value of a personal account at the time of retirement, what monthly benefit would the annuity provide?

Rates of return are inherently uncertain. Generally, higher returns are associated with higher risk. Private insurers tend to minimize that risk by investing in bonds, mortgages, and real estate, and the internal rates of return of annuities generally reflect the long-term corporate bond rate.[13] There is also a degree of uncertainty in future mortality rates, especially as they are dependent on the characteristics of the particular annuitant population. Administrative costs are basically the overhead associated with advertizing, managing assets, labor costs, customer service, etc.

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[11]Lincoln National Life Insurance Company recently began to offer an inflation-indexed single premium immediate annuity, called "Inflation Proofer."

[12]Perhaps the best-known examples of variable annuities are those provided by the Teachers Insurance and Annuity Association – College Retirement Equities Fund (TIAA – CREF).

[13]Warshawsky, Mark J. The Market for Individual Annuities and the Reform of Social Security. *Benefits Quarterly*, third quarter 1997.

How Does the Federal Thrift Savings Plan Annuitize Benefits?

The federal Thrift Savings Plan (TSP) is part of the retirement program provided to federal employees. It is similar to defined contribution pension plans established under Section 401(k) of the Internal Revenue Code that allow employees to save part of their earnings on a tax-deferred basis. It is important to note that the TSP does not serve as a substitute for Social Security, but as part of two different federal retirement plans, both of which also include a defined benefit[14] pension component and, for one of those plans, Social Security as well.

Federal workers have their choice of five funds in which to place their TSP contributions. One, the "C fund," which often is proposed as a model for investing individual accounts in the stock market, is indexed to the S&P 500. Since its inception in 1988, the C fund has tracked the performance of the S&P 500 very closely.[15]

When federal workers leave the government, they have several ways to withdraw the amount accumulated in their TSP accounts. One is to receive a life annuity. As mentioned earlier, many of the Social Security reform proposals that feature individual accounts provide that upon retirement the accounts be annuitized in a manner similar to the TSP.

The manner in which the TSP provides an annuity is to purchase it from a provider. Currently, that provider is Metropolitan Life Insurance Company (Metlife), a major national insurance company competitively chosen by the Federal Retirement Thrift Investment Board. The types of annuities offered are single or joint life annuities with either fixed or graded monthly payments. The graded annuity is adjusted each year to reflect increases in the Consumer Price Index, but the adjustment cannot exceed 3%.

Workers may use a worksheet or an annuity calculator on the TSP website to estimate their monthly payments. The interest rate used in making the estimate is based on the current 3-month moving average rate of 10-year U.S. Treasury notes. This rate of interest is binding, i.e., once the annuity begins, changes in the 10-year U.S. Treasury rate have no effect on the level of the monthly payments.

Annuities payable from the TSP first began in 1989. Since then, the 3-month moving average of the 10-year U.S. Treasury rates has ranged from 4.0% to 9.25%. For a worker retiring at age 62 with a given amount accumulated in a TSP account,

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[14]A *defined benefit* plan is one in which the benefit is determined by a specific formula, such as 1% of a worker's highest salary times the number of years of service, and the risk of financing the plan falls mainly on the employer. Benefits in a *defined contribution* plan are determined by the investment return on the contributions to an employee's account, and the investment risk falls on the employee.

[15]For the 10-year period 1993-2002, the C fund's annual rate of return was 9.29%, while the S&P's annual rate of return was 9.34%.

the 9.25% rate produces an annuity that is 58% higher than that produced by the 4.0% rate.[16]

Methodology

In order to calculate the effect on annuities if the economic conditions of the past were to recur in the future, the CRS model was adjusted to reflect wage levels, inflation, long-term government bond interest rates, and the total return of the S&P 500 that occurred each year from 1926 through 2002. For example, if individual accounts invested in the S&P 500 were to begin in 2003 and one wished to know their potential value as an annuity for someone who will retire in 2023, the model projects economic performance over the next 20 years under 58 scenarios, reflecting each 20-year period in the past 76 years, beginning with 1926-1945 and ending with 1983-2002. To depict the relative value of the annuity, its present value is compared to the present value of the Social Security benefit that would be payable under current law benefit rules and under each economic scenario. This method was chosen because it is commonly used to illustrate how much of the Social Security benefit an individual account could replace. Because replicating the economic performance of the past 76 years into the future affects not only the value of the individual account but the value of the Social Security benefit as well, depicting the value of the individual account as a percentage of the Social Security benefit takes into account the effect of the economy on both.[17]

An issue raised by this depiction is the choice of the illustrative worker used in the analysis. Illustrations of the effects of reforms on the Social Security program often depict a full-career worker who always earned an average wage. It is recognized that this does not represent a "typical" worker, but that it is useful for portraying the effects of reforms in generalized terms. There are limitations in applying this scenario to the issues addressed in this paper. The Social Security benefit formula is designed so that workers with low career earnings receive a benefit that replaces a larger proportion of their earnings than do workers with high career earnings. In contrast, everything else held equal, the value of a worker's individual

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[16]Because the differences in interest rates have a greater effect the longer the period over which the annuity is paid, the largest effect of these differences is on younger retirees. As federal retirees can retire before age 62 (as early as age 55), the effect of differences in interest rates on annuities would be greater than it would be for Social Security retirees. For example, for workers retiring before age 60, the above difference in interest rates would make a difference in the annuity of 67%.

[17]There are two effects of economic performance on Social Security. The effect depicted here is on the value of an individual's benefit. Social Security benefits are sensitive to the relationship of wage and price levels (for a discussion of this sensitivity, see CRS Report 92-333, *Social Security: The Effect of Economic Variations on Benefits*, by Geoffrey Kollmann). Their present values also are sensitive to changes in interest rates. The other effect, not depicted here, is on the financial health of the system as a whole, as wage growth relative to price increases, employment rates, and interest earned by the trust funds affect the degree to which the system is under-or over-funded as a whole. In this regard, the financial condition of the program can indirectly have an effect on benefits, as it ultimately determines the level of benefits that can be supported by the program's financial resources.

account would be strictly proportional to the level of his or her earnings. This means that, for a given rate of contributions and rate of return, an individual account would replace a lower proportion of the Social Security benefit of a low-paid worker than for a high-paid worker. Also, using as an example a worker who always earned an average wage may overstate the value of individual accounts. Typically, many workers start work in entry level jobs with relatively low wages and earn higher wages as they advance in their careers. Because of the power of compound growth, contributions made early in a career have a disproportionate effect on the eventual value of the account. Everything else held equal, the lower contributions made early in their careers would result in smaller account balances than those shown for a worker who always earned an average wage.

At first glance, this may appear unimportant, because by focusing on the effect of economic variations on the annuities produced by individual accounts relative to Social Security for workers with the same characteristics, this paper draws attention to the magnitude of the differences between annuity values rather than on the values of the annuities themselves. However, while not the main focus of this paper, it is useful to know what these values are, and by showing what proportion of Social Security benefits the annuities would replace, the paper also illustrates the relative value of the accounts. In recognition of these concerns, the illustrative worker used in this report, while based on a worker whose Social Security benefit is equal to that of a worker who always earned the average wage, has yearly earnings that are "scaled" in accordance with a recent publication of the Social Security Administration (SSA) that adjusts work histories to take into account typical career patterns.[18] Consistent with the data in the SSA document, the worker is assumed to begin work at age 21 and work every year until retiring at age 62 (the age at which most workers retire today). He or she is assumed to be unmarried, and thus would receive a "single life" annuity.[19]

As mentioned earlier, the interest rate on which a fixed annuity is based is determined at the time the annuity is purchased, and usually reflects the current long-term government or corporate bond rate. Because the interest rate earned by new issues of U.S. government securities to the Social Security trust funds is based on the average rate earned on current outstanding long-term government debt, the CRS model uses it as a proxy for the rate of reform on long-term bonds for the period from 1937 to the present. (For the period 1926-1936, which was before the creation of the trust funds, a comparable set of numbers was constructed from data on U.S. bonds.) A more complete description of the methodology used in the report may be found in the Appendix.

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[18]Social Security Administration. Office of the Actuary. *Internal Rates of Return Under the OASDI Program for Hypothetical Workers*. Actuarial Note No. 144, June 2001. The pattern in these scaled earnings histories shows relatively low earnings at the beginning of the career, fairly rapid growth through the middle of the career, and a gradual tapering off of earnings at the end of the career.

[19]A joint annuity would produce a smaller monthly benefit to account for the longer combined lifespan of a couple. Social Security implicitly provides a joint survivor annuity to all recipients automatically with no explicit reduction in the worker's monthly benefit.

Results

Projected Annuity Values as a Proportion of Social Security Benefits

The following graphs show the projected values of the annuities produced by individual accounts as a proportion of the Social Security benefits promised under current law for workers retiring at age 62 in the future. These values are shown for workers with "scaled" average earnings (previously described) who, beginning in 2003, contribute 2% of pay into an individual account. The results for each period are calculated under the appropriate number of variations occurring in the 77-year period from 1926-2002. For example, the value of an annuity of someone who will retire in 2013 is projected over 10 years under 67 scenarios, reflecting each distinct period of 10 consecutive years between 1926 through 2002, and the value as an annuity of someone who works a full career is projected over the next 41 years under 36 scenarios, reflecting each distinct period of 41 consecutive years between 1926 through 2002.

Accounts Invested in Funds that Track the S&P 500. Figures 1 through **4** show the projected values of the annuities produced by individual accounts as a proportion of the Social Security benefits promised under current law if the accounts were invested in a fund that tracks the S&P 500 (minus a 1% annual administrative fee) for periods of 10, 20, 30 and 41 years. The annuities shown are those that would be paid under a fixed rate of return on long-term U.S. government bonds prevailing at the end of the selected illustrative period.[20] For example, **Figure 1** shows what proportion of Social Security would be replaced by an annuity bearing a fixed rate of interest for a worker who contributed to an individual account for 10 years. If economic conditions in 2003-2012 were the same as those that occurred in 1965 through 1974, the proportion would be about 2%. If economic conditions were the same as those that occurred in 1989 through 1998, the proportion would be about 9%. For results presented in table form, see **Tables 1** through **4** in the Appendix.

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[20]As would be done if the account were annuitized under the rules applicable to the federal TSP.

Figure 1. *10-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 10 Years
(Account Invested in S&P 500, Annuity at Fixed Interest Rate)

Percent

Worker Always Earned Scaled Average Wage and Retires at Age 62

Account Invested in S&P 500

Economy performs as it did beginning in:
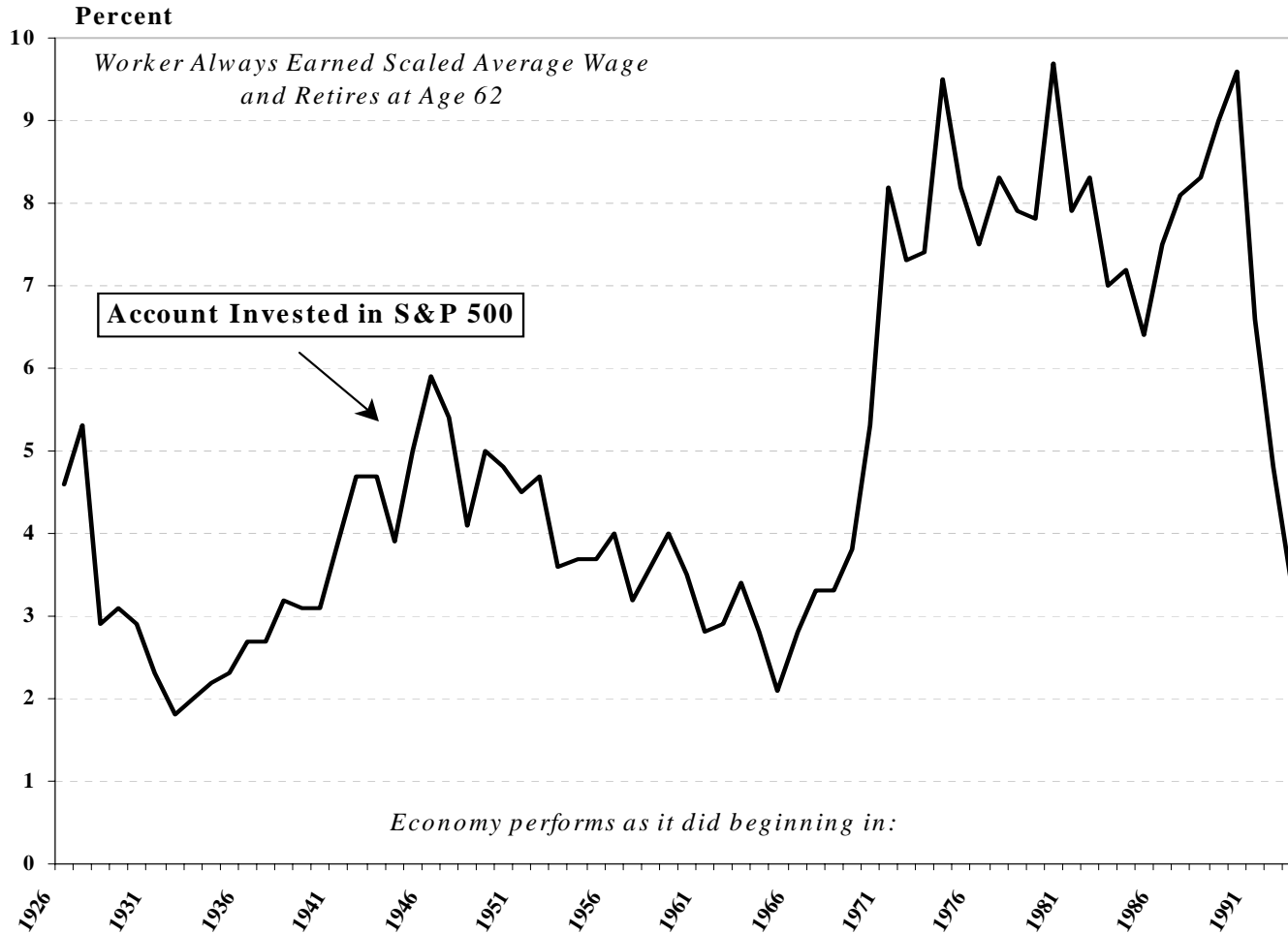
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

Figure 2. *20-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 20 Years (Account Invested in S&P 500, Annuity at Fixed Interest Rate
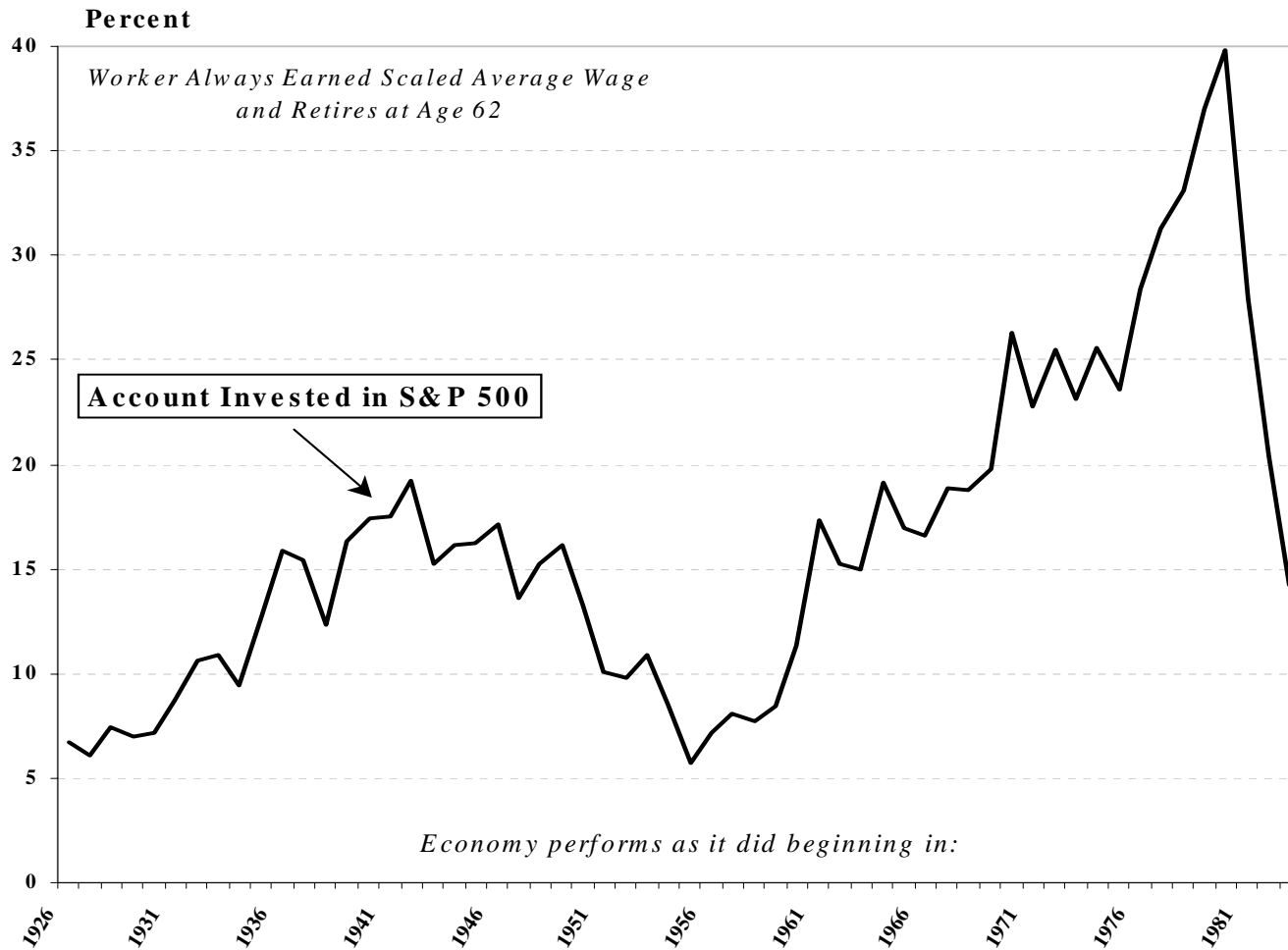
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

Figure 3. *30-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 30 Years (Account Invested in S&P 500, Annuity at Fixed Interest Rate)

Percent

Worker Always Earned Scaled Average Wage and Retires at Age 62

Account Invested in S&P 500

Economy performs as it did beginning in:

Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

Figure 4. *41-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 41 Years
(Account Invested in S&P 500, Annuity at Fixed Interest Rate)
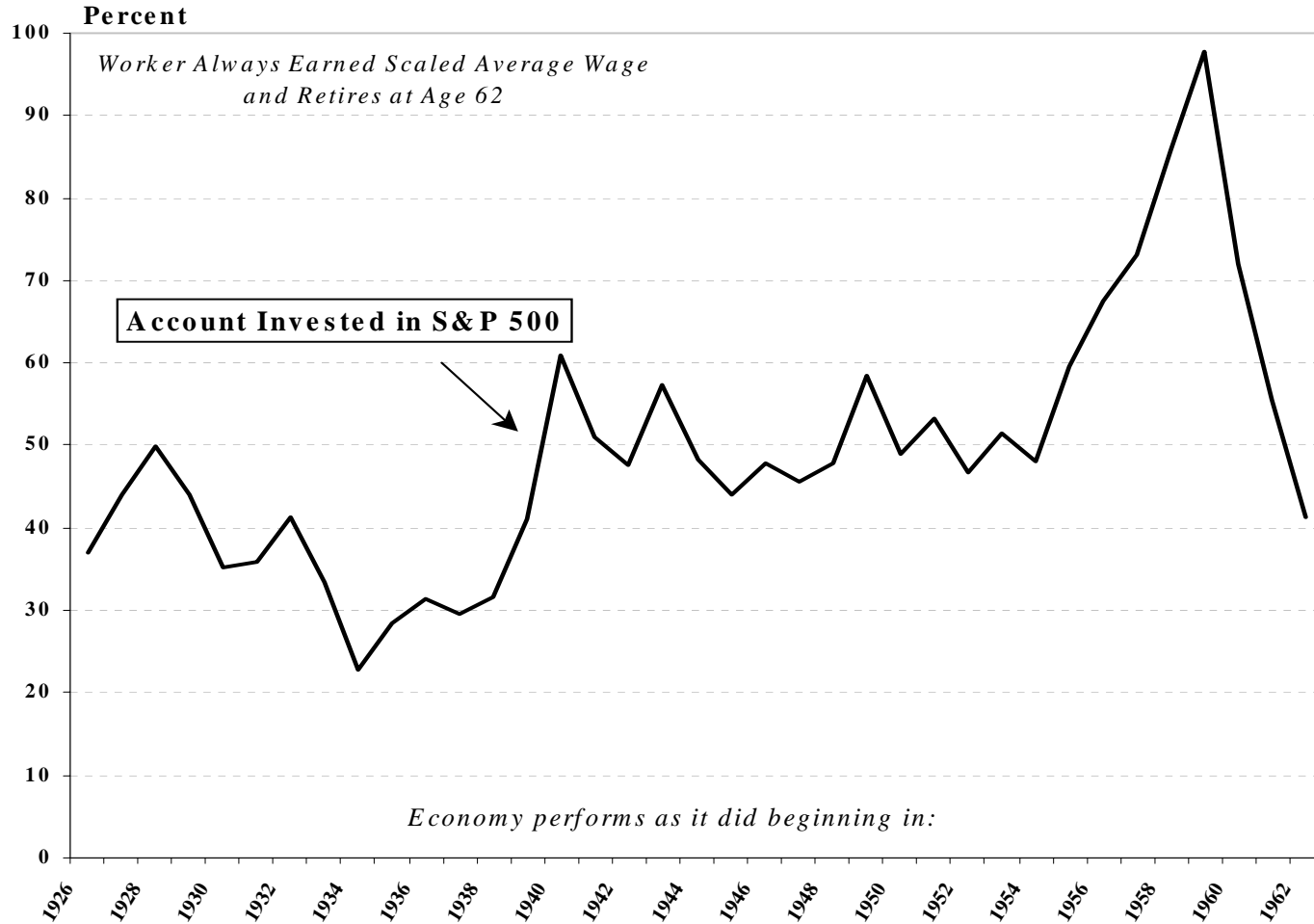
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

As the charts show, there are wide variations in the annuities produced under different economic conditions.[21] The greatest disparity occurs for someone retiring in 2023, where the annuity that correlates to the 20-year period 1980 through 1999 is seven times larger than the annuity that correlates to the 20-year period 1955 through 1974. The maximum disparities in the 10, 30, and 41 year periods are factors of 5.4, 5.3, and 4.3, respectively.

It should be noted that by definition the maximum disparities occur only once in the various time periods. For example, for a worker who retires in 2013 (and thus paid into an individual account for 10 years), the maximum disparity occurs only when two of the 68 different eras are compared. More importantly to potential investors, in this illustration the probability of getting as little as 1.8% or as much as 9.7% of one's Social Security replaced by an individual account is only one in 68. Statistically, it is more meaningful that 25% of the time the replacement factor was less than 3.2% and 25% of the time it was more than 7.2%. The average, or mean, value over these 10-year periods was 5.0%. (For a full discussion of these statistical measures, and tables that show them for the values shown in each of the figures, see *Tables and Summary Statistics* in the Appendix.)

Effect of Fixed Interest Rate on Degree of Variability. The variability in the proportion of Social Security benefits provided by an individual account in **Figures 1** through **4** is affected not only by the value of the amount in the account at retirement, but also by the rate of interest prevailing on the date of retirement. Theoretically, there would be less volatility if the interest rate were not fixed at the time of retirement but were adjusted to current market conditions.[22] **Figures 5** through **8** show what proportion of Social Security benefits would be provided by an individual account if the interest rate applicable to the annuity were adjusted each year to reflect the current rate of a portfolio of long-term U.S. government bonds.[23] For example, **Figure 5** shows what proportion of Social Security would be replaced by an annuity bearing either a fixed or variable rate of interest for a worker who contributed to an individual account for 10 years. If the economic conditions were the same as occurred in 1946 through 1955, the proportion would be about 6% under a variable interest rate, and about 7% under a fixed rate. If the economic conditions were the same as occurred in 1971 through 1980, the proportion would be about 8% under a variable interest rate, and about 6% under a fixed rate. (For results and statistical measures presented in table form, see **Tables 5** through **8** in the Appendix.)

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[21]The range of disparities would probably be wider if inter-year variability were included (i.e., if peaks and troughs during each of the years were modeled).

[22]For example, TIAA – CREF offers annuities whose income is based on money market accounts.

[23]This is how the present values of Social Security benefits are calculated, so this would be the same as comparing the present values of the individual accounts and the Social Security benefits using the same discount rate. Thus, the change in values expressed in **Figures 5-8** are the same as would be shown if one were illustrating only the variations in the values of the amounts accumulated in the individual accounts. If one wishes, these illustrations can be used to focus just on the variability of individual account balances at the time of retirement.

Figure 5. *10-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for
Workers Contributing 2% of Pay Into Individual Accounts for 10 Years
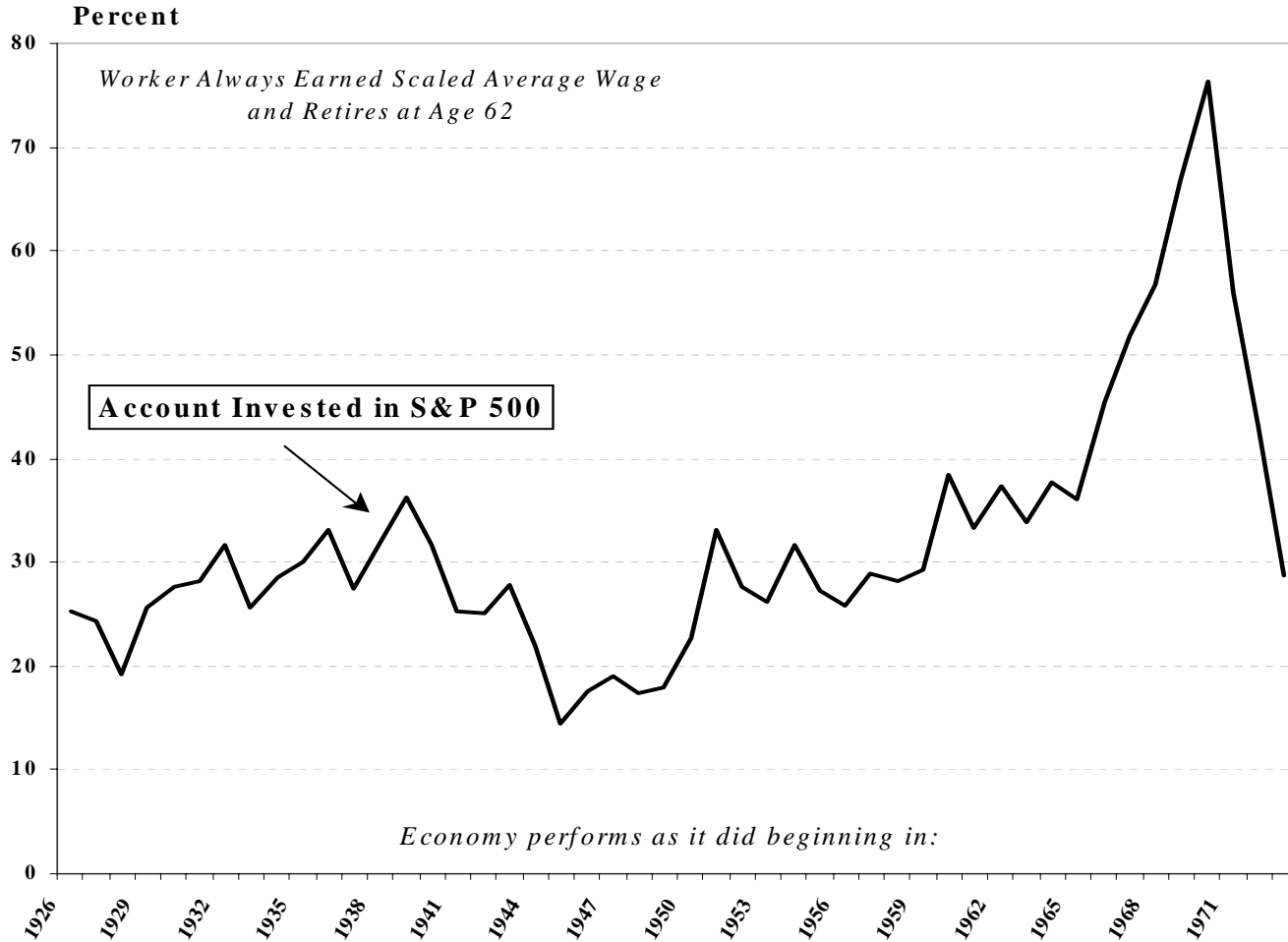**(Annuity at Fixed and Variable Interest Rates)**
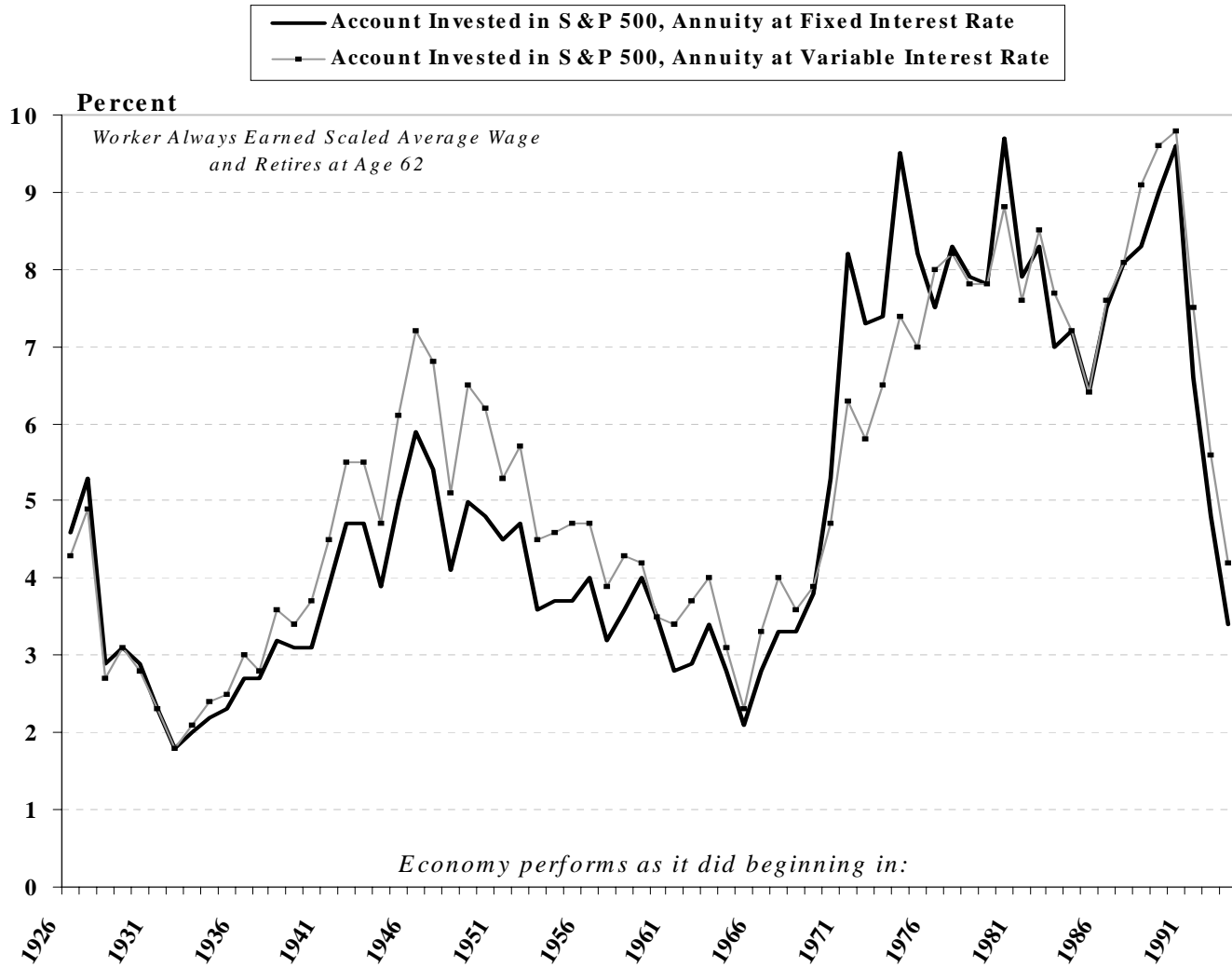
Figure 6. *20-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 20 Years (Annuity at Fixed and Variable Interest Rates)

Account Invested in S&P 500, Annuity at Fixed Interest Rate

Account Invested in S&P 500, Annuity at Variable Interest Rate

Worker Always Earned Scaled Average Wage and Retires at Age 62

*Economy performs as it did beginning in:*
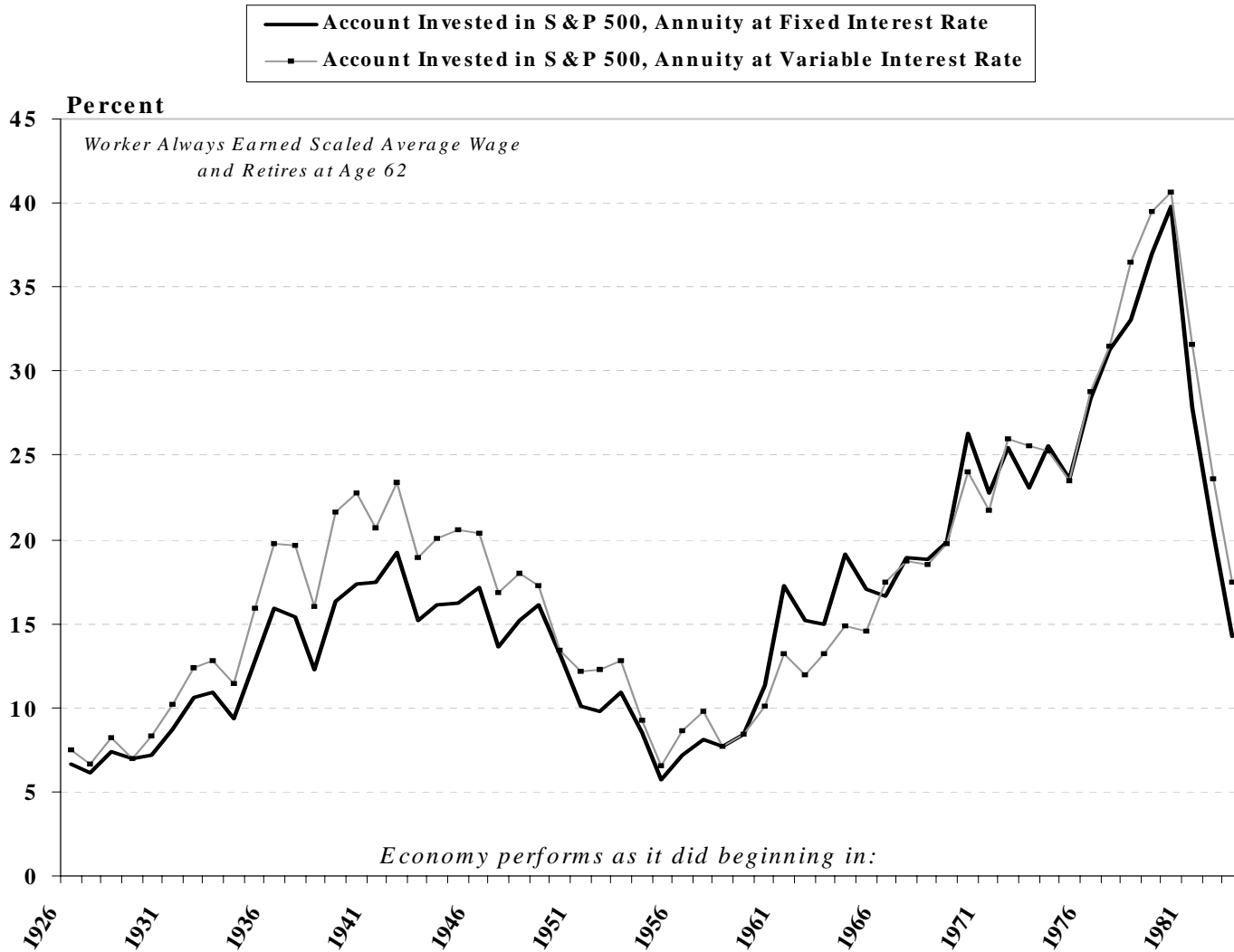
Figure 7. *30-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for
Workers Contributing 2% of Pay Into Individual Accounts for 30 Years
(Annuity at Fixed and Variable Interest Rates)

Account Invested in S&P 500, Annuity at Fixed Interest Rate
Account Invested in S&P 500, Annuity at Variable Interest Rate

Percent

*Worker Always Earned Scaled Average Wage
and Retires at Age 62*

Economy performs as it did beginning in:

Figure 8. *41-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 41 Years (Annuity at Fixed and Variable Interest Rates)

——— Account Invested in S&P 500, Annuity at Fixed Interest Rate
—■— Account Invested in S&P 500, Annuity at Variable Interest Rate

Worker Always Earned Scaled Average Wage and Retires at Age 62

Economy performs as it did beginning in:

As **Figures 5** through **8** show, factoring out the effect of a fixed rate of interest in most cases does reduce the volatility in annuities, especially over longer periods. The maximum disparities in the 10, 20, 30, and 41-year periods are factors of 5.4, 6.2, 4.8, and 3.9, respectively, compared to the maximum disparities produced by a fixed interest rate of 5.4, 6.9, 5.3, and 4.3, respectively. The figures also show that a variable interest rate can produce annuities that are higher or lower than the annuities produced by a fixed interest rate. Sometimes these differences can be substantial. For example, if the economic conditions prevailing in the period 1940-1980 were to recur over the next 41 years, a worker with a full career would receive an annuity under a fixed rate of interest that would be 33% higher than under a variable rate.

Effect of Adding Bonds to Investment Mix. Most Social Security reform proposals that feature individual accounts allow contributions to the accounts to be invested in several funds, including ones that invest in whole or in part in high grade corporate or U.S. bonds. Some funds are a mixture of broad-based stock index funds and high-grade corporate or U.S. bonds. One prominent proposal mandates that all contributions go to a fund that is invested 60% in stocks and 40% in high-grade corporate bonds.[24] The question arises of how such an investment strategy would affect the size and volatility of individual account annuities. Following are figures that reflect the same circumstances as those featured in **Figures 1** through **4**, but also include the annuities produced by investments in a fund that is 60% invested in stocks that track the S&P 500 and 40% invested in long-term U.S. bonds. For example, **Figure 9** shows that, if economic conditions were the same as those that occurred in 1946 through 1955, the proportion of Social Security replaced would be about 4% under the 60/40 mix, and about 6% under the S&P 500 rate. If economic conditions were the same as those that occurred in 1969 through 1978, the proportion under the 60/40 mix and the S&P 500 rate would be about the same.

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[24]The Chairman of the House Ways and Means Committee and its Social Security Subcommittee Chairman proposed such a measure in the 106th Congress. Representative Shaw, Chairman of the Ways and Means Social Security Subcommittee, proposed this approach in H.R. 3497 in the 107th Congress. In H.R. 75 in the 108th Congress, he proposes offering three investment choices: a mix of 60% stocks/ 40% bonds, a mix of 65% stocks/ 35% bonds, and a mix of 70% stocks/ 30% bonds.

Figure 9. *10-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 10 Years (Account Invested Entirely in Stocks and in 60% Stocks, 40% Bonds)
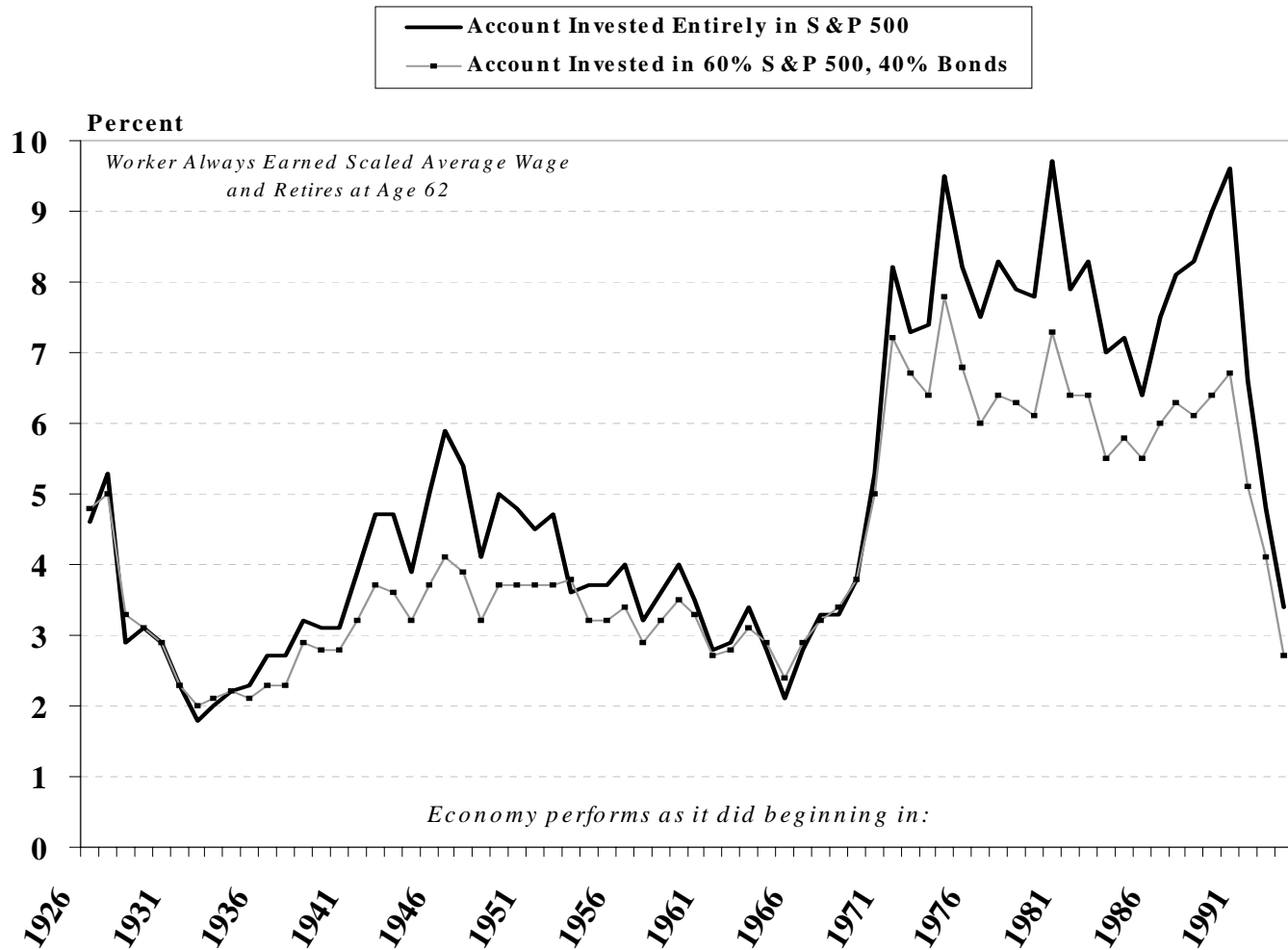
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

Figure 10. *20-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 20 Years (Account Invested Entirely in Stocks and in 60% Stocks, 40% Bonds)
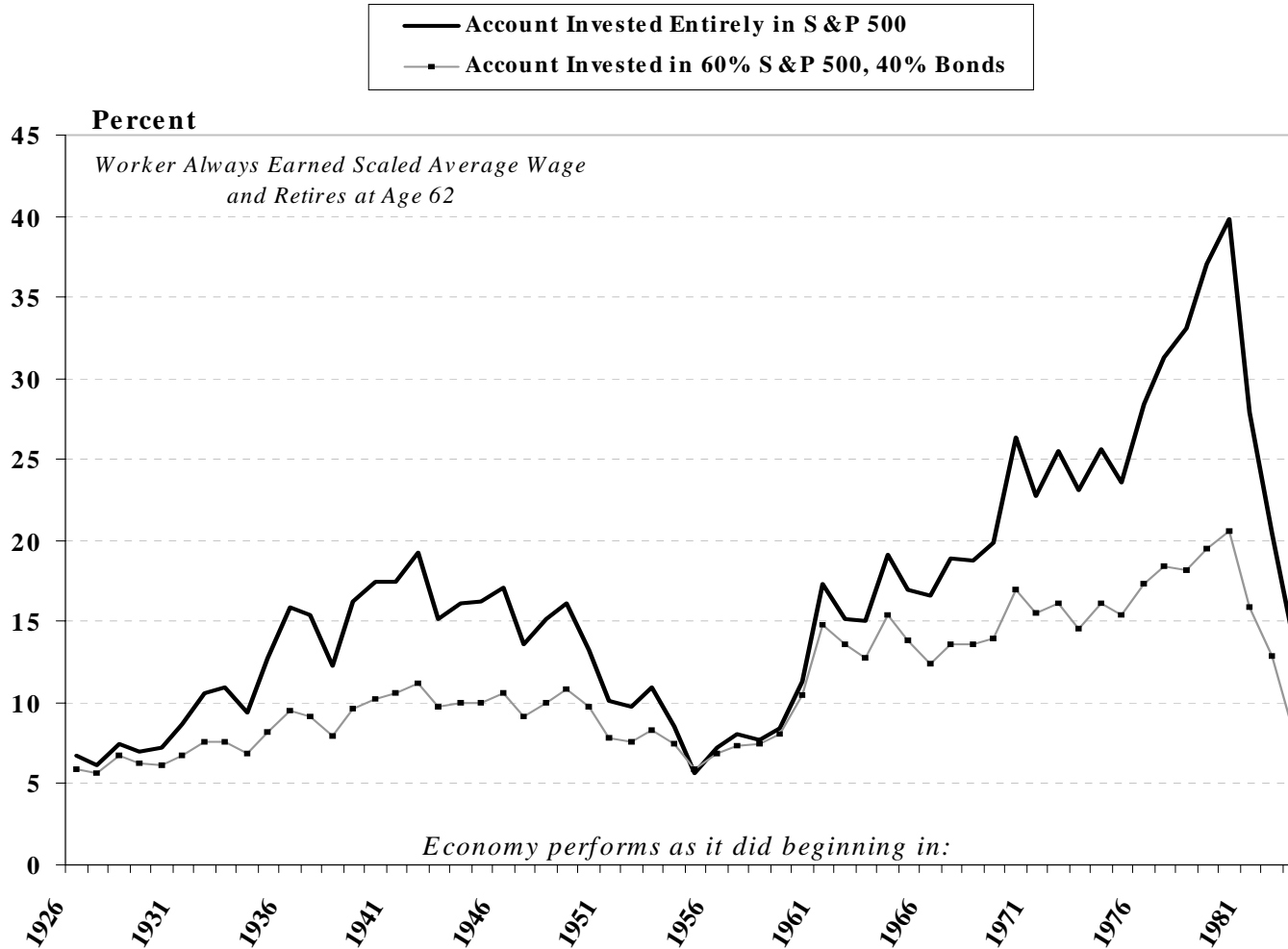
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

Figure 11. *30-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 30 Years (Account Invested Entirely in Stocks and in 60% Stocks, 40% Bonds)
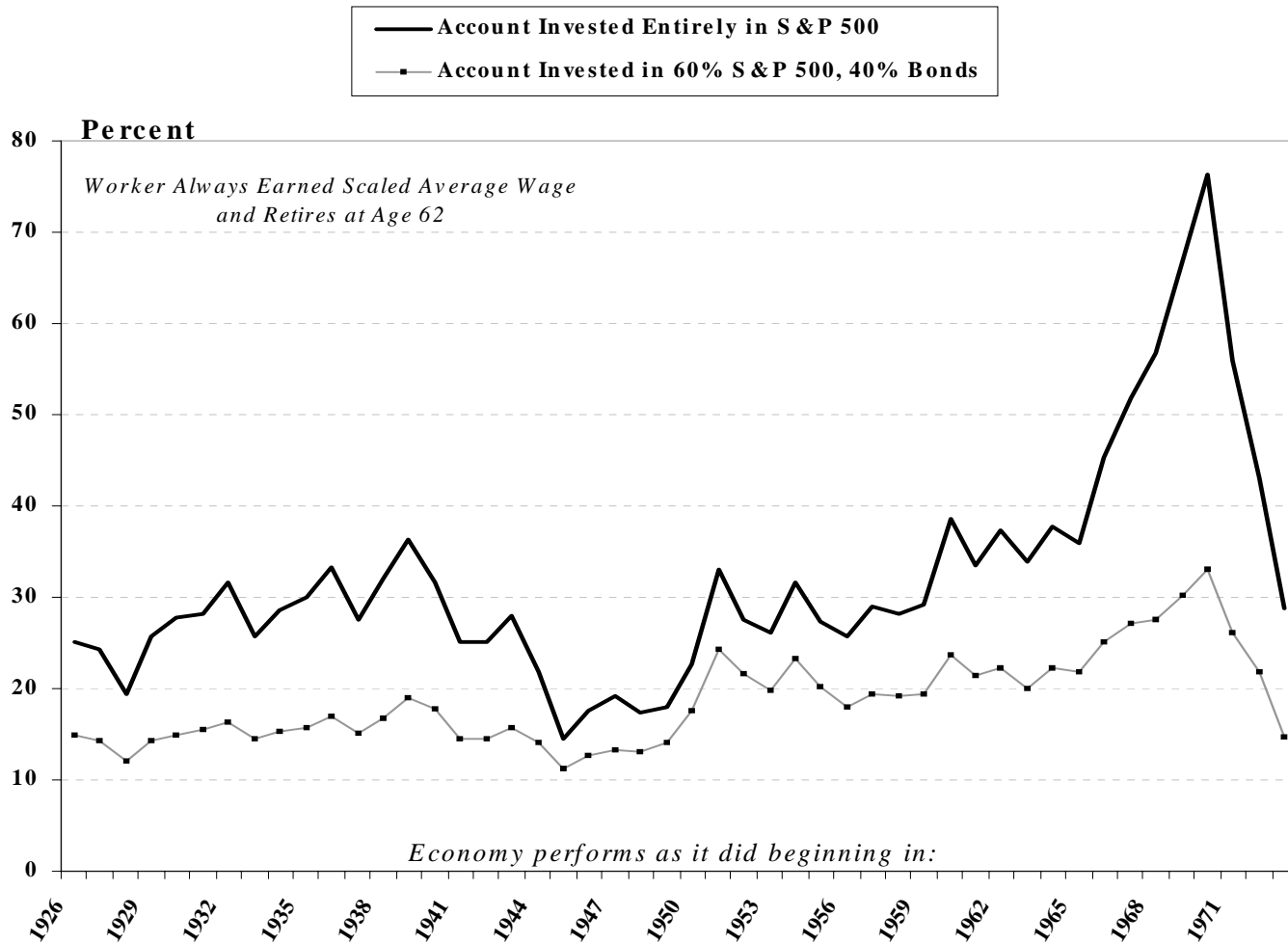
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.
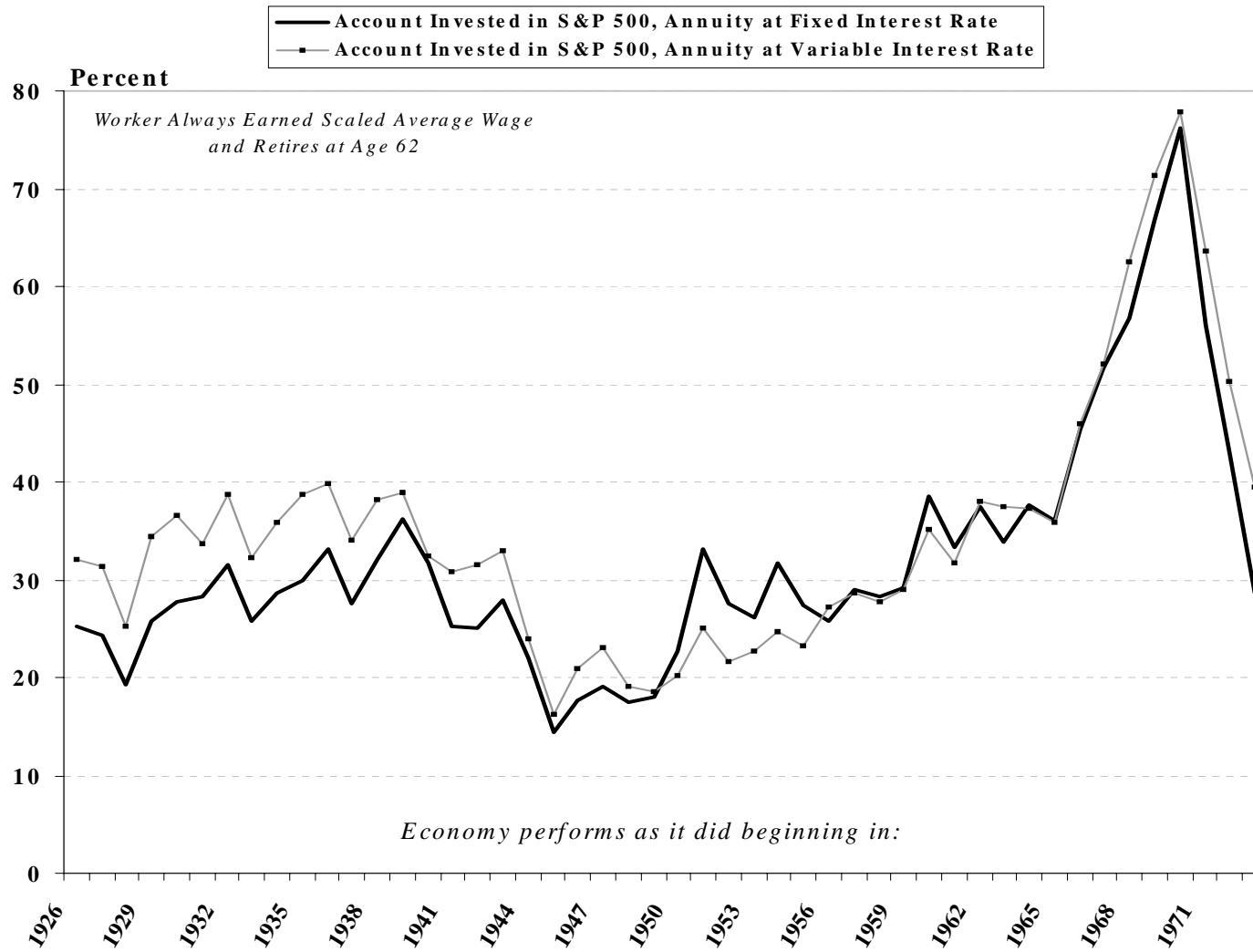
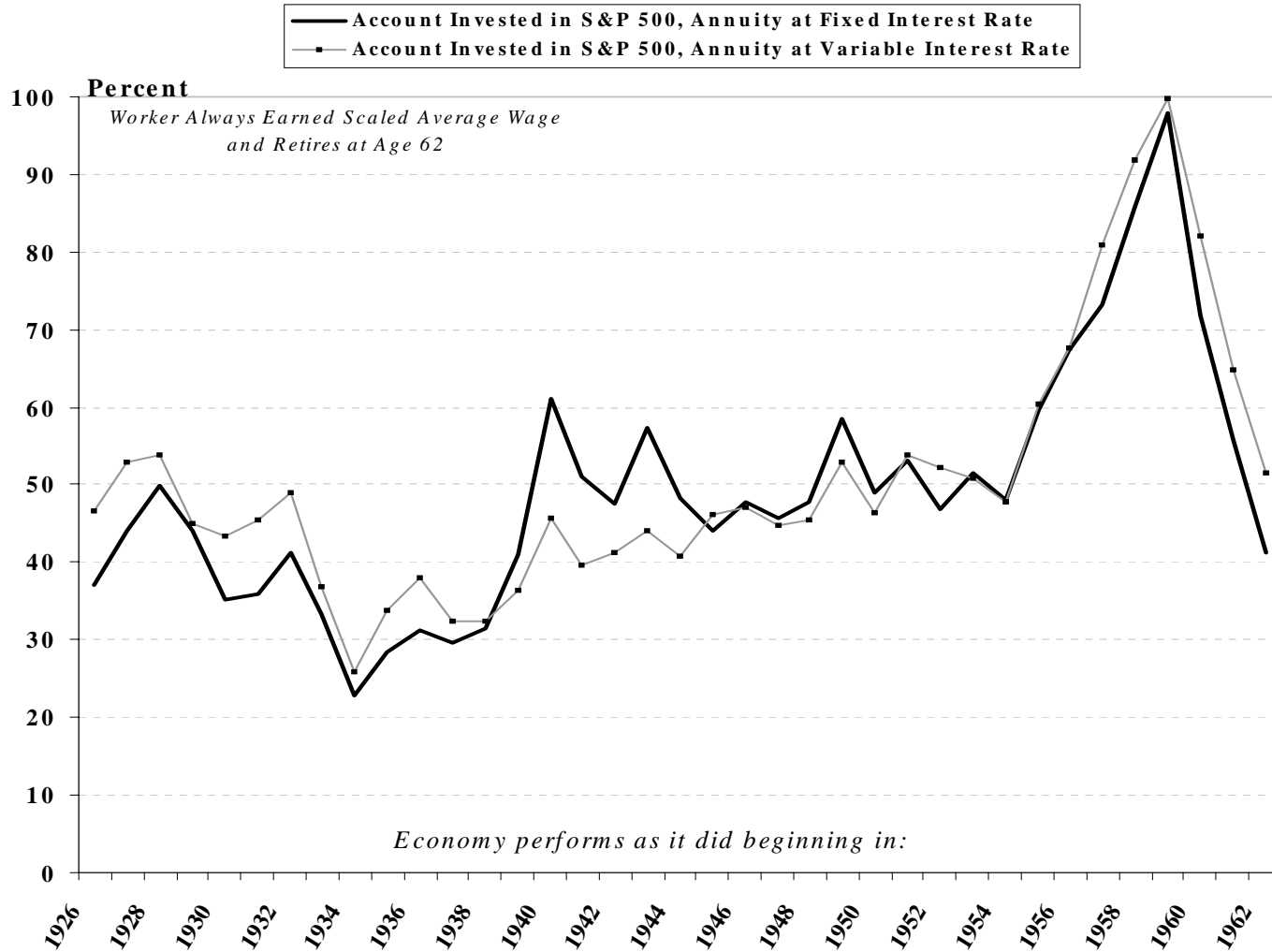## Figure 12. *41-Year Accumulation*
Value of Annuities as a Proportion of Social Security Benefits for Workers Contributing 2% of Pay Into Individual Accounts for 41 Years (Account Invested Entirely in Stocks and in 60% Stocks, 40% Bonds)
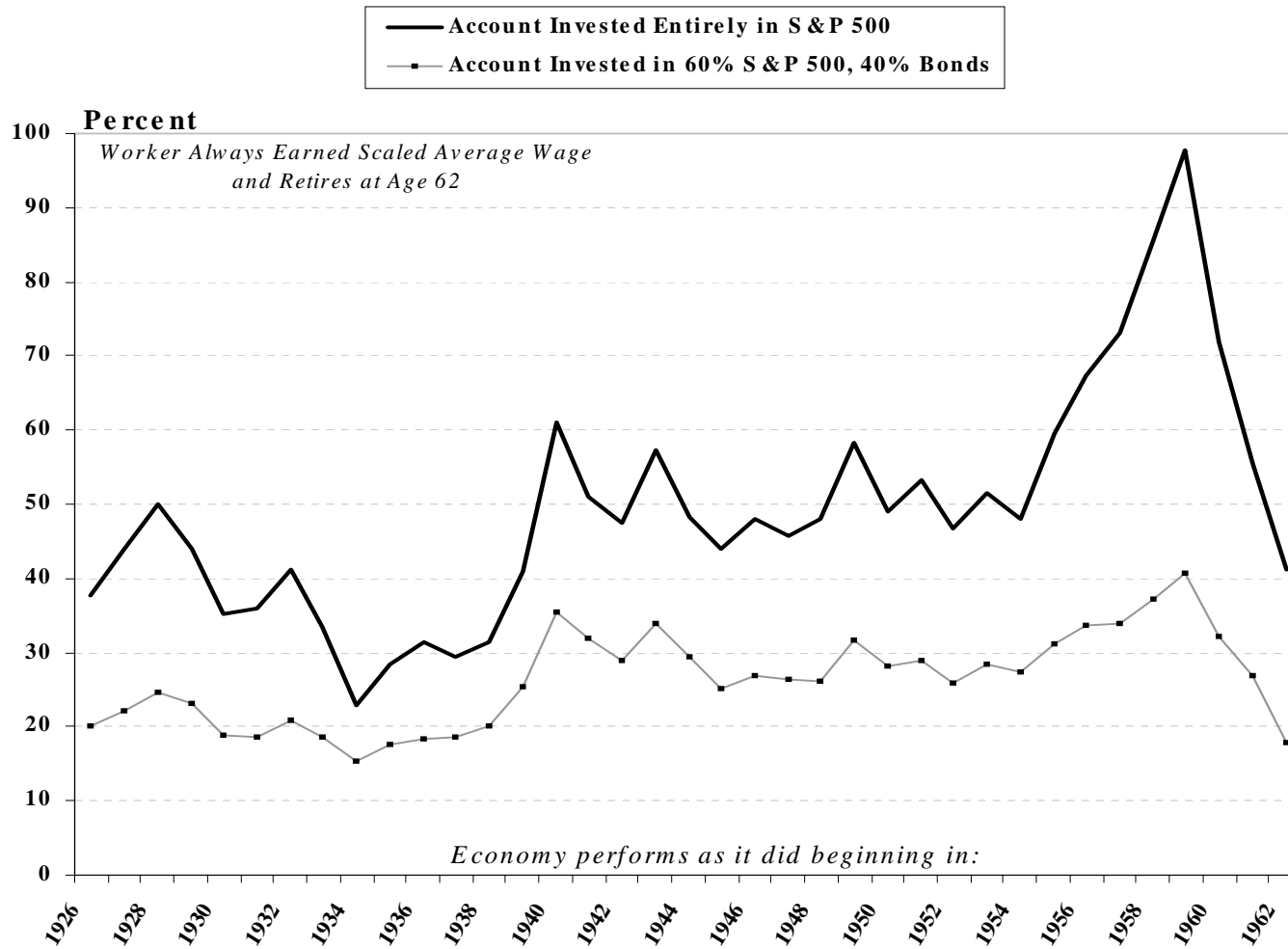
Note: Account is converted to a fixed life annuity at date of retirement based on the prevailing rate of interest on long-term U.S. bonds.

As these charts show, investing in a mixture of stocks and bonds would produce less volatility in the annuities. The greatest disparity occurs for someone retiring in 2013, where the annuity that correlates to the 10-year period 1980 through 1989 is 3.9 times larger than the annuity that correlates to the 10-year period 1932 through 1941. The maximum disparities in the 20, 30, and 41-year periods are factors of 3.7, 3.0, and 2.7, respectively. (For results and statistical measures presented in table form, see **Tables 9** through **12** in the Appendix.) The comparable numbers under the all-stock scenario are 5.4, 6.9, 5.3 and 4.3, respectively.

However, while the addition of bonds to the investment portfolio helps to limit the range of disparities in the annuity values, in the vast majority of cases modeled here these values are lower than those produced by the all-stock portfolio. In the 11 cases (out of 211) where the annuity value is higher under the 60/40 mix, 10 occur when the worker retires in 2013, reflecting the shorter period (10 years) in which the individual account has been in effect. For the periods where the individual account has been in effect for 30 or 41 years, in all cases the annuities reflecting the all-stock portfolio are higher than those reflecting the 60/40 mix of stocks and bonds. For a full-career worker, the least difference between the annuities that an all-stock portfolio and the 60/40 mix provided was 49%, while the most was 140%.

Analysis

These modeling results illustrate that the value of individual accounts would be highly sensitive not only to fluctuations in investment performance during the accumulation phase but, if converted to an annuity, to the rate of interest prevailing at the time of retirement as well. However, while isolating the effect of a fixed rate of interest produces differences of up to 33% in the value of an annuity provided by an individual account, it does not produce that much of a difference in the extremes of the range of variability. While the addition of bonds to the investment portfolio helps to limit the range of disparities in the annuity values, over any appreciable period of time these values are lower than those produced by the all-stock portfolio.

Conclusions

The analysis in this report is meant to contribute to evolving concepts of Social Security reform and should be of interest to both sides of the debate. For those who oppose individual accounts, especially if the accounts are placed in higher-risk investments, the potential volatility in account values may support concerns that such unpredictability and uneven treatment of recipients are alien to the concept of social insurance, which has always been expressed as providing a predictable and assured "floor of protection" that backstops other types of retirement income. They may focus particularly on the problems in the transition period, when individual accounts would not have long to build up and as this modeling has illustrated would be even more volatile. They also may focus on instances where workers who only have 10 or 20 years to build up their account could receive less from an individual account than the Social Security benefit it would supplement or replace. Even after the transition period to a new system were complete, the problem of small accumulations

and short-term volatility would apply to younger workers who become disabled or die with dependent survivors.

Those who support individual accounts may focus on the level of income that individual accounts could provide relative to Social Security. They may view these modeling results as supporting their contention that investing a portion of the payroll tax mostly in a broad spectrum of stocks would generally produce an annuity that would be significantly higher than the Social Security benefit it would supplement or replace. Stated another way, advocates maintain that Social Security's inherent rate of return on the contributions to the system are far lower than provided by investments in private financial markets. (For an annualized year-by-year long-range rate of return on the S&P 500, see **Table 13** in the Appendix.) To them, the potential for a large degree of volatility would be overcome by the likelihood that the values would be higher than what Social Security could provide. Their argument might run as follows: the long-range cost of retired worker benefits to the Social Security program is projected to be 10.47% of taxable payroll.[25] Thus, 2% of pay can be said to pay for 19.1% (2/10.47) of the promised Social Security benefit of a retired worker. Under this formulation, for workers who contribute to individual accounts throughout their careers, the value of the account can be said to be greater than that provided by Social Security if the portion of Social Security it replaces is greater than 19.1%. Under the circumstances modeled in this report, for full-career workers the mean, or average, proportion of Social Security replaced under the three investment scenarios (49.6%, 50.5%, and 26.2%)[26] would be considerably more than 19.1%. On a year-by-year basis, under the all-stock scenarios there are no instances when a full-career worker would receive an annuity from an individual account that is less than 19.1% of the Social Security benefits promised under current law. Under the 60/40 mix scenario, there are eight instances (out of 37, or 22% of the time) when a full-career worker would receive an annuity from an individual account that is less than 19.1% of the Social Security benefits promised under current law.

Regardless of one's perspective on this "moneysworth" issue, the public may have problems with annuitizing individual accounts. Some may not want annuitization at all, preferring instead an approach through which they would receive the accumulated amount as a lump sum to spend when they wish, or to leave to their heirs. This could be especially true for those who do not expect to live long in retirement. The idea of mandatory annuitization could also prove unpopular because one of the selling points some individual-account proponents use is that "it's your money, with your name on it, not just a government promise." This carries the connotation that the account is "owned" by the individual and therefore carries with it property rights, which implies that the owner of the account should be able to do with it what he or she wants. This concern might be alleviated to a degree if features were added such as a cash refund option, which, should the annuitant die early, would pay the estate the amount by which the balance in the account at the time of

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[25]Figure provided by Alice Wade, Deputy Chief Actuary of the Social Security Administration.

[26]See Summary Statistics in the Appendix.

annuitization exceeds the amount paid out.[27] However, choosing such an option would lower the monthly amount of the annuity while the annuitant is alive. Another option could be to allow workers to receive a lump sum distribution if the balance in the account exceeds a minimum threshold, such as an amount sufficient to provide income at the poverty level or the retiree's previous standard of living.[28] Also, a schedule of maximum periodic withdrawals, regulated in a manner similar to the rules that currently apply to IRAs, could be considered.[29]

If annuitization were voluntary, the concern that people could outlive the assets in their account because of poor or unlucky financial management, inflation, or underestimation of their life span, would remain. The government might experience additional costs if people exhausted their accounts because they then might qualify for government needs-based assistance. It has been suggested that some people might "game the system" by deliberately spending down their accounts.[30] Another concern is that voluntary annuitization would carry the risk of adverse selection, meaning that people would choose to annuitize their accounts only if it were in their best interest to do so and would thus drive up the costs of the annuity. For example, private sector experience suggests that people who choose to annuitize on average live longer than the general population.[31] Moreover, if unisex mortality tables were used, because women tend to live longer than men it would be rational for men to avoid annuitizing and for women to seek it.

Whether annuitization were mandatory or voluntary, the public might react negatively when they learn that the value of their annuity can vary substantially depending on the timing of their retirement. In this regard, proposals that mandate annuitization under a fixed rate of interest, as would happen under proposals that apply the federal TSP rules, may not be seen as the best model. If the rate of return on the annuity were not fixed, as occurs under variable annuities, then the subsequent adjustments in the annuity could compensate for unlucky circumstances at the time of annuitization, but future annuity payments would be volatile (and they periodically could decline in value). Allowing people to postpone annuitization also could compensate for unfortunate timing, but only the better-off may be able to afford to

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[27]The federal TSP offers such an option.

[28]This approach was recommended by the President's Commission to strengthen Social Security in its December 2001 report. It should be noted that there would be costs in administering such a "means test," which might lower annuity benefit levels. Also, if there is no periodic adjustment to the annuity for inflation, over time the annuity will provide an increasingly smaller proportion of the poverty level or previous standard of living.

[29]Such rules regulate the *minimum* amount of periodic withdrawals after age 62, whereas here the schedule would regulate the *maximum* amount that could be withdrawn per period. Under this scenario, it is unclear if the balance in the account would ever be fully withdrawn, because under the IRA rules, the period over which the account is disbursed is readjusted annually to reflect the remaining life expectancy of the annuitant. For a lengthy discussion of annuitization issues, see "Social Security Privatization and the Annuities Market." Congressional Budget Office. February 1998, cited previously.

[30]Ibid., p.22.

[31]Ibid., p.17.

forego the income from the account. Furthermore, retirees would have to guess whether they would do better (or worse) if they choose to wait to annuitize. "Timing the market" is difficult, even for professional financial managers. However, there are methods that might alleviate the issue of timing. One would be to "ladder" annuitization, meaning that converting the accounts to annuities could be spread over several years. This would be similar in concept to a practice often used by bond holders, in which the risk of interest rate fluctuations is minimized by purchasing bonds on a periodic basis. Said another way, by converting only part of the account each year, annuitization would be "averaged-in." The "downside" of this arrangement would be that for several years the annuitant could not be sure what his eventual retirement income would be. Also, annuity providers, who already may be reluctant to administer small accounts, might oppose administering the even smaller and more numerous accounts that periodic annuitization would produce.

An option that addresses two problems – annuitizing at a fixed interest rate and protecting retirees from inflation – would be to invest the accumulated account at retirement in inflation-indexed government bonds. Since 1997 the U.S. Treasury has issued securities ("I-bonds") that bear an interest rate that is adjusted to a set percentage above the inflation rate. Theoretically using I-bonds to set the rate for an annuity would provide less variation in the value of annuities. It also is argued that if the accounts were invested in these accounts then indexing the annuity to inflation would be easier to do because the increase in the monthly payments and the rate of interest earned by the investments on which the annuity is based would both be adjusted proportionately. However, I-bonds apparently still are sensitive to the influences of market demand and fiscal and monetary policy. Every 6 months the Treasury sets the amount that newly-issued bonds will earn above inflation. In the past 3 years these rates have varied between 1.6% and 3.6%, illustrating that they too have a degree of volatility.

Moreover, a massive investment in government I-bonds to finance annuities could raise concerns that the resources they represent are not "real." Critics of the current Social Security trust funds have long maintained that, because they are comprised exclusively of U.S. government securities, they represent merely a promise by the government to raise revenue when it comes time to redeem the securities. From this viewpoint, the securities are "IOUs, " not real resources. They also are part of the national debt and can be affected by restrictions to the debt ceiling. As I-bonds are U.S. securities, they could be subject to the same criticism. Put another way, the government would be under the obligation to come up with the resources to redeem the securities as workers retire, and would then have to raise taxes, cut other programs, or borrow from the public, an arrangement no different from the current financing arrangement and subject to the same criticisms.

A natural question is how other public retirement systems, at home and abroad, have dealt with the issues involved with the disbursement of individual accounts. Chile and the United Kingdom are often cited as examples, and each currently offers inflation-indexed annuities. (For a complete discussion of these and other systems, see the Appendix.)

Finally, how the individual accounts would be financed has an important bearing on the degree of these concerns. There are two basic approaches for funding

personal accounts. One assumes the money for the new accounts would come from additional contributions from workers or from the government on their behalf. The other assumes that workers would be allowed to divert part of their existing Social Security taxes to the accounts. The first is typically referred to as an "add-on" approach, the second as a "carve-out" approach. Under the carve-out approach it is generally recognized that the loss of revenue caused by using existing Social Security taxes to fund personal accounts would worsen the program's financing problems. Unless a new source of revenue were created for Social Security, its benefits would have to be reduced to compensate for the lower receipts, and this reduction would have to be in addition to that needed to remedy the already existing long-range financing imbalance.

Thus, absent mitigating measures, the carve-out approach is seen as a "double whammy" on Social Security benefits. Because the "floor of protection" that Social Security provides would be substantially less than under current law, in large part due to the diversion of payroll taxes to individual accounts, it is argued that it would be even more imperative that the portion of Social Security that the individual account replaces should be close in character to Social Security (i.e., an inflation-indexed annuity).

It is probable that the salience of nearly all these issues would be mitigated if individual accounts were financed by an add-on approach. Not only would the account be labeled as a "supplement" rather than a "replacement," but, because it would not directly cause a reduction of the Social Security benefit, it also would be viewed as similar to an IRA or a 401(k) account that builds on Social Security. Because workers currently can use these forms of retirement income pretty much as they wish, the concerns about protection against inflation, people outliving their assets, variability, etc. probably would be softened if the accounts were viewed this way. However, securing the resources that would be necessary to finance individual accounts from outside the Social Security system would have its own set of issues.

Cautionary Notes

The purpose of this report is to illustrate the possible effects of the economy on individual accounts and their annuities in relationship to Social Security. In doing so, it uses past economic performance as a proxy for what might happen in the future. The reader should recognize that how the economy performed in the past is no guarantee that it will perform that way in the future, and therefore the results shown in this paper should not be considered determinative of what will actually happen if individual accounts are implemented.

For purposes of showing personal account accumulations, the analysis assumes a 41-year career, based on a person starting work at age 21 and earning a wage that is "scaled" to reflect typical work patterns and will eventually lead to a Social Security benefit that is equal to that of a worker who always earned an average wage. This stylized scenario is a more refined version of that often used in analyzing Social Security benefits. However, such a scenario should not be construed to necessarily represent a "typical" worker, because of variabilities in unemployment, the ages of

entry and exit from the work force, career earnings patterns, etc. These variations are particularly important in calculating the value of personal account accumulations.

There are several issues that are not addressed in this report. First, the benefits that occur in the aggregate because of higher rates of return (e.g., investment in equities) are not necessarily restricted to *individual* accounts. Such gains might also be achieved if the same dollar amounts were directly invested by the trust funds (although gains might be distributed differently).[32] Second, there would be transition costs associated with moving from a pay-as-you-go system to a pre-funded system. These costs could be financed only from higher taxes, lower spending on other government programs, or increased borrowing. Borrowing from the public could raise interest payments for the federal government and crowd out private investment.[33] These factors could lower the return that could be expected to accrue to the accounts.

Additional cautions regarding assumptions made in preparing the report are discussed at length in the Appendix.

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[32]See CRS Report RL30571, *Social Security Reform: The Issue of Individual Versus Collective Investment for Retirement*, by David Koitz, and RL30189, *Investing Social Security Funds in the Stock Market: an Economic Perspective*, by Brian Cashell.

[33]For a further discussion, see CRS RL31498, *Social Security Reform: Economic Issues, Savings,* by Jane Gravelle and Marc Labonte.

Appendix

Methods and Basic Assumptions Used to Prepare Report

Over the years the Congressional Research Service has developed a computer model that does case simulations of individual worker's Social Security benefits. Computations of benefits are based on current law, and the underlying economic and demographic projections used are those contained in the intermediate or "best guess" assumptions of the latest report of the Social Security Board of Trustees. The computations can be expressed in current and constant dollars or as a percentage of pre-retirement earnings that Social Security benefits replace.

The model can be modified to reflect the features of various reform plans so the effect on present and future recipients' benefits and taxes can be evaluated, including the value and effect of personal accounts. It also can be modified to show the effect of differences in personal characteristics (e.g., in their relative earnings levels), in underlying economic and demographic assumptions, or to reflect alternative assumptions about how much of future Social Security benefits can be paid given the system's projected financing problems.

A crucial measure in comparing the value of benefits over a lifetime is the computation of present values. The model does so by constructing streams of benefit payments that accrue at a specified rate of interest and include cost of living adjustments for benefits. These streams are adjusted by the probability that a particular worker will survive to each year. These probabilities are based on the mortality assumptions contained in cohort life tables on which the intermediate demographic projections are based. Cohort, rather than period, life tables are used because they reflect expected improvements in mortality.

For lifetime benefit computations (expressed as the present value of benefits at age 62), the probability of survival in each year after retirement is based on the Trustees' projections of mortality for a recipient's age cohort.[34] The Trustees project mortality rates separately for men and women. The illustrations shown in this report are based on "unisex" mortality assumptions that reflect a blending of the Trustees' separate assumptions for men and women. This methodology was chosen largely because the proposals illustrated here envision an annuity system that mandates the use of unisex assumptions in computing annuities (in recognition that gender-based projections of life expectancy are not permitted in determining annuities payable under employer plans, e.g., 401(k) plans.). Also, because men and women with the same circumstances (i.e., earnings history, age, and time of retirement) receive the same level of benefits for as long as they live, Social Security implicitly annuitizes on a unisex basis.

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[34]"Discounting" is used in present value analysis to reflect the value of money over time. For example, to compute the value of lifetime Social Security benefits, the calculation involves determining the amount of money that would have to be invested at a given rate of interest at the time of retirement so that the principal and accumulated interest would be just enough to fund a recipient's benefit given his or her probability of survival in each subsequent year.

The rate of return for accounts invested in a fund indexed to the S&P 500 market assumes dividends would be reinvested. It is assumed that administrative costs and related management fees would lower the rate of return by 1 percentage point per year.[35] It is assumed that individual accounts would be free from taxation during the accumulation phase, and would be taxed similarly to Social Security in the payout phase.

How Disbursements From Individual Accounts Are Handled Under Other Systems

In Chile, often cited as the pioneer for countries replacing a pay-as-you-go government defined benefit program with individual accounts, a worker at retirement can elect to: (1) receive monthly payments from his or her account that are determined by the family members' life expectancy and the balance remaining in the account (and which are adjusted annually); (2) buy an inflation-indexed annuity from a private insurance company; or (3) combine these two options. Retirement is allowed before attaining retirement age (age 65 for men, 60 for women) if the funds are sufficient to provide adequate benefits, both in terms of monetary amounts and the rate of replacement of former earnings. Lump sum withdrawals are allowed if the amount remaining is sufficient to purchase a minimum annuity. While the amount of the pension is based on the value of the worker's contribution plus interest, the government guarantees (i.e., it bears the cost of) a minimum benefit (85% of the current minimum wage). The government also guarantees (and bears the cost of) a minimum rate of return.

In the United Kingdom, often cited as a model for how an older democratic industrial country can switch to a partially privatized system, workers may opt out of the earnings-related tier of the state plan into a defined contribution personal pension plan. Upon retirement a worker may withdraw up to 25% of assets as a tax-free lump sum. Otherwise, the assets must be used to purchase an annuity from a life insurance company which pays the retiree an agreed-upon income for the rest of his or her life. Until recently, the value of the annuities varied widely because they depended on the value of the accumulated amount in the pension and the cost of annuities at the time of retirement. An extreme example occurred in 1987 when a worker retiring on October 23 would have received a pension that was 30% lower than if he or she had retired a week earlier. However, to help avoid this situation the rules were recently changed to allow retirees to defer the purchase of an annuity, but they must do so by the time they attain age 75. Both flat-payment annuities and

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[35]This adjustment is a crude proxy for the costs to administer the account. "Index fund" investments usually have low costs, perhaps a mere fraction of a percent, whereas actively traded, personally-directed accounts might have considerable transaction charges. The federal TSP "C fund," mentioned several times in this report as a model that is widely used in reform proposals, has an administrative cost that is 0.08% of fund assets. However, administering the TSP is aided greatly by the nature of the federal centralized payroll systems and its stable workforce and the fact that there are no costs borne by the fund associated with advertizing and attracting customers. It is likely that collecting contributions from all the nation's employers, including many "Mom and Pop" operations, and maintaining records for all the nation's workers, including potentially very small accounts, would drive up administrative costs of Social Security individual accounts considerably.

annuities indexed to inflation are available. Insurance companies are able to inflation-index annuities in large part because the U.K. government issues inflation-indexed bonds.

Forced annuitization has been heavily criticized for locking people into rates of return that they regard as too low. Interest rates in the late 80s and early 90s were in double digits, but now are around 6%. In response to this criticism, a bill was introduced recently in the House of Commons that would require people to buy annuities only to provide income equal to the state support threshold; any balance in the account above that requirement could be spent as the retiree wishes.

In the United States, examples of an individual account alternative can be found in state and local government plans. Under pre-1983 law, state and local governments could opt out of Social Security. In particular, three counties in Texas have been noted for their defined contribution system that replaced Social Security in 1981.[36] These plans allow retiring employees to receive their benefits as a lump sum or as an annuity. The annuities are not indexed to inflation, but workers may choose a graded annuity.

Tables and Summary Statistics

Tables 1 through **12** show the year-be-year values that are reflected in **Figures 1** through **12**. They show the value of the annuities, expressed as a proportion of Social Security benefits, that could be purchased at age 62 with the proceeds of individual accounts, assuming that the accounts were invested in particular ways and that the economy performed as it did over specific periods in the past. Each table contains at least 37 and as many as 68 values, depending on the length of the investment period being illustrated.

Accompanying each table are summary statistics that provide measures of the range of results and the extent to which the results tend to cluster near the center – or *average value* – of the distribution. They indicate how frequently the annuity value of the individual accounts was substantially more or less than the average value that was achieved under each scenario. Six summary statistics are shown for each table: the *minimum* and *maximum* values of the annuities, the *mean* and the *median* values of the annuities, and the values of the annuities at the *25th percentile* and the *75th percentile*. All of the annuity values are expressed as a percentage of the worker's Social Security benefit.

The *minimum* and the *maximum* define the full range of the results. By definition, no simulation produced an account with an annuity value that was lower than the minimum or higher than the maximum. The *mean* is a simple arithmetic average. It is calculated by adding up the value of the individual accounts in each table (expressed as a percentage of the Social Security benefit) and then dividing this total by the number of accounts. As a measure of a central tendency – which is what an "average" represents – the mean can sometimes be deceptive because it may be

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[36]For an explanation and analysis of these plans see GAO Report HEHS-00-31, *Social Security Reform: Experience of the Alternate Plans in Texas.*

biased by a relatively small number of unusually high or low values. The *median* is another measure of central tendency that is more representative of the population because it is not biased by unusually high or low values. The median is calculated by ordering all of the observed values from highest to lowest and finding the value that lies exactly at the midpoint of the distribution. The median falls at the *50th percentile*. One half of all observed values are greater than the median and half are less than the median. Likewise, 25% of all observations fall below the 25th percentile and 75% fall below the 75th percentile. Thus, the interval between the 25th percentile and the 75th percentile defines the *middle half* of any distribution. Only one-fourth of all observed values fall below this interval and one-fourth fall above it.

Table 1. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *10* Years (Account Invested in S&P 500, Annuity at *Fixed* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1935	4.6%	1960-1969	3.5%
1927-1936	5.3	1961-1970	2.8
1928-1937	2.9	1962-1971	2.9
1929-1938	3.1	1963-1972	3.4
1930-1939	2.9	1964-1973	2.8
1931-1940	2.3	1965-1974	2.1
1932-1941	**1.8**	1966-1975	2.8
1933-1942	2.0	1967-1976	3.3
1934-1943	2.2	1968-1977	3.3
1935-1944	2.3	1969-1978	3.8
1936-1945	2.7	1970-1979	5.3
1937-1946	2.7	1971-1980	8.2
1938-1947	3.2	1972-1981	7.3
1939-1948	3.1	1973-1982	7.4
1940-1949	3.1	1974-1983	9.5
1941-1950	3.9	1975-1984	8.2
1942-1951	4.7	1976-1985	7.5
1943-1952	4.7	1977-1986	8.3
1944-1953	3.9	1978-1987	7.9
1945-1954	5.0	1979-1988	7.8
1946-1955	5.9	1980-1989	**9.7**
1947-1936	5.4	1981-1990	7.9
1948-1937	4.1	1982-1991	8.3
1949-1958	5.0	1983-1992	7.0
1950-1959	4.8	1984-1993	7.2
1951-1960	4.5	1985-1994	6.4
1952-1961	4.7	1986-1995	7.5
1953-1962	3.6	1987-1996	8.1
1954-1963	3.7	1988-1997	8.3
1955-1964	3.7	1989-1998	9.0
1956-1965	4.0	1990-1999	9.6
1957-1966	3.2	1991-2000	6.6
1958-1967	3.6	1992-2001	4.8
1959-1968	4.0	1993-2002	3.4

*Retiring at age 62 in 2013

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 10 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	5.0%
Minimum	1.8
25th Percentile	3.2
50th Percentile	4.3
75th Percentile	7.2
Maximum	9.7
Ratio of Maximum to Minimum	5.4 to 1

**Table 2. Value of Annuities as a Proportion of Social Security
Benefits for Workers* Paying Into Individual Accounts for *20* Years
(Account Invested in S&P 500, Annuity at *Fixed* Interest Rate)**

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1945	6.7%	1955-1974	**5.7**%
1927-1946	6.1	1956-1975	7.2
1928-1947	7.4	1957-1976	8.1
1929-1948	7.0	1958-1977	7.7
1930-1949	7.2	1959-1978	8.4
1931-1950	8.7	1960-1979	11.3
1932-1951	10.6	1961-1980	17.3
1933-1952	10.9	1962-1981	15.2
1934-1953	9.4	1963-1982	15.0
1935-1954	12.8	1964-1983	19.1
1936-1955	15.9	1965-1984	17.0
1937-1956	15.4	1966-1985	16.6
1938-1957	12.3	1967-1986	18.9
1939-1958	16.3	1968-1987	18.8
1940-1959	17.4	1969-1988	19.8
1941-1960	17.5	1970-1989	26.3
1942-1961	19.2	1971-1990	22.8
1943-1962	15.2	1972-1991	25.5
1944-1963	16.1	1973-1992	23.1
1945-1964	16.2	1974-1993	25.6
1946-1965	17.1	1975-1994	23.6
1947-1966	13.6	1976-1995	28.4
1948-1967	15.2	1977-1996	31.3
1949-1968	16.1	1978-1997	33.1
1950-1969	13.2	1979-1998	37.0
1951-1970	10.1	1980-1999	**39.8**
1952-1971	9.8	1981-2000	27.9
1953-1972	10.9	1982-2001	20.4
1954-1973	8.5	1983-2002	14.2

*Retiring at age 62 in 2023.
Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 20 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	16.3%
Minimum	5.7
25th Percentile	10.2
50th Percentile	15.7
75th Percentile	19.2
Maximum	39.8
Ratio of Maximum to Minimum	7.0 to 1

Table 3. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *30* Years (Account Invested in S&P 500, Annuity at *Fixed* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1955	25.2%	1950-1979	22.7%
1927-1956	24.3	1951-1980	33.1
1928-1957	19.3	1952-1981	27.6
1929-1958	25.7	1953-1982	26.1
1930-1959	27.7	1954-1983	31.7
1931-1960	28.2	1955-1984	27.3
1932-1961	31.6	1956-1985	25.8
1933-1962	25.7	1957-1986	29.0
1934-1963	28.6	1958-1987	28.2
1935-1964	30.0	1959-1988	29.2
1936-1965	33.2	1960-1989	38.5
1937-1966	27.5	1961-1990	33.4
1938-1967	32.1	1962-1991	37.4
1939-1968	36.3	1963-1992	33.8
1940-1969	31.7	1964-1993	37.7
1941-1970	25.2	1965-1994	36.0
1942-1971	25.1	1966-1995	45.4
1943-1972	27.9	1967-1996	51.8
1944-1973	21.9	1968-1997	56.7
1945-1974	**14.4**	1969-1998	66.9
1946-1975	17.6	1970-1999	**76.3**
1947-1976	19.1	1971-2000	56.0
1948-1977	17.4	1972-2001	43.1
1949-1978	18.0	1973-2002	28.7

*Retiring at age 62 in 2033

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 30 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	32.0%
Minimum	14.4
25th Percentile	25.6
50th Percentile	28.7
75th Percentile	34.4
Maximum	76.3
Ratio of Maximum to Minimum	5.3 to 1

Table 4. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *41* Years (Account Invested in S&P 500, Annuity at *Fixed* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security
1926-1966	37.0%
1927-1967	44.0
1928-1968	50.0
1929-1969	44.0
1930-1970	35.3
1931-1971	35.9
1932-1972	41.2
1933-1973	33.4
1934-1974	**22.8**
1935-1975	28.5
1936-1976	31.3
1937-1977	29.5
1938-1978	31.5
1939-1979	41.0
1940-1980	61.0
1941-1981	51.0
1942-1982	47.6
1943-1983	57.4
1944-1984	48.2
1945-1985	44.0
1946-1986	47.9
1947-1987	45.7
1948-1988	47.9
1949-1989	58.4
1950-1990	48.9
1951-1991	53.2
1952-1992	46.8
1953-1993	51.5
1954-1994	48.1
1955-1995	59.6
1956-1996	67.4
1957-1997	73.2
1958-1998	85.8
1959-1999	**97.8**
1960-2000	71.9
1961-2001	55.6
1962-2002	41.2

*Retiring at age 62 in 2044
Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 41 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	49.1%
Minimum	22.8
25th Percentile	41.0
50th Percentile	47.9
75th Percentile	55.6
Maximum	97.8
Ratio of Maximum to Minimum	4.3 to 1

Table 5. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *10* Years (Account Invested in S&P 500, Annuity at *Variable* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1935	4.3%	1960-1969	3.5%
1927-1936	4.9	1961-1970	3.4
1928-1937	2.7	1962-1971	3.7
1929-1938	3.1	1963-1972	4.0
1930-1939	2.8	1964-1973	3.1
1931-1940	2.3	1965-1974	2.3
1932-1941	**1.8**	1966-1975	3.3
1933-1942	2.1	1967-1976	4.0
1934-1943	2.4	1968-1977	3.6
1935-1944	2.5	1969-1978	3.9
1936-1945	3.0	1970-1979	4.7
1937-1946	2.8	1971-1980	6.3
1938-1947	3.6	1972-1981	5.8
1939-1948	3.4	1973-1982	6.5
1940-1949	3.7	1974-1983	7.4
1941-1950	4.5	1975-1984	7.0
1942-1951	5.5	1976-1985	8.0
1943-1952	5.5	1977-1986	8.2
1944-1953	4.7	1978-1987	7.8
1945-1954	6.1	1979-1988	7.8
1946-1955	7.2	1980-1989	8.8
1947-1936	6.8	1981-1990	7.6
1948-1937	5.1	1982-1991	8.5
1949-1958	6.5	1983-1992	7.7
1950-1959	6.2	1984-1993	7.2
1951-1960	5.3	1985-1994	6.4
1952-1961	5.7	1986-1995	7.6
1953-1962	4.5	1987-1996	8.1
1954-1963	4.6	1988-1997	9.1
1955-1964	4.7	1989-1998	9.6
1956-1965	4.7	1990-1999	**9.8**
1957-1966	3.9	1991-2000	7.5
1958-1967	4.3	1992-2001	5.6
1959-1968	4.2	1993-2002	4.2

*Retiring at age 62 in 2013.
Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 10 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations compare the present values of individual accounts and Social Security using the same discount rate of yearly returns of newly-issued U.S. government long-range bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	5.3%
Minimum	1.8
25th Percentile	3.6
50th Percentile	4.7
75th Percentile	7.1
Maximum	9.8
Ratio of Maximum to Minimum	5.3 to 1

Table 6. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *20* Years (Account Invested in S&P 500, Annuity at *Variable* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1945	7.5%	1955-1974	**6.5%**
1927-1946	6.7	1956-1975	8.6
1928-1947	8.2	1957-1976	9.8
1929-1948	7.0	1958-1977	7.7
1930-1949	8.3	1959-1978	8.4
1931-1950	10.2	1960-1979	10.1
1932-1951	12.4	1961-1980	13.2
1933-1952	12.8	1962-1981	12.0
1934-1953	11.4	1963-1982	13.2
1935-1954	15.9	1964-1983	14.9
1936-1955	19.7	1965-1984	14.6
1937-1956	19.6	1966-1985	17.5
1938-1957	16.0	1967-1986	18.7
1939-1958	21.6	1968-1987	18.5
1940-1959	22.8	1969-1988	19.7
1941-1960	20.7	1970-1989	24.0
1942-1961	23.4	1971-1990	21.7
1943-1962	18.9	1972-1991	26.0
1944-1963	20.1	1973-1992	25.6
1945-1964	20.6	1974-1993	25.3
1946-1965	20.4	1975-1994	23.5
1947-1966	16.8	1976-1995	28.8
1948-1967	18.0	1977-1996	31.5
1949-1968	17.2	1978-1997	36.5
1950-1969	13.4	1979-1998	39.5
1951-1970	12.2	1980-1999	**40.6**
1952-1971	12.3	1981-2000	31.6
1953-1972	12.8	1982-2001	23.6
1954-1973	9.3	1983-2002	17.5

*Retiring at age 62 in 2023
Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 20 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations compare the present values of individual accounts and Social Security using the same discount rate of yearly returns of newly-issued U.S. government long-range bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	17.7%
Minimum	6.5
25th Percentile	12.1
50th Percentile	17.4
75th Percentile	21.7
Maximum	40.6
Ratio of Maximum to Minimum	6.3 to 1

Table 7. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *30* Years (Account Invested in S&P 500, Annuity at *Variable* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1955	32.0%	1950-1979	20.2%
1927-1956	31.3	1951-1980	25.0
1928-1957	25.3	1952-1981	21.6
1929-1958	34.5	1953-1982	22.7
1930-1959	36.6	1954-1983	24.6
1931-1960	33.7	1955-1984	23.2
1932-1961	38.7	1956-1985	27.2
1933-1962	32.3	1957-1986	28.6
1934-1963	35.9	1958-1987	27.7
1935-1964	38.7	1959-1988	29.0
1936-1965	39.8	1960-1989	35.1
1937-1966	34.0	1961-1990	31.7
1938-1967	38.2	1962-1991	38.0
1939-1968	38.9	1963-1992	37.5
1940-1969	32.4	1964-1993	37.3
1941-1970	30.8	1965-1994	35.8
1942-1971	31.6	1966-1995	46.0
1943-1972	32.9	1967-1996	52.0
1944-1973	24.0	1968-1997	62.6
1945-1974	**16.3**	1969-1998	71.4
1946-1975	20.9	1970-1999	**77.8**
1947-1976	23.1	1971-2000	63.6
1948-1977	19.1	1972-2001	50.2
1949-1978	18.5	1973-2002	39.5

*Retiring at age 62 in 2033

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 30 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations compare the present values of individual accounts and Social Security using the same discount rate of yearly returns of newly-issued U.S. government long-range bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	34.6%
Minimum	16.3
25th Percentile	25.2
50th Percentile	32.7
75th Percentile	38.2
Maximum	77.8
Ratio of Maximum to Minimum	4.8 to 1

Table 8. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *41* Years (Account Invested in S&P 500, Annuity at *Variable* Interest Rate)

Economy performs as it did in:	Value of annuity as % of Social Security
1926-1966	46.6%
1927-1967	52.9
1928-1968	53.8
1929-1969	45.1
1930-1970	43.3
1931-1971	45.5
1932-1972	48.9
1933-1973	36.8
1934-1974	**25.9**
1935-1975	33.8
1936-1976	38.0
1937-1977	32.4
1938-1978	32.3
1939-1979	36.3
1940-1980	45.7
1941-1981	39.6
1942-1982	41.3
1943-1983	44.1
1944-1984	40.8
1945-1985	46.2
1946-1986	47.1
1947-1987	44.7
1948-1988	45.4
1949-1989	53.0
1950-1990	46.4
1951-1991	53.9
1952-1992	52.1
1953-1993	50.9
1954-1994	47.8
1955-1995	60.3
1956-1996	67.6
1957-1997	80.9
1958-1998	91.8
1959-1999	**99.8**
1960-2000	82.0
1961-2001	64.9
1962-2002	51.4

*Retiring at age 62 in 2044

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 41 years to individual accounts that earn the same rate of return as the S&P 500 minus a 1% administrative fee. Illustrations compare the present values of individual accounts and Social Security using the discount rate of yearly returns of new-issue U.S. government long-range bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	50.5%
Minimum	25.9
25th Percentile	41.2
50th Percentile	46.3
75th Percentile	53.2
Maximum	99.8
Ratio of Maximum to Minimum	3.8 to 1

Table 9. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *10* Years (Investment in 60% Stocks/40% Bonds)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1935	4.8%	1960-1969	3.3%
1927-1936	5.0	1961-1970	2.7
1928-1937	3.3	1962-1971	2.8
1929-1938	3.1	1963-1972	3.1
1930-1939	2.9	1964-1973	2.9
1931-1940	2.3	1965-1974	2.4
1932-1941	**2.0**	1966-1975	2.9
1933-1942	2.1	1967-1976	3.2
1934-1943	2.2	1968-1977	3.4
1935-1944	2.1	1969-1978	3.8
1936-1945	2.3	1970-1979	5.0
1937-1946	2.3	1971-1980	7.2
1938-1947	2.9	1972-1981	6.7
1939-1948	2.8	1973-1982	6.4
1940-1949	2.8	1974-1983	**7.8**
1941-1950	3.2	1975-1984	6.8
1942-1951	3.7	1976-1985	6.0
1943-1952	3.6	1977-1986	6.4
1944-1953	3.2	1978-1987	6.3
1945-1954	3.7	1979-1988	6.1
1946-1955	4.1	1980-1989	7.3
1947-1936	3.9	1981-1990	6.4
1948-1937	3.2	1982-1991	6.4
1949-1958	3.7	1983-1992	5.5
1950-1959	3.7	1984-1993	5.8
1951-1960	3.7	1985-1994	5.5
1952-1961	3.7	1986-1995	6.0
1953-1962	3.8	1987-1996	6.3
1954-1963	3.2	1988-1997	6.1
1955-1964	3.2	1989-1998	6.4
1956-1965	3.4	1990-1999	6.7
1957-1966	2.9	1991-2000	5.1
1958-1967	3.2	1992-2001	4.1
1959-1968	3.5	1993-2002	2.7

*Retiring at age 62 in 2013.

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 10 years to individual accounts. Sixty percent of the individual accounts earn the same rate of return as the S&P 500, minus a 1% administrative fee, and 40% of the individual accounts earns the government long-term bond rate. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	4.2%
Minimum	2.0
25th Percentile	2.9
50th Percentile	3.7
75th Percentile	5.9
Maximum	7.8
Ratio of Maximum to Minimum	3.7 to 1

**Table 10. Value of Annuities as a Proportion of Social Security
Benefits for Workers* Paying Into Individual Accounts for *20* Years
(Investment in 60% Stocks/40% Bonds)**

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1945	5.9%	1955-1974	5.9%
1927-1946	**5.6**	1956-1975	6.9
1928-1947	6.7	1957-1976	7.3
1929-1948	6.2	1958-1977	7.4
1930-1949	6.1	1959-1978	8.1
1931-1950	6.7	1960-1979	10.5
1932-1951	7.6	1961-1980	14.8
1933-1952	7.6	1962-1981	13.6
1934-1953	6.9	1963-1982	12.8
1935-1954	8.2	1964-1983	15.4
1936-1955	9.5	1965-1984	13.8
1937-1956	9.2	1966-1985	12.4
1938-1957	8.0	1967-1986	13.6
1939-1958	9.6	1968-1987	13.6
1940-1959	10.2	1969-1988	13.9
1941-1960	10.6	1970-1989	17.0
1942-1961	11.2	1971-1990	15.5
1943-1962	9.7	1972-1991	16.1
1944-1963	10.0	1973-1992	14.6
1945-1964	10.0	1974-1993	16.1
1946-1965	10.6	1975-1994	15.4
1947-1966	9.2	1976-1995	17.3
1948-1967	10.0	1977-1996	18.4
1949-1968	10.8	1978-1997	18.2
1950-1969	9.8	1979-1998	19.5
1951-1970	7.8	1980-1999	**20.6**
1952-1971	7.6	1981-2000	15.9
1953-1972	8.3	1982-2001	12.9
1954-1973	7.4	1983-2002	8.4

*Retiring at age 62 in 2023

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 20 years to individual accounts. Sixty percent of the individual accounts earn the same rate of return as the S&P 500, minus a 1% administrative fee, and 40% of the individual accounts earns the government long-term bond rate. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	11.1%
Minimum	5.6
25th Percentile	7.7
50th Percentile	10.0
75th Percentile	13.9
Maximum	20.6
Ratio of Maximum to Minimum	3.7 to 1

Table 11. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *30* Years (Investment in 60% Stocks/40% Bonds)

Economy performs as it did in:	Value of annuity as % of Social Security	Economy performs as it did in:	Value of annuity as % of Social Security
1926-1955	14.8%	1950-1979	17.5%
1927-1956	14.2	1951-1980	24.2
1928-1957	12.1	1952-1981	21.6
1929-1958	14.3	1953-1982	19.7
1930-1959	14.9	1954-1983	23.2
1931-1960	15.5	1955-1984	20.3
1932-1961	16.3	1956-1985	17.9
1933-1962	14.4	1957-1986	19.4
1934-1963	15.3	1958-1987	19.1
1935-1964	15.7	1959-1988	19.3
1936-1965	17.0	1960-1989	23.6
1937-1966	15.2	1961-1990	21.4
1938-1967	16.8	1962-1991	22.3
1939-1968	18.9	1963-1992	20.1
1940-1969	17.8	1964-1993	22.3
1941-1970	14.5	1965-1994	21.8
1942-1971	14.4	1966-1995	25.1
1943-1972	15.8	1967-1996	27.2
1944-1973	14.0	1968-1997	27.5
1945-1974	**11.2**	1969-1998	30.3
1946-1975	12.7	1970-1999	**33.1**
1947-1976	13.3	1971-2000	26.1
1948-1977	13.1	1972-2001	21.9
1949-1978	14.0	1973-2002	14.6

*Retiring at age 62 in 2033

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 30 years to individual accounts. Sixty percent of the individual accounts earn the same rate of return as the S&P 500, minus a 1% administrative fee, and 40% of the individual accounts earns the government long-term bond rate. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	18.7%
Minimum	11.2
25th Percentile	14.6
50th Percentile	17.7
75th Percentile	21.8
Maximum	33.1
Ratio of Maximum to Minimum	3.0 to 1

Table 12. Value of Annuities as a Proportion of Social Security Benefits for Workers* Paying Into Individual Accounts for *41* Years (Investment in 60% Stocks/40% Bonds)

Economy performs as it did in:	Annuity as % of Social Security
1926-1966	19.7%
1927-1967	22.2
1928-1968	24.7
1929-1969	23.2
1930-1970	18.8
1931-1971	18.7
1932-1972	20.8
1933-1973	18.7
1934-1974	**15.3**
1935-1975	17.5
1936-1976	18.4
1937-1977	18.5
1938-1978	20.1
1939-1979	25.5
1940-1980	35.5
1941-1981	31.8
1942-1982	28.9
1943-1983	33.9
1944-1984	29.3
1945-1985	25.2
1946-1986	27.0
1947-1987	26.4
1948-1988	26.2
1949-1989	31.6
1950-1990	28.1
1951-1991	28.9
1952-1992	25.8
1953-1993	28.4
1954-1994	27.4
1955-1995	31.2
1956-1996	33.7
1957-1997	33.9
1958-1998	37.3
1959-1999	**40.7**
1960-2000	32.1
1961-2001	27.0
1962-2002	17.9

*Retiring at age 62 in 2044

Illustrations based on workers who have typical work patterns that produce the Social Security benefit of someone who always earned an average wage and who contribute 2% of pay for 41 years to individual accounts. Sixty percent of the individual accounts earn the same rate of return as the S&P 500, minus a 1% administrative fee, and 40% of the individual accounts earns the government long-term bond rate. Illustrations assume that the amount accumulated in the account is converted to a fixed life annuity based on the prevailing rate of interest on long-term U.S. bonds.

Statistical measure	Percentage of Social Security benefit
Mean (Average)	26.2%
Minimum	15.3
25th Percentile	20.6
50th Percentile	26.7
75th Percentile	31.3
Maximum	40.7
Ratio of Maximum to Minimum	2.7 to 1

**Table 13. S&P 500 Annualized Total Real Rates of Return
Over 41-Year Periods, 1926-2002**

1926-1966	8.18%
1927-1967	7.57%
1928-1968	6.76%
1929-1969	6.62%
1930-1970	7.25%
1931-1971	8.74%
1932-1972	9.04%
1933-1973	7.19%
1934-1974	6.25%
1935-1975	5.92%
1936-1976	5.59%
1937-1977	6.44%
1938-1978	5.68%
1939-1979	5.81%
1940-1980	6.50%
1941-1981	6.56%
1942-1982	6.70%
1943-1983	6.71%
1944-1984	6.36%
1945-1985	6.23%
1946-1986	7.06%
1947-1987	7.32%
1948-1988	7.67%
1949-1989	7.80%
1950-1990	6.88%
1951-1991	7.10%
1952-1992	6.84%
1953-1993	7.07%
1954-1994	5.95%
1955-1995	5.98%
1956-1996	6.32%
1957-1997	7.40%
1958-1998	7.15%
1959-1999	7.32%
1960-2000	7.01%
1961-2001	6.05%
1962-2002	5.61%

Note: Excludes administrative fees. "Annualized" means that the principal at the beginning of the period compounds over time with dividends reinvested.