CRS Report for Congress

Retirement Savings: How Much Will Workers Have When They Retire?

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Summary

Over the past 25 years, an important change has occurred in the structure of employer-sponsored retirement plans in the private sector. Although the percentage of the workforce who participate in employer-sponsored retirement plans has remained relatively stable at approximately half of all workers, the type of plan by which most workers are covered has changed from *defined benefit* (DB) pensions to *defined contribution* (DC) plans. The responsibilities of managing a DB plan — making contributions, investing the assets, and paying the benefits to retired workers and their survivors — lie mainly with the employer. In a typical DC plan, the worker must decide whether to participate in the plan, how much to contribute, how to invest the contributions, and what to do with the money in the plan when he or she changes jobs or retires. As a result of the shift from DB plans to DC plans, workers today bear more responsibility for preparing for their financial security in retirement.

According to data collected by the Federal Reserve Board, 45% of households in which the householder or spouse was employed contributed to employer-sponsored retirement plans in 2004, and 58% owned a retirement account of any kind. Among married-couple households in which the householder was under age 35, the median balance in all retirement accounts owned by the household was $19,000 in 2004. Among unmarried householders, the median retirement account balance in 2004 was just $7,000. Among married-couple households headed by individuals between 45 and 54 years old, median retirement assets in 2004 were $103,200. Unmarried householders aged 45 to 54 had a median balance of $32,000. Most households that participated in defined contribution plans in 2004 contributed between 3% and 10% of pay to the plan. Younger households with median earnings contributed about 5% of pay, while median-earnings households 45 and older contributed about 6% of pay.

The report also presents the results of an analysis of the amount of retirement savings that households might be able to accumulate by age 65 under a number of different scenarios. The analysis shows how varying the age at which households begin to save for retirement, the percentage of their earnings that they save, and the rate of return on investment can affect the amount of retirement savings the household will accumulate. Using Monte Carlo methods that simulate the variability of investment rates of return, we found that a married-couple household that contributed 8% of pay annually for 30 years beginning at age 35 to a retirement plan invested in a mix of stocks and bonds could expect have accumulated $468,000 (in 2004 dollars) by age 65 if rates of return were at the median over the 30-year period. Nevertheless, given the variability of rates of return, there is a 5% chance that the couple would have $961,000 or more and a 5% chance that the couple would have $214,000 or less. Higher contribution rates and longer investment periods lead to higher account balances, but also increase the impact of the variability of investment rates of return. At a 10% contribution rate over 30 years, the household could expect to accumulate $594,000, with a 90% probability that account would total between $301,000 and $1.2 million. Saving 8% of pay over 40 years, the household could expect to accumulate $844,000, with a 90% probability that the account would total between $370,000 and $2 million. This report will not be updated.

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Trends in Retirement Plan Design

Over the past 25 years, an important change has occurred in the structure of employer-sponsored retirement plans in the private sector. Although the percentage of the workforce who participate in employer-sponsored retirement plans has remained relatively stable at approximately half of all workers, the type of plan by which most workers are covered has changed. In 1980, the majority of workers participated in *defined benefit* (DB) pensions. (See **Table 1**.) Generally, workers in DB plans do not have to elect to participate. All covered workers earn benefits under the plan, and the benefits typically are based on the number of years of service by the employee and some measure of the worker's average salary. At retirement, benefits typically are paid as an annuity that provides the retiree with a monthly income for life. The *Employee Retirement Income Security Act of 1974* (ERISA, P.L. 101-508) requires an employer that sponsors a defined benefit (DB) plan to establish a trust fund that holds assets sufficient to pay the retirement benefits earned by the workers who participate in the plan.[1] The responsibilities of managing a DB plan — making contributions, investing the assets, and paying the benefits to retired workers and their survivors — lie mainly with the employer.

Table 1. Number of Plans and Active Participants, by Type of Plan, 1980-2003

Year	DB Plans	DB Participants	DC Plans	DC Participants
1980	148,096	30,100,000	340,805	18,886,000
1985	170,172	28,895,000	461,963	33,168,000
1990	113,062	26,205,000	599,245	35,340,000
1995	69,492	23,395,000	623,912	42,203,000
2000	48,773	22,218,000	686,878	50,874,000
2003	47,036	21,304,000	652,976	51,828,000

Note: Active participants are workers participating in plans at their current jobs.
Source: U.S. Department of Labor, *Private Pension Plan Bulletin: Abstract of Form 5500 Annual Reports*, various years.

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[1] ERISA governs only private-sector plans. Retirement plans offered by state and local governments to their employees are governed by the statutes of those jurisdictions. Retirement plans for federal employees are governed by Title 5 of the United States Code. Unlike private plans, most government-sponsored DB plans require employee contributions.

Today, a majority of workers participate in 401(k)-type plans rather than in traditional defined benefit pensions. These are called *defined contribution* (DC) plans. Defined contribution plans are much like savings accounts maintained by employers on behalf of each participating employee. In a typical DC plan, the worker must decide whether to participate in the plan, how much to contribute, how to invest the contributions, and what to do with the money in the plan when he or she changes jobs or retires. Thus, in a DC plan, it is the *employee* who bears the investment risk and who is ultimately responsible for prefunding his or her retirement income. As a result of the shift from DB plans to DC plans, workers today bear more responsibility for preparing for their financial security in retirement. Decisions that workers make — or fail to make — from the time that they first enter the workforce can have a substantial impact on their wealth and income many decades in the future. Understanding how workers have responded to these challenges and opportunities may help Congress develop policies that will assist workers in making the best possible decisions to provide for their financial security in retirement.

This CRS report presents information on trends in retirement plan design and then summarizes data collected by the Federal Reserve Board on the retirement savings accumulated by workers and the rates at which they are saving for retirement. The report also presents the results of an analysis conducted by CRS on the amount of retirement savings that workers might be able to accumulate by age 65 under a number of different scenarios. The analysis shows how varying each of several factors, including the age at which households begin to save for retirement, the percentage of their earnings that they save, and the rate of return on investment can affect the amount of retirement savings the household will accumulate. We then convert the accumulated savings into an annuity to illustrate the share of pre-retirement earnings that the accumulated retirement savings could replace.

Growing prevalence of defined contribution plans. The rapid growth of defined contribution plans began in the 1980s. In 1978, Congress added section 401(k) to the Internal Revenue Code, which allowed employees to contribute part of their current pay into a retirement plan on a pre-tax basis.[2] In 1981, the Internal Revenue Service (IRS) published regulations for "cash or deferred arrangements" established under §401(k), into which employees can make pre-tax contributions, and in which interest, dividends, and capital gains accrue on a tax-deferred basis until the money is withdrawn.[3] Since that time, DC plans have overtaken defined benefit pensions in the number of plans, the number of participants, and total assets. In 2006, only 20% of all workers in the private sector were included in defined benefit pension plans, while 43% participated in defined contribution plans. About 12% of workers participated in both types of plan.[4]

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[2] Defined contribution plans had existed for many years, but prior to enactment of I.R.C. §401(k), they were funded by employer contributions or after-tax employee contributions.

[3] 401(k) plans cover mainly workers in for-profit businesses in the private sector. Workers in non-profits are sometimes covered under 403(b) plans and workers in state and local governments are sometimes covered under 457 plans.

[4] The Labor Department reports that 51% of private sector workers were in any type of plan. Twenty percent were in DB plans and 43% were in DC plans. (43% + 20% - 51% = 12%).

DB and DC plans also differ with respect to participation. In general, all workers who meet the requirements for coverage under a DB plan automatically earn benefits under the plan. The employer prefunds the benefits that will be paid to all eligible employees when they reach retirement age. In contrast, in most DC plans, the employee must elect to participate. The employee also must decide how much to contribute to the plan, and how to invest the contributions. According to the U.S. Department of Labor, 20% of workers whose employers sponsored DC plans did not participate in these plans in 2006.[5]

One way to boost enrollment in DC plans would be to enroll all eligible employees automatically. More firms, particularly among large employers, have adopted automatic enrollment in recent years. According to the Profit Sharing/401(k) Council of America, 17% all 401(k) plans had automatic enrollment in 2005, up from 11% in 2004. Automatic enrollment had been adopted by 34% of plans with 5,000 or more participants by 2005, compared to just 4% of plans with fewer than 50 participants. The *Pension Protection Act of 2006* (P.L. 109-280) contains provisions that are intended to encourage employers to adopt automatic enrollment in defined contribution plans. Plans with this feature will be exempted from certain tests for discrimination in favor of highly-compensated employees, a practice that is prohibited by law.

With the trend away from defined benefit plans to defined contribution plans, workers now bear much of the responsibility of preparing for retirement. Workers whose employers offer savings or "thrift" plans such as those authorized under §401(k), §403(b), and §457 of the Internal Revenue Code can accumulate assets on a tax-deferred basis while they are working. Most people with earned income also can contribute to an individual retirement account (IRA). In 2007, IRA contributions of up to $4,000 (or $5,000 for people 50 and older) are tax-deductible for workers who are not covered by a retirement plan at work.[6] In these plans, taxes are paid when the funds are withdrawn, and a penalty may apply if the withdrawal occurs before retirement. Another option is to save for retirement in a Roth IRA. Roth IRAs accept *only* after-tax contributions; however, withdrawals from a Roth IRA during retirement are *tax-free*.[7]

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[5] Fifty-four percent of workers in the private sector worked for employers who sponsored defined contribution plans in 2006, and 43% of private-sector workers participated in DC plans. Assuming that all workers whose employers sponsored a DC plan were eligible to participate, these figures imply a participation rate of 80% among eligible employees. (*National Compensation Survey: Employee Benefits in Private Industry*, U.S. Department of Labor, Bureau of Labor Statistics, Summary 06-05, Aug. 2006, Table 2, page 7.)

[6] For workers who are covered by a retirement plan at work, the tax deduction phases out between $75,000 and $85,000 of adjusted gross income for a married couple filing a joint return and between $50,000 and $60,000 of adjusted gross income for a single individual.

[7] In 2007, unmarried workers can contribute to a Roth IRA if they have adjusted gross income of less than $110,000. Married couples can contribute to a Roth IRA if they have adjusted gross income of less than $160,000. Total combined contributions to both traditional IRAs and Roth IRAs cannot exceed $4,000 for workers under age 50 and $5,000 for workers age 50 and older.

The Survey of Consumer Finances

This Congressional Research Service report presents data on retirement plan participation and retirement savings account balances collected through the *Survey of Consumer Finances* (SCF) in 2004, the most recent year for which survey data are available. The SCF is an interview survey sponsored by the Board of Governors of the Federal Reserve System in cooperation with the Department of the Treasury. It is conducted once every three years to collect information on the assets and liabilities of U.S. households, the sources and amounts of their income, their demographic characteristics, employment, and participation in employer-sponsored health and retirement plans. Data from the SCF are widely used by economists at the Federal Reserve, other government agencies, and by private-sector research organizations and academic institutions to study trends in the amount and distribution of assets and liabilities among U.S. households. Since 1992, SCF data have been collected by the National Organization for Research at the University of Chicago (NORC). In 2004, 4,522 households were interviewed for the SCF, representing a total of 112.1 million U.S. households.[8]   Like all household surveys, the SCF is subject to reporting error.

Retirement Savings of American Households

According to the Survey of Consumer Finances, there were 84.7 million households with one or more workers in 2004 and in 44.5% of these households either the householder, the householder's spouse, or both participated in a defined contribution retirement plan.[9] (See **Table 2**.) Some workers do not participate because their employer does not offer a plan; however, data from the Department of Labor indicate that among workers whose employer offers a DC plan, 20% do not participate.[10]

Participation in employer-sponsored defined contribution plans varied with the age and marital status of the householder. Participation was lowest among households in which the householder was under age 35 (37%) and highest among households in which the householder was between the ages of 45 and 54 (52%). Participation was higher among married-couple households (51%) than among unmarried householders (36%), partly because married-couple households had more

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[8] This report refers to *households* rather than to *families* because, according to the researchers at the Federal Reserve Board, the unit of analysis in the SCF is more comparable to the Census Bureau's definition of a household than to its definition of a family. (For more information, see Bucks, Kennickell, and Moore, *Federal Reserve Bulletin*, 2006.)

[9] There were 112.1 million households in the U.S. in 2004, and 84.7 million households (75.6%) in which either the householder or the householder's spouse was employed at the time the survey was conducted. We counted households as participating in the plan if the household, the employer, or both contributed to a plan.

[10] See *National Compensation Survey: Employee Benefits in Private Industry*, U.S. Department of Labor, Bureau of Labor Statistics, Summary 06-05, Aug. 2006. Some workers whose employer offers a plan may not be eligible to participate if they are under age 21, have less than one year of service, or work less than 1,000 hours in a year.

workers. However, married-couple households had higher participation rates at all ages than households headed by unmarried persons.

Table 2 also shows the percentage of participating households in which either the household, the employer, or both contribute to the plan. Ninety percent of participating households reported that they contributed to the plan in which they participated, while 83% reported that the employer contributed to the plan.[11] Three-fourths of all participating households reported that both the household and the employer contributed to the plan.

Retirement account balances in 2004. Age and marital status are both important considerations when evaluating the adequacy of a household's retirement savings. Couples obviously need more income to support themselves than single persons (although they do not necessarily need twice as much income.)[12] Younger workers have more time to save than older workers, and can reap the benefits of compound interest over a longer period. As the data presented later in this report will demonstrate, workers who wait until middle age to start saving for retirement face an uphill struggle in accumulating adequate retirement assets.

Table 3 shows the retirement account balances of households that owned one or more retirement accounts in 2004, categorized by the age and marital status of the household head. The first column shows the balances in all of the DC plans at the current main jobs of the householder and his or her spouse. The second column shows the balances in all retirement accounts owned by the household, including accounts at their current jobs, balances held in accounts at former employers, and balances in individual retirement accounts (IRAs). The third column of **Table 3** shows the ratio of household retirement saving to annual household earnings. For example, in the second row of **Table 3**, we see that among married-couple households in which the householder was under age 35, the median balance in all retirement accounts owned by the household was $19,000. This amount was equal to 26.7% of the median annual earnings of those households. Similar ratios are used later in this report to illustrate a measure of the adequacy of retirement savings.

Table 3 also shows the 75th percentile and the 25th percentile retirement of account balances. At the 75th percentile, married couple households headed by persons under age 35 had total retirement assets of $44,000. In other words, three-fourths of married-couple households headed by persons under age 35 had total retirement assets of $44,000 or less in 2004, while one-fourth of all such households had total retirement assets of more than $44,000. At the 25th percentile, married couple households headed by persons under age 35 had total retirement assets of $5,400 in 2004.

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[11] In any particular instance it is possible that only the household or the employer contributed to the plan. Assuming that each household answered the survey questions correctly, those that reported that the household did not contribute to the plan would be participating on the basis of employer contributions only.

[12] In these tables, the householder is classified by his or her legal marital status at the time the interview was conducted.

Among married-couple households headed by individuals between 45 and 54 years old, median retirement assets in 2004 were $103,200. Households headed by unmarried individuals had retirement assets that were lower at every age than those of married couples, both in absolute terms and as a ratio of their current earnings. Among households headed by single persons between the ages of 45 and 54, for example, median retirement assets in 2004 were $32,000, or less than a third of the median retirement assets of married-couple households in this age group. Likewise, at the 75th percentile, households headed by unmarried individuals between the ages of 45 and 54 had total retirement assets of $80,000, compared to assets of $275,000 among married couple households in this age group. At the 25th percentile, households headed by unmarried individuals between the ages of 45 and 54 had total retirement assets of $11,400, compared to assets of $30,000 among married couple households.

Eventually, most households will have to begin spending their retirement assets. Most choose to do so through periodic withdrawals, while others choose to convert some or all of their retirement assets into a guaranteed stream of income by purchasing an annuity. An individual retiring at age 65 in January 2007 with $119,500 — the median retirement account balance among married-couple households head by persons age 55 and older — could purchase a level, single-life annuity that would pay $826 per month ($9,912 per year) or a joint and 100% survivor annuity paying $662 per month ($7,944 per year), based on the current annuity interest rate of 5.25%.[13] These amounts would replace just 19% and 15%, respectively, of the median household earnings of $52,000 among all married-couple households headed by individuals who were 60 to 64 years old in 2004.[14]

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[13] This is the interest rate on annuities issued by MetLife in January 2007.

[14] Median household earnings in 2004 were calculated by CRS from Census Bureau data.

Table 2. Household Participation in Defined Contribution Plans at Current Employer in 2004

	Households with working head or spouse[a]	Household participates in a DC plan[b]	Among participating households:		
			Household contributes to the plan	Employer(s) contribute to the plan	Both contribute to the plan
Age of householder					
Under 35	22,880	36.6%	89.1%	85.0%	77.1%
35 to 44	21,601	49.6	88.6	83.0	73.5
45 to 54	20,693	51.9	90.7	80.9	72.5
55 or older	19,499	40.5	89.9	85.4	77.6
Marital status					
Married householder	47,845	51.3	90.1	85.2	77.2
Single householder[c]	36,828	35.8	88.6	80.0	70.6
Married householder					
Under 35	9,663	46.5	88.8	86.0	79.8
35 to 44	12,530	58.8	88.8	83.7	74.1
45 to 54	12,998	55.9	91.7	85.0	77.5
55 or older	12,654	42.8	90.7	86.7	78.7
Single householder[c]					
Under 35	13,217	29.4	89.5	83.8	74.0
35 to 44	9,071	36.9	88.1	81.6	72.1
45 to 54	7,696	45.2	88.5	72.5	62.2
55 or older	6,845	36.1	88.2	82.3	75.1
Total	**84,673**	**44.5%**	**89.6%**	**83.4%**	**74.9%**

Source: CRS analysis of the Federal Reserve Board's 2004 *Survey of Consumer Finances.*

a. Households with an employed householder and/or employed spouse/partner, in thousands.
b. Householder, householder's spouse, or both participate in a defined contribution plan at work.
c. Includes householders who are widowed, divorced, separated, or never married.

Table 3. Household Retirement Account Balances in 2004

	Balance in all DC plans at current job	Total of all retirement accounts in household[a]	Ratio of total retirement savings to annual household earnings
Married householder			
Age			
Under 35			
75th percentile	$30,000	$44,000	.515
50th percentile (median)	13,000	19,000	.267
25th percentile	4,700	5,400	.094
35 to 44			
75th percentile	82,000	115,000	1.100
50th percentile (median)	35,000	47,600	.534
25th percentile	10,000	14,000	.179
45 to 54			
75th percentile	186,000	275,000	2.24
50th percentile (median)	64,000	103,200	.897
25th percentile	20,000	30,000	.321
55 and older			
75th percentile	192,000	373,000	4.830
50th percentile (median)	49,000	119,500	1.555
25th percentile	12,000	35,000	.535
Single householder			
Age			
Under 35			
75th percentile	$12,000	$16,000	.324
50th percentile (median)	5,500	7,000	.153
25th percentile	2,000	2,500	.063
35 to 44			
75th percentile	29,000	40,000	.858
50th percentile (median)	12,900	14,000	.366
25th percentile	3,900	5,000	.121
45 to 54			
75th percentile	70,000	80,000	1.731
50th percentile (median)	24,000	32,000	.860
25th percentile	7,900	11,400	.232
55 and older			
75th percentile	125,000	176,000	3.771
50th percentile (median)	25,000	65,000	1.406
25th percentile	9,000	13,000	.407

Source: Congressional Research Service analysis of the 2004 *Survey of Consumer Finances*.
a. Includes defined contribution plans from current and past jobs and individual retirement accounts (IRAs). Only accounts with balances of $1 or more are included in the percentile rankings.

Amount of contributions.   The amount that a household accumulates in a DC plan depends on the amount that the employer and employee have contributed to the plan and the investment gains or losses on those contributions. The maximum permissible annual contributions by workers and employers are limited by federal law, but few workers contribute the legal maximum.[15]   In 2004, the maximum permissible *employee* contribution to defined contribution plans was the lesser of 100% of earnings or $13,000 per worker. Workers age 50 and older were permitted to contribute an additional $3,000. The maximum total contribution, including both *employee* and *employer* contributions, was $41,000 per worker in 2004.

Table 4 shows the annualized dollar amount of contributions to defined contribution plans *per household* in 2004. **Table 5** shows household contributions, employer contributions, and total contributions as a percentage of household earnings. In both tables, the first column of data shows the amount of household contributions, the second shows the amount of employer contributions, and the third column shows the total contribution to the plan. The employer and employee contributions do not sum to the total contribution because in some cases only the household contributed to the plan, and in other cases only the employer contributed.[16]

At each age, married-couple households contributed more to DC plans than households headed by unmarried persons. Among both married-couple households and single households and across all age groups, employee salary deferrals into defined contribution plans were larger than employer contributions. (See **Table 4**.) Among married-couple households headed by persons under 35, the median household contribution in 2004 was $3,680, and the median employer contribution was $2,520. The median total contribution was $5,520. Among households headed by unmarried persons under 35, the median household contribution in 2004 was $2,080, and the median employer contribution was $1,400.   The median total contribution was $3,120.

As a percentage of pay, the contributions of married-couple households and households headed by unmarried individuals differed less than the dollar amounts of their contributions. (See **Table 5**.)   The median contribution among households headed by individuals under age 45 was about 5% for both single and married households.   Both married-couple households and singles ages 45 to 54 typically contributed about 6% of earnings. Overall, household contributions ranged from about 3% of household earnings at the 25th percentile of contributions to about 10% of household earnings at the 75th percentile of contributions.

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[15] The maximum annual deferral into a DC plan is subject to I.R.C. §402(g). As established by P.L. 107-16, the maximum employee contribution under I.R.C. §402(g) is $15,500 in 2007 and is indexed in $500 increments. Workers age 50 and older can contribute an additional $5,000. Under I.R.C. §415(c), the limit on total annual additions to defined contribution plans — comprising the sum of employer and employee contributions — is $45,000 in 2007.   The §415(c) limit is indexed in $1,000 increments.

[16] Unlike the calculation of a mean, when calculating percentiles, zero values are excluded. Therefore, although the mean household contribution and mean employer contribution sum to the mean total contribution, the median household contribution and median employer contribution do not necessarily sum to the total median contribution.

Table 4. Contributions to Employer-sponsored Plans in 2004
(in 2004 dollars)

	Household contribution to DC plan	Employer contribution to DC plan	Total contribution to DC plan
Married householder			
Age			
Under 35			
75th percentile	$6,960	$4,080	$10,400
50th percentile (median)	3,680	2,520	5,520
25th percentile	1,800	1,350	3,120
35 to 44			
75th percentile	8,800	5,500	13,160
50th percentile (median)	4,440	2,880	6,600
25th percentile	2,280	1,560	3,600
45 to 54			
75th percentile	11,400	6,440	14,700
50th percentile (median)	6,000	3,120	8,760
25th percentile	2,880	1,600	4,440
55 and older			
75th percentile	12,000	6,210	15,960
50th percentile (median)	5,400	3,000	7,860
25th percentile	2,280	1,320	3,640
Single householder			
Age			
Under 35			
75th percentile	$3,960	$2,520	$5,640
50th percentile (median)	2,080	1,400	3,120
25th percentile	960	780	1,560
35 to 44			
75th percentile	3,600	3,380	6,760
50th percentile (median)	2,340	1,900	3,600
25th percentile	1,200	960	2,080
45 to 54			
75th percentile	5,400	3,800	8,400
50th percentile (median)	3,120	2,200	4,320
25th percentile	1,800	1,100	2,400
55 and older			
75th percentile	9,240	3,600	12,000
50th percentile (median)	4,200	2,040	5,760
25th percentile	1,800	1,080	2,300

Note: Employer and employee contributions do not sum to the total because in some cases only the household contributed to the plan, and in other cases only the employer contributed.
Source: Congressional Research Service analysis of the 2004 *Survey of Consumer Finances*.

Table 5. Contributions to Employer-sponsored Plans in 2004
(As a percentage of household earnings)

	Household contribution to DC plan	Employer contribution to DC plan	Total contribution to DC plan
Married householder			
Age			
Under 35			
75th percentile	9.3%	5.1%	13.8%
50th percentile (median)	5.1	3.1	8.1
25th percentile	2.9	2.0	4.8
35 to 44			
75th percentile	8.3	6.0	12.2
50th percentile (median)	5.3	3.6	8.4
25th percentile	3.1	2.3	5.2
45 to 54			
75th percentile	9.4	5.9	13.8
50th percentile (median)	6.2	3.7	9.1
25th percentile	4.0	2.4	6.1
55 and older			
75th percentile	10.4	6.1	15.8
50th percentile (median)	6.7	4.0	10.2
25th percentile	3.8	2.3	6.0
Single householder			
Age			
Under 35			
75th percentile	7.7%	5.1%	11.5%
50th percentile (median)	4.7	3.4	7.4
25th percentile	3.0	2.2	4.7
35 to 44			
75th percentile	8.1	7.0	12.7
50th percentile (median)	5.5	4.9	9.7
25th percentile	4.0	2.4	5.9
45 to 54			
75th percentile	10.1	7.3	14.9
50th percentile (median)	6.0	5.0	10.0
25th percentile	4.0	3.1	6.1
55 and older			
75th percentile	13.1	7.5	19.8
50th percentile (median)	9.7	4.1	13.2
25th percentile	4.9	3.0	7.1

Note: Employer and employee contributions do not sum to the total because in some cases only the household contributed to the plan, and in other cases only the employer contributed.
Source: Congressional Research Service analysis of the 2004 *Survey of Consumer Finances*.

How much might workers accumulate by Age 65?

In the previous section, we described the amounts that households had accumulated in retirement savings accounts and how much they were contributing to their retirement plans in 2004, as reported in the Federal Reserve Board's *Survey of Consumer Finances*. In this section, we use income data from the Census Bureau's *Current Population Survey* and statistical software that simulates the variability of investment rates of return to estimate future retirement account balances and to demonstrate how several variables can affect the amount of retirement savings that households could accumulate by age 65.[17]

As was shown by the data displayed in **Table 2**, only 45% of working households participated in employer-sponsored defined contribution plans in 2004. Some households that did not participate in employer-sponsored plans saved for retirement in individual retirement accounts (IRAs), but data from the SCF indicate that most households that did not participate in an employer-sponsored plan also did not own an IRA.[18] Households that do not save for retirement may be reducing their future incomes significantly, but by how much? If a household starts to save, what variables might affect the amount that they have accumulated by the time the householder reaches age 65? We address these questions in this section of the report.

As we noted in the introduction, workers must decide not only whether to save for retirement, but also how much to save, how to invest their savings, and what to do with their accumulated savings each time they change jobs and when they reach retirement. A number of variables can affect the amount that households have accumulated in their retirement accounts by the time they reach retirement age, including:[19]

- household earnings;
- the amount that the household saves;
- the age at which the householder begins to save, and thus the number of years over which contributions and investment earnings accumulate; and
- the average annual rate of return earned by the household's retirement account.

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[17] We used the CPS rather than the SCF as the source of earnings because its much larger sample size (more than 70,000 households) allowed us to estimate household earnings among married-couple and unmarried householders by individual year of age rather than in age groups. Our estimates of future retirement accumulations are based on annual contributions as a percentage of earnings. Therefore, the SCF asset data were not needed.

[18] According to the 2004 SCF, 38.8 million households had balances in DC plans in 2004, 32.6 million households owned an IRA, and 15.0 million had both a DC plan and an IRA. Of 73.3 million U.S. households that did not own a DC plan from current or past employment in 2004, only 17.6 million (24.0%) owned an IRA. (CRS Report RL30922, *Retirement Savings and Household Wealth: Trends from 2001 to 2004* by Patrick Purcell)

[19] Households may have wealth other than retirement accounts, including other financial assets and/or a home that they own. This report focuses on retirement savings accounts.

Methods. To estimate household savings, we also had to estimate household earnings. For the base year of our analysis, we estimated earnings in 2004 at every age from 25 through 64 for married-couple and unmarried households at the 75th, 50th, and 25th percentiles of earnings from the March 2005 CPS. This produced an age-earnings-marital status matrix with 240 cells. (See **Appendix Table A-1**.) For each later year in the simulation, we increased earnings by 1.1%, which is the estimated long-run growth rate of real wages as projected by the Office of the Actuary of the Social Security Administration. For example, the median earnings in 2004 of a married-couple household headed by a 25 year-old was $41,000. To estimate the same household's earnings one year later when the householder would be age 26, we multiplied the the 2004 median earnings of married-couple households headed by a 26-year-old ($45,600) by 1.011, which resulted in estimated household earnings of $46,102. The following year, when the householder would be age 27, we estimated household earnings as $51,106, which is the 2004 earnings of a married-couple household headed by a 27 year-old, ($50,000) multiplied by 1.011^2. We repeated the process for each household through age 64. For simplicity, we assumed that married-couple households would remain married-couple households throughout the period of the analysis and that unmarried households would remain unmarried.

Having estimated household earnings each year, we next had to choose the percentage of earnings that each household would contribute to its retirement account annually. The data on contribution rates from the 2004 Survey of Consumer Finances indicated that most households contribute between 3% and 10% of earnings to their employer-sponsored retirement plan. Based on these data, we estimated the retirement savings that would accumulate by age 65, assuming that households contributed either 6%, 8%, or 10% of household earnings to the account every year, starting at age 25, age 35, or age 45.[20] Assuming the householder retires at age 65, these starting dates would result in periods of saving for retirement lasting 40 years, 30 years, and 20 years, respectively. Households that do not save every year would accumulate less than we have estimated for those that contribute consistently.

To estimate the amount that households would have accumulated in their retirement account by age 65, we had to estimate the annual rate of return on the funds invested in those accounts. Rather than assume that the rate of return in each year would be the long-term average rate of return on a mixed portfolio of stocks and bonds, we used a *Monte Carlo* simulation process in which the rate of return in each year was randomly selected from the range of likely rates of return implied by the historical returns on stocks and bonds. Many financial advisors recommend that investors shift their portfolios away from stocks and into bonds as they approach retirement. Therefore, in our simulations, households allocated 65% of assets to the *Standard & Poor's 500* index of stocks from the ages of 25 to 34, 60% to stocks from 35 to 44, 55% to stocks from 45 to 54, and 50% to stocks after age 55. In each case, the remainder of the portfolio was assumed to be invested in AAA-rated corporate bonds. The accounts were re-balanced after each year of the simulation so that the portfolio would start the next year at the chosen allocation between stocks and bonds. The model also takes into account the correlation between stock and bond returns.

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[20] The amounts represent the total annual contribution to the plan, as a percentage of earnings. We do not differentiate between worker contributions and employer contributions.

What is "Monte Carlo" Analysis?

Monte Carlo analysis is a method of estimating the probable outcome of an event in which one or more of the variables affecting the outcome are random. The term was coined by mathematicians in the 1940s who likened probability analysis to studying the games of chance played in the casinos of Monte Carlo. One common use of Monte Carlo simulations is to illustrate how the variability of investment rates of return can affect the amount that workers will accumulate in a retirement account. The essence of a Monte Carlo estimation process is to simulate an event many times, allowing the random variable to vary according to its mathematical mean and variance, and then rank each outcome according to the likelihood of its occurrence. Using Monte Carlo methods, we can estimate not just the result that will occur "on average," but also the likelihood of results that are significantly above or below the average. In other words, Monte Carlo methods of estimation allow us to incorporate into our estimates the element of *risk*.

Monte Carlo estimation methods utilize not just the average value of a random variable, but also the distribution of values around the average. For example, rates of return in the stock market vary from year to year. The nominal rate of return on the *Standard & Poor's 500* index of stocks averaged 10.0% between 1926 and 2005, but annual rates of return varied widely around this average, producing a standard deviation of 19.7%. Likewise, while the nominal annual return on AAA-rated corporate bonds averaged 6.3% between 1926 and 2005, the standard deviation around this average was 7.1%. (Appendix **Table A2** shows annual rates of return.)

To estimate the likely rate of return that an investment would achieve over a 40-year period, for example, Monte Carlo simulation software generates a rate of return for each year based on the distribution of probable rates of return, as derived from historical data. The program then simulates the 40-year period a second time, again generating a rate of return for each year from the probability distribution of rates of return. The process is repeated until the simulation is completed, and thousands of 40-year investment periods have been simulated. The results of the simulation — in this case, investment rates of return — are then ranked by percentiles.

In our simulation of a 40-year period in which 100% percent of assets were invested in common stocks, the mean real rate of return in 5,000 iterations (simulating a 40-year period 5,000 times) was 6.8%, which is the same as the actual mean real rate of return on common stocks in the period from 1926 through 2005. (1.10/1.03 = 1.068) However, in 5% of those 5,000 iterations, the mean real rate of return over the 40-year period was 1.5% or less, while at the other extreme, in 5% of the 5,000 iterations, the mean real rate of return over the 40-year period was 12.1% or more. In terms of evaluating risk, these results imply an expected annual average real rate of return on common stocks over any given 40-year period of 6.8%, and a 90% probability that the average annual real rate of return over that period will be between 1.5% and 12.1%. With this information about the likely range of outcomes, a household might choose to save more or less than they had been saving before, depending on their tolerance for risk.

Simulation Results: Retirement Account Balances at Age 65

In Figures 1 through 4, we illustrate the likely range of retirement savings that would be accumulated by married-couple households and unmarried householders with high, medium, and low earnings, based on several different contribution rates, lengths of investment period, and investment rates of return. We refer to households with earnings at the 75th percentile for their age and marital status as "high earners," and to those with earnings at the 50th and 25th earnings percentiles as "median earners" and "low earners," respectively.

Variability of investment rates of return. **Figure 1** illustrates how the variability of investment rates of return can affect the amount of retirement assets that households accumulate. In this example, we estimated the value of a retirement account balance at age 65 for a married-couple household with median earnings that, beginning at age 35, contributed 8% of earnings each year for 30 years to an account that was invested in a mix of stocks and bonds. Each of the 1,000 simulations of a 30-year investment period produced a unique mean rate of return for the 30-year period. Of these, the median real rate of return over the 30-year period was 5.5% At this rate of return, the household's retirement account balance (in 2004 dollars) would be $468,000 when the householder reached age 65.

Figure 1. Effect of variability in investment rates of return on retirement savings at age 65
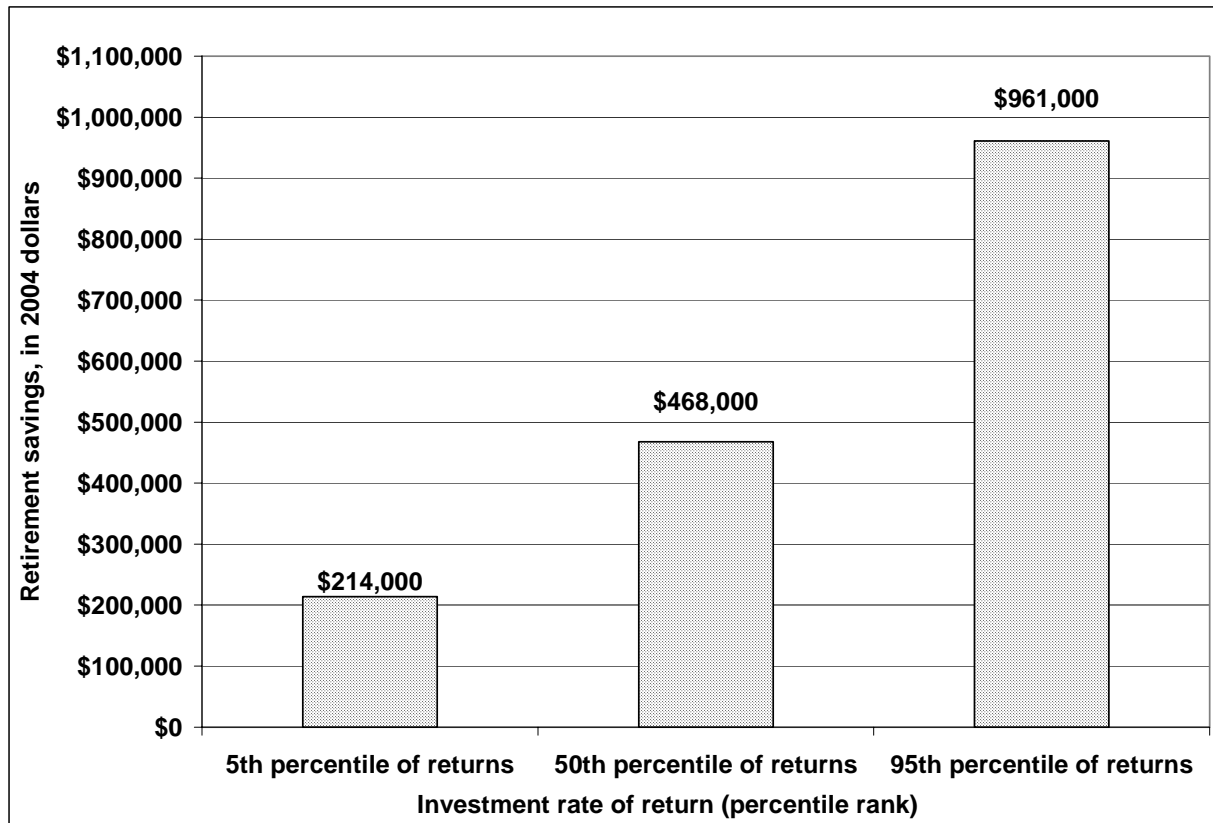
Note: Retirement savings at age 65 of a married-couple household with median earnings that contributes 8% of pay annually for 30 years beginning at age 35, by investment rate of return.
Source: Congressional Research Service.

Figure 1 also shows what this household would accumulate in its retirement account if the average rate of return over the 30-year investment period was significantly higher than average or lower than average. Based on the history of stock and bond returns from 1926 through 2005, and given the allocation of investment assets that we chose, there is a 5% chance that the household's retirement account would earn an average annual real rate of return of 1.7% or less over the 30-year investment period. The historical record of returns suggests that such a low rate of return has approximately a one-in-twenty chance of occurring in any given 30-year period. In the event that investment returns were at the 5th percentile, the household would have $214,000 (in 2004 dollars) in its retirement account when the householder reached age 65. This is less than half of the amount that it would have accumulated if the average rate of return over the 30-year period were equal to the median real rate of return of 5.5%.

On the other hand, stock and bond markets might perform better-than-average over the period when the household is saving for retirement, in which case it will accumulate more assets than it would have in a period of average investment returns. Based on historical returns, in any 30-year investment period, there is a 95% probability that the average real rate of return on the mix of assets in the household's retirement account would be 9.3% or less. However, there is a 5% chance that average real rate of return would be higher than 9.3%. If the household were to attain a 9.3% average real rate of return on its investments over 30 years, it would have a retirement account balance of $961,000 (in 2004 dollars) at age 65. The amounts displayed in **Figure 1** illustrate that variability in rates of return will inevitably lead to some uncertainty in retirement planning. Households can decide when to begin saving for retirement and how much to save, but variability in rates of return is beyond their control and yet has a great impact on their assets at retirement.

Length of investment period. The age at which a worker starts saving for retirement can dramatically affect the amount that he or she has accumulated at retirement age. Beginning to save at a younger age results in larger total contributions and allows investment gains to compound over a longer time. **Figure 2** shows the retirement account balance at age 65 of a married-couple with median household earnings that contributes 8% of pay each year to a retirement account invested in a mix of stocks and bonds over periods of 20, 30, and 40 years. The household that begins saving at age 25 saves for 40 years, while the households that begin saving at ages 35 and 45 save for 30 years and 20 years, respectively. For each of the three investment periods, we show the account balance at age 65 if the average rate of return for the investment period were equal to the median rate of return, and if the average rate of return were significantly below the median (at the 5th percentile of likely rates of return) or significantly above the median (at the 95th percentile of likely rates of return).

If the couple were to begin saving at age 25 and earned the median rate of return over 40 years, their account balance at age 65 would be $844,000 (in 2004 dollars). Delaying the start of retirement saving until age 35 would result in an account balance of $468,000, or just 55% of the amount they would have accumulated had they started saving at age 25. Waiting until age 45 to begin saving for retirement would result in an account balance of $213,000 at 65, or one-fourth of the amount they would have had at 65 if they had contributed 8% a year starting at age 25.

Of course, a couple that delays the start of saving until age 45 might get lucky and invest during a period of above-average rates of return. For example, if rates of return during the twenty years when they were saving were in the 95th percentile of the likely rates of return, the couple would accumulate $372,000 (in 2004 dollars) by age 65, or about 75% more than if rates of return during that period were at the 50th percentile. On the other hand, even a couple that begins to save at age 25 may have the misfortune to invest during a period of below-average returns. A couple with median household earnings that contributes an amount equal to 8% of earnings annually for 40 years to a retirement account that is invested in a mix of stocks and bonds could expect to accumulate $844,000 (in 2004 dollars) by age 65 if investment returns over that period were in the 50th percentile of likely returns, but they would have just $370,000 if investment returns were at the 5th percentile of likely rates of return. Workers cannot control the variability of investment rates of return, but they can choose to begin saving while they are young. As the data presented in **Figure 2** demonstrate, this usually will lead to much greater wealth at retirement than they could achieve if they were to wait until 35 or 45 to begin saving.

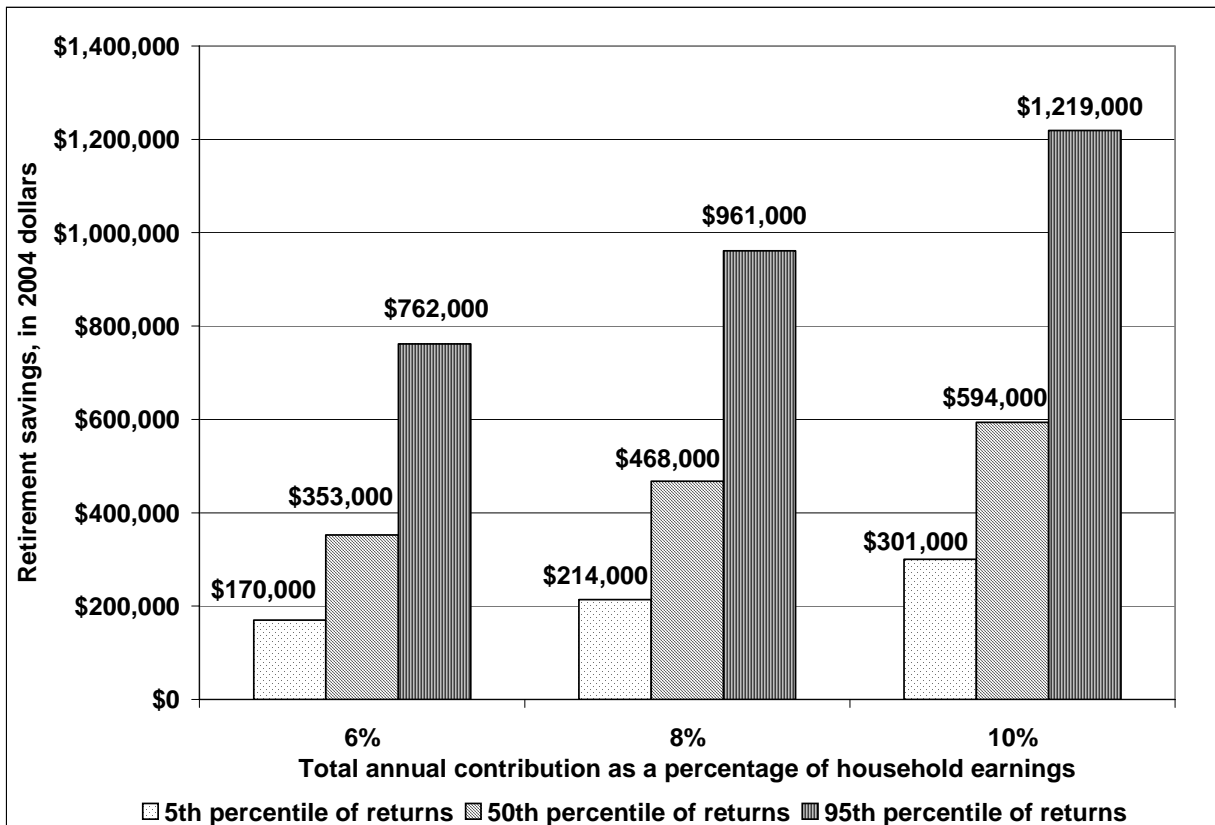**Figure 2. Effect of age at which saving begins on retirement savings at age 65**
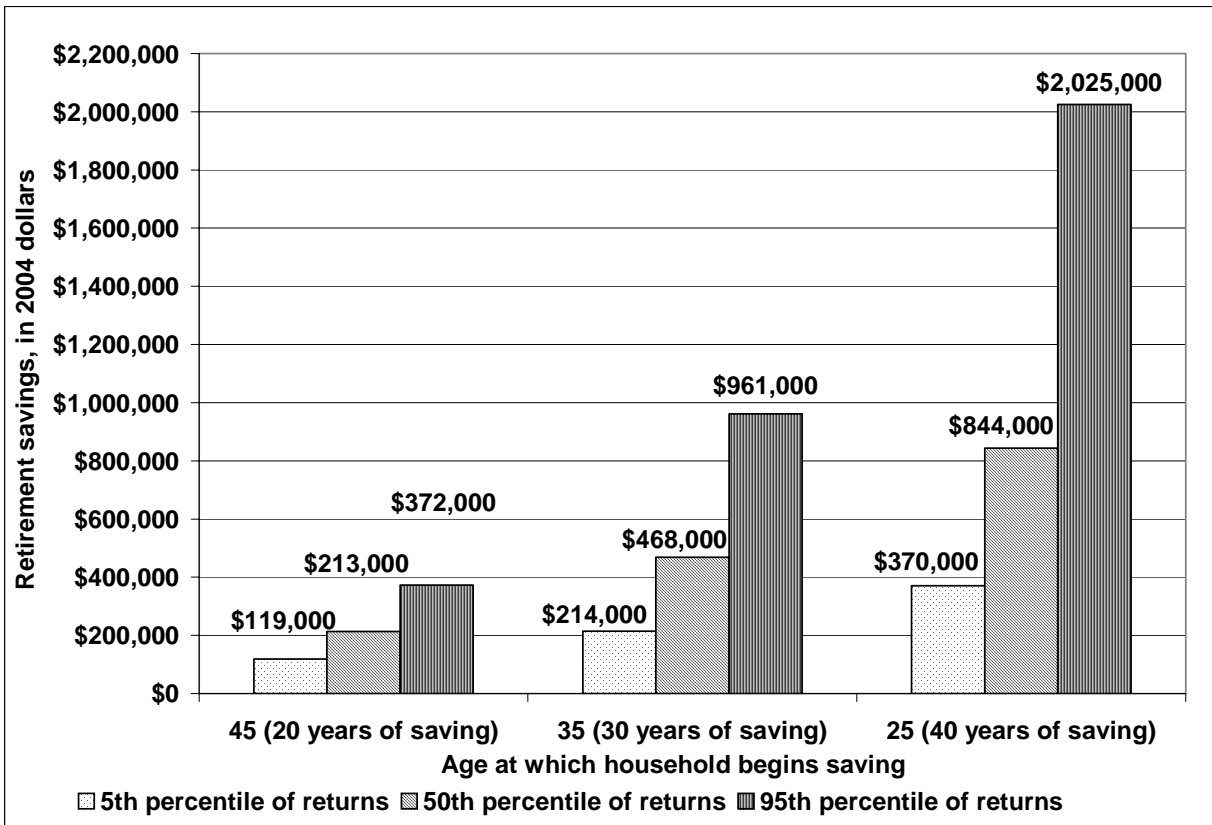
Note: Retirement savings at age 65 of a married-couple household with median earnings that contributes 8% of earnings annually beginning at age 35, by age at which saving begins and investment rate of return
Source: Congressional Research Service.

Contribution rates. **Figure 3** illustrates the effect of contribution rates on retirement savings. A married-couple household that contributed 6% of household earnings each year to a retirement account invested in a mix of stocks and bonds starting at age 35 would accumulate $353,000 (in 2004 dollars) by age 65 if the real rate of return over that period were at the 50th percentile of likely rates of return. By contributing 8% of earnings, the household would have $468,000 by age 65, or 33% more than if they had contributed 6% of pay to their account. Had the couple contributed 10% per year for 30 years, their account balance at age 65 would be $594,000, or 68% higher than the amount resulting from a 6% annual contribution.

Variation in rates of return can affect retirement accumulations significantly, even for those who contribute a greater amount to their retirement account. For example, the results displayed in **Figure 3** show that if the average real rate of return over 30 years were in the 5th percentile of likely rates of return, a couple that contributed 6% of pay annually to a retirement account invested in a mix of stocks and bonds could expect to have accumulated just $170,000 (in 2004 dollars) by age 65. This is less than a quarter of the amount that they would have accumulated if rates of return during that period had been at the 95th percentile. Similarly, with returns at the 5th percentile, a couple contributing 10% of earnings annually will have accumulated $301,000 by age 65, or about half of what they would have accumulated at the median rate of return, and only a quarter of the $1.2 million that would have accumulated if rates of return were at the 95th percentile of likely rates of return.

Figure 3. Effect of annual contribution rate on retirement savings at age 65

Note: Retirement savings at age 65 of a married-couple household with median earnings that contributes for 30 years beginning at age 35, by annual contribution and investment rate of return.
Source: Congressional Research Service.

Household earnings. **Figure 4** shows account balances at age 65 (in 2004 dollars) for married couples at three different earnings levels, assuming that they contributed 8% of earnings each year beginning at age 35 to a retirement account invested in a mix of stocks and bonds. A married-couple household with median earnings would have accumulated $468,000 (in 2004 dollars) by age 65 if stock and bond market returns were at the median during the 30-year investment period. A high-earning household with earnings at the 75th percentile would have accumulated $706,000 dollars, while a low-earning household with earnings at the 25th percentile would have accumulated just $289,000.

Figure 4. Effect of household earnings on retirement savings at age 65
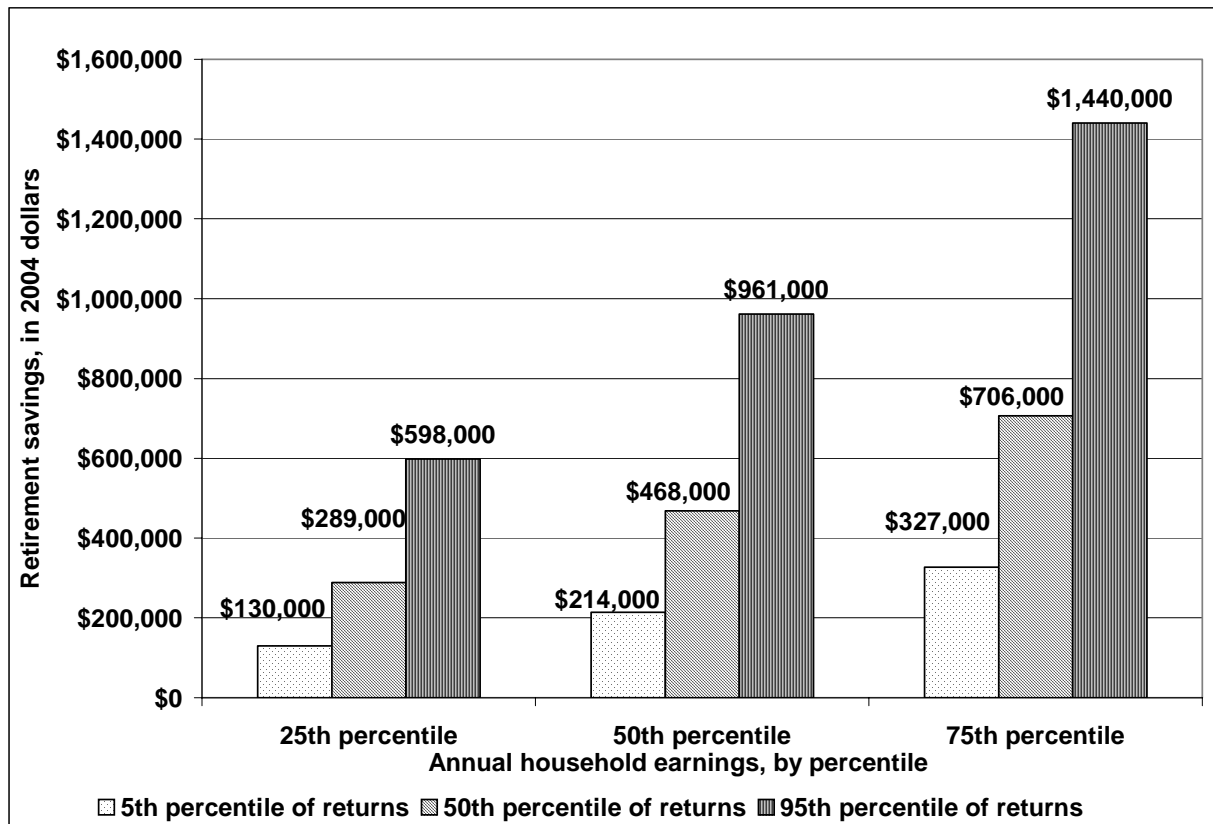
Note: Retirement savings at age 65 of a married-couple household that contributes 8% of household earnings for 30 years beginning at age 35, by annual household earnings and investment rate of return.
Source: Congressional Research Service.

Simulation Results: Measuring retirement income adequacy

For most people, the main purpose of saving for retirement is to have money available to replace the earnings that they will lose when they stop working. The proverbial "three-legged stool" of retirement income — private pensions, Social Security, and personal savings — is missing a leg for many households because the number of defined benefit pensions has declined substantially over the past 25 years. Most workers in the U.S. — about 96% — are covered by Social Security, but Social Security is not designed to replace all of a worker's earnings.[21] The Social Security Administration estimates that for a career-long average-wage earner retiring at the full retirement age, Social Security will replace about 41% of their career-average earnings. For a career-long low-wage earner, Social Security will replace an estimated 55% of average earnings. For a career-long high-wage earner, Social Security will replace just 27% of their average earnings.

The percentage of pre-retirement earnings that is replaced by Social Security, pensions, or other income is called the earnings replacement rate. The estimated value of retirement accounts at age 65 in constant 2004 dollars is an *absolute* measure of retirement assets. The earnings replacement rate is a *relative* measure of retirement assets. To calculate earnings replacement rates, we first needed to decide on an appropriate measure of earnings. For most households, a relevant measure would be their average earnings in the years just before they reach retirement age. As our measure of pre-retirement earnings, we used average household earnings of married-couple and single-person households headed by persons 60 to 64 years old. We used average earnings in 2004 as reported on the CPS for households headed by persons 60 to 64 years old as the base measure of earnings, and projected these amounts forward at a growth rate of 1.1 percent per year.

To calculate the earnings replacement rate from households' retirement savings, we converted the account balance into a stream of income. We did this by calculating the annuity value of the retirement account. An annuity is a contract between an individual and a financial institution — usually an insurance company — in which, in exchange for a premium paid by the annuity purchaser, the insurer promises to pay the individual an income for life or for a fixed period of years. The premium for an "immediate income" annuity is usually a single payment, which the insurer then invests. A life annuity insures the purchaser (and his or her surviving spouse in the case of a joint and survivor annuity) against longevity risk, which is the risk that the individual will outlive his or her retirement assets. We calculated the percentage of pre-retirement earnings that would be replaced if the household's entire retirement account balance were converted to a life annuity.[22] For example, if a

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[21] Most workers not covered by Social Security are employees of state and local governments that have elected not to participate. These governments are required to provide them with pensions. About one-fourth of state and local workers are not in Social Security.

[22] We defined pre-retirement earnings as average household earnings in the five years before the householder reached age 65. For most households, earnings peak when the householder is between 50 and 60 years old. Also, the annuity values are based on converting the entire account balance to an annuity, and thus illustrate the maximum replacement rate that could

(continued...)

married-couple household with median earnings contributed an amount equal to 8% of earnings to a retirement account each year for 30 years and earned the median rate of return over that period of time, the couple would have accumulated $468,000 (in 2004 dollars) when the householder reached age 65. In January 2007, this amount would purchase a joint and 100% survivor annuity that would replace 42% of the household's average annual earnings in the five years before the householder reached age 65.[23] (On the CPS, income is reported before taxes. The replacement rate here is pre-tax annuity income divided by pre-tax earnings.)

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[22] (...continued)
be achieved from converting the household's retirement account to an annuity.

[23] The annuity values were calculated on [http://www.immediateannuities.com]. For married couples, they represent the income from a level, joint and 100% survivor annuity for a couple in which the husband is age 65 and the wife is age 62. For unmarried households, they represent the income from a level, single-life annuity for a male householder who is 65 years old. An annuity purchased by a woman age 65 with the same account balance would provide a smaller annual income because women have longer life expectancies than men.

Annuities: Insurance against longevity risk

Workers who reach retirement age with the bulk of their retirement wealth in a retirement account face the risk that if they withdraw money too quickly, they may outlive their assets. Income annuities provide protection against this risk by pooling the mortality risk of everyone who purchases an annuity. Some annuity purchasers will die before reaching their normal life expectancy, which offsets the costs to the insurer of paying income to those who live longer than their normal life expectancy. Despite offering a guaranteed income, no matter how long the purchaser and his or her insured spouse may live, the market for income annuities in the United States remains relatively small.

Why aren't income annuities more popular? One reason for the slow growth of the annuity market is that purchasing an annuity is not without risks. First, annuities tend to be purchased by people who, because of good health and family history, expect to live longer than average. Because annuity purchasers tend to have longer-than-average life expectancy, insurers must charge premiums that are higher than they would be if annuity purchasers were a random cross-section of the population. Because annuities are priced according to the longer life-expectancy of people who actually buy them, a person with average life expectancy may find that an annuity is not a good deal. Second, the annuity purchaser could die earlier than he or she expects, in which case the annuity premium will, in essence, have been forfeited to the insurer. There are many types of annuities that reduce this risk, such as joint and survivor annuities and term-certain annuities, but each of these guarantees reduces the income that the annuity pays during the life of the purchaser.

Most annuities offer only limited protection against inflation. A level annuity pays a fixed monthly amount for life. The real value of the annuity declines over time as prices rise. Some annuities offer partial inflation protection. Graded annuities increase the monthly payment by a fixed percentage — typically 3% — each year, but they pay a smaller initial amount and also lose value if inflation exceeds the guaranteed percentage increase in the annuity. Some insurers now offer inflation-indexed annuities, but they are very expensive and few have been sold. Another risk in buying an annuity is that giving up a substantial proportion of one's retirement assets to an insurer could leave a household with inadequate resources to pay for any large expenses that may arise, such as medical costs or long-term care expenses.

Benefits from life annuities could help assure that people who have most of their retirement wealth in a retirement account do not exhaust their assets before they die and spend their later years in or near poverty, but inducing more people to purchase income annuities remains a challenge for many insurers.

Measuring earnings replacement rates. Figures 1 through 4 illustrate how variation in rates of return, length of investment period, contribution rates, and household income can affect the amount of retirement savings that households have accumulated by age 65. **Figure 5** combines in a single graph the effect that variation in investment rate of return, length of investment period, and contribution rates can have on earnings replacement rates for a married-couple household with median household earnings. In this graph, the value of the household's retirement account at age 65 (measured in 2004 dollars) has been converted to a joint and 100% survivor annuity, and the income from the annuity is compared to average household earnings over the five years before retirement.

On the vertical axis, the graph shows the annuity value of the household's retirement account, measured as the percentage of average pre-retirement earnings the annuity would replace. On the horizontal axis, we show three investment periods of 20, 30, and 40 years, which correspond in our analysis to saving for retirement starting at ages 45, 35, and 25, respectively. The vertical bars show the range of replacement rates that could be achieved from converting the household's retirement account to a joint and 100% survivor annuity at age 65, depending on the percentage of pay that the household contributed to its account each year and the investment rate of return. On each bar, the replacement rates corresponding to low, average, and high rates of return are represented by the square, circle, and diamond, respectively. For example, the left-most (and shortest) vertical bar in **Figure 5** shows that if a married couple with median earnings invested 6% of household earnings for 20 years, their retirement account balance at age 65 could purchase an annuity that would pay an amount equal to just 8% of their final average pay, assuming that investment returns over the 20-year period were in the 5th percentile of likely returns. The annuity value of their account would replace 14% of their final average earnings if investment returns were at the median, and the annuity would replace 27% of their final average pay if investment returns over the 20-year period were in the 95th percentile of likely returns.

Moving from left to right across **Figure 5**, the vertical bars representing earnings replacement rates both begin and end at higher replacement rates, representing the effects on retirement savings of higher contribution rates and longer investment periods. The greater length of the bars as contribution rates rise and investment periods grow longer illustrates the impact that variability of rates of return can have on retirement account accumulations, and in turn on the annuity income that one could purchase with those accounts. Looking at the left-most panel, we see that if a household were to begin saving 8% of earnings at age 45, the annuity value of its retirement account could vary by more than 20 percentage points, depending on whether the real rate of return in the period is significantly above average (at the 95th percentile of returns) or significantly below average (at the 5th percentile of returns.) After a 20-year period of high investment returns, a median-earning couple saving 8% of earnings per year would have a retirement account balance that, if converted to an annuity, could replace 33% of its average pre-retirement earnings. If investment returns during that period are significantly below average, however, the annuity value of their retirement account would replace just 11% of the couple's pre-retirement average earnings.

The longer the investment period, the greater the difference in retirement accumulations that results from the variability of returns. After a 40-year period of high investment returns (at the 95th percentile of likely returns), a median-earning couple saving 8% of earnings per year would have a retirement account balance that, if converted to an annuity, could replace 180% of its average pre-retirement household earnings. In other words, if they converted their entire retirement account to an annuity, the income would be almost twice their average household earnings in the five years preceding retirement. If investment returns during that period were significantly below average (at the 5th percentile of likely returns), the annuity value of their retirement account would replace only about one-third of the couple's pre-retirement average earnings.

The account balance that a household would accumulate over 40 years of investing during a period of below-average returns would be much less than the amount that the couple would have accumulated if they'd had the good fortune to have invested during a period of above-average rates of return. Nevertheless, in our simulations the annuity value of an account accumulated by contributing 8% of earnings over 40 years of very low investment returns was almost the same as the annuity value of an account accumulated by contributing 8% of earnings over a 20-year period of well above-average investment returns. Workers who begin to save at a young age can accumulate substantial retirement assets even in periods of low returns, and they will be far better off at retirement than those who delay saving in the event that investment returns are at or above the historical average.

Figure 5. Estimated range of earnings replacement rates at age 65 for a married-couple household with median earnings
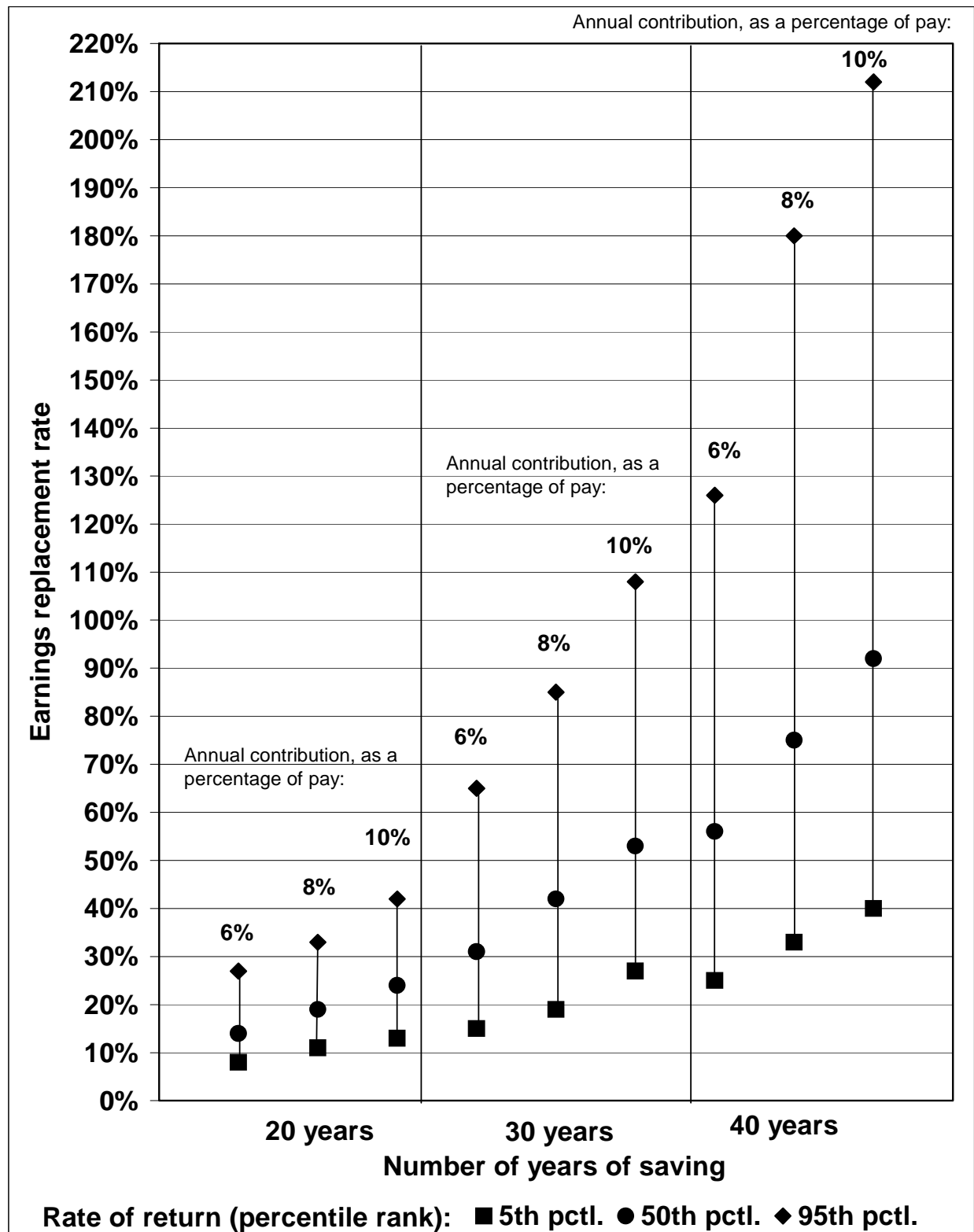
Married couples versus singles. The data presented in Figures 1 through 5 illustrate account balances for married-couple households at age 65 under specific assumptions about the age at which savings begin, annual contribution rates, investment rates of return, and household earnings. **Figure 6** compares the accumulated retirement savings at age 65 (in 2004 dollars) of married-couple households and unmarried householders with median earnings who contribute 8% of earnings beginning at age 35 to a retirement account invested in a mix of stocks and bonds. Account balances are higher for married couples because their higher earnings produce larger contributions, but as the data presented in **Figure 7** demonstrate, if the couple purchases a joint and 100% survivor annuity, their earnings replacement rate would be lower than that of an unmarried householder purchasing a single-life annuity.[24]

If, over a 30-year investment period, total rates of return on stocks and bonds were at their historical median, a married-couple with median earnings that contributed 8% of pay annually to a retirement plan invested in a mix of stocks and bonds could accumulate an estimated $468,000 (in 2004 dollars) by age 65. This is almost twice as much as the estimated $247,000 that would be accumulated by an unmarried householder with median earnings contributing 8% of pay to a retirement account over the same period. Nevertheless, the annuity value of the retirement account, expressed as a percentage of pre-retirement earnings, would be higher for the unmarried householder than for the married-couple household. (See **Figure 7**.) The higher earnings replacement rate for the unmarried householders is due largely to the fact that in these examples, the annuity estimates are based on a joint and 100% survivor annuity for the married-couple household and a single-life annuity for the unmarried householder. If the married-couple household elected to purchase an annuity without a survivor benefit (i.e., a single-life annuity based on the age of the householder), their annuity income would be higher during the life of the annuity purchasers, but the surviving spouse would no longer receive annuity income after the death of the annuity purchaser.

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[24] Married-couple households have higher earnings than unmarried households mainly because they are more likely to have multiple earners.

Figure 6. Estimated retirement savings at age 65 of married couple and unmarried householders
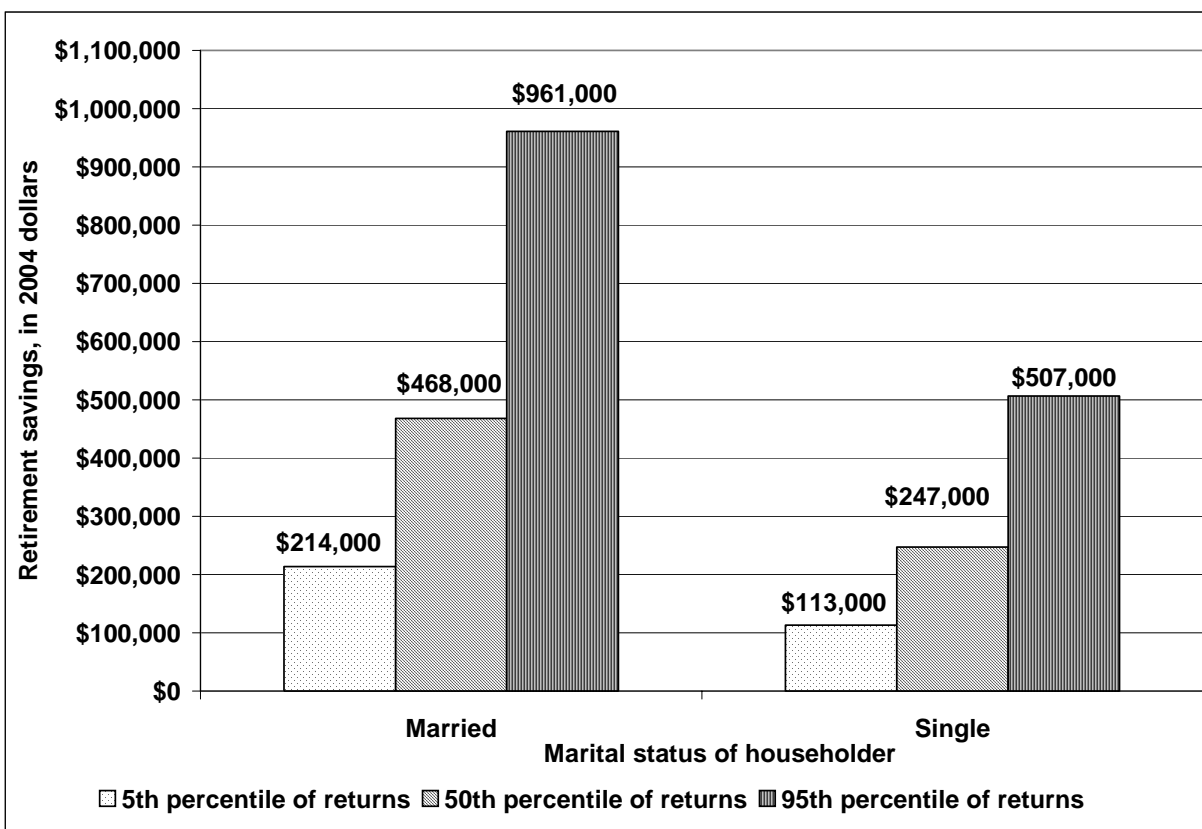
Note: Retirement savings at age 65 of married couples and singles with median household earnings who contribute 8% of household earnings for 30 years, by investment rate of return.
Source: Congressional Research Service.

Figure 7. Earnings replacement rates at age 65 of married couples and unmarried householders
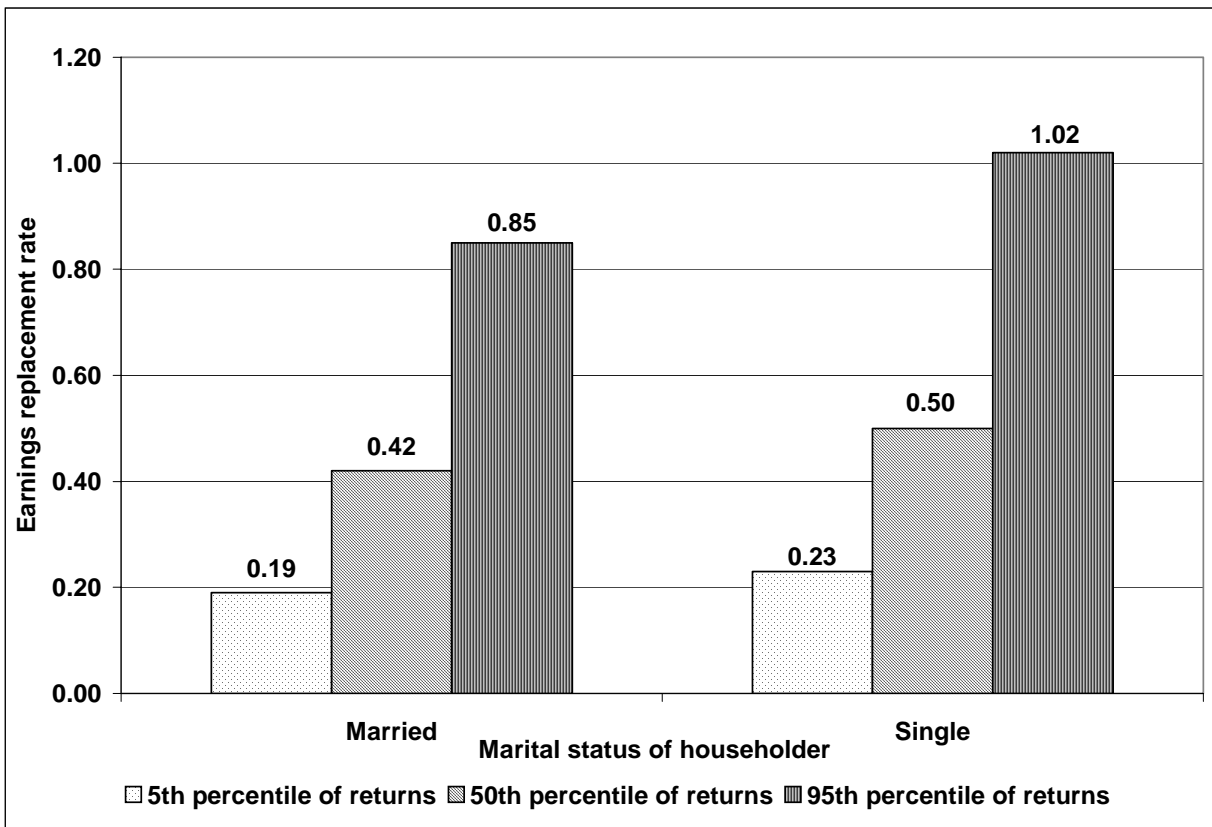
Note: Earnings replacement rate at age 65 of married couples and singles with median household earnings who contribute 8% of household earnings for 30 years, by investment rate of return.
Source: Congressional Research Service.

Detailed simulation results. **Table 6** displays the estimated retirement account balances (in 2004 dollars) at age 65 for households that contribute an amount equal to 8% of household earnings to a retirement account for periods of 40 years (beginning at age 25), 30 years (beginning at age 35), and 20 years (beginning at age 45). Retirement account accumulations are shown both for married-couple households and unmarried householders with high, median, and low career-average earnings. These earnings levels are represented by households with earnings at the 75th percentile, 50th percentile, and 25th percentile among households of the same age and marital status. Similar tables showing retirement account balances resulting from contributions equal to 6% of earnings and 10% of earnings are shown in the appendix to this report. (See **Table A3** and **Table A4**.)

For each of six types of household, as defined by household earnings and the marital status of the householder, **Table 6** shows the estimated retirement account balance at age 65 resulting from annual contributions equal to 8% of pay over periods of 20, 30, and 40 years, depending upon whether the average real rate of return on investment during that period was at the 95th, 50th, or 5th percentile of likely returns. For example, a median-earning married-couple household that began contributing 8% of pay annually at age 35 to a retirement account invested in a mix of stocks and bonds could expect, *on average*, to have accumulated $468,000 (in 2004 dollars) in

its retirement account by age 65. This is the amount that would result if investment returns over those 40 years fell in the middle — the 50th percentile — of the likely range of possible returns, based on the distribution of real rates of total return on stocks and bonds that occurred between 1926 and 2005. If rates of return over the investment period were well above average — at the 95th percentile of likely returns — the household's estimated retirement account balance at age 65 would be $961,000 (in 2004 dollars). On the other hand, if the average rate of return earned over the investment period was well below average — at the 5th percentile of likely rates of return — the household would have accumulated just $214,000 (in 2004 dollars) by age 65.

Table 6 also displays two relative measures of retirement savings: the ratio of the account balance to the household's average earnings in the five years before the householder reached age 65 and the annuity value of the retirement account balance at age 65. For example, the estimated retirement account balance at age 65 of $468,000 (in 2004 dollars) for a median-earning married-couple household that contributed 8% of pay annually to a retirement account over 40 years beginning at age 25 would be equal to 7.0 times the household's average earnings (in 2004 dollars) during the five years when the householder was ages 60 to 64. Based on current interest rates, if this amount were converted to a level, joint and 100% survivor annuity, it would replace an estimated 42% of the household's average earnings in the five years that the householder was ages 60 to 64. In our simulations, given an annual retirement plan contribution equal to 8% of earnings, the ratio of account balances at age 65 to household earnings from ages 60 to 64 ranged from a low of 1.8 times earnings for low-earning married-couple and unmarried households that begin to save at age 45 and invest during a period of low investment returns to a high of 31times earnings for a high-earning unmarried householder who begins saving at age 25 and invests during a period of high investment returns. Replacement rates ranged from a low of 10% for low-earning married-couple households and 12% for low-earning unmarried households who invest in a period of below-average returns to 202% for high-earning married-couple households and 257% for high-earning unmarried households who invest in a period of above-average returns.

Table 6. Retirement Savings and Income Replacement Rates, Based on Annual Total Contributions Equal to 8% of Household Earnings
(Amounts in 2004 dollars)

	Married householder Annual household earnings			Unmarried householder Annual household earnings		
	75th percentile	50th percentile	25th percentile	75th percentile	50th percentile	25th percentile
Household begins saving at age 25 (40 years of saving)						
95th percentile of returns						
Account balance	2,997,000	2,025,000	1,267,000	1,880,000	1,184,000	698,000
Savings/Final 5 avg. pay	23.5	27.1	30.4	26.8	28.7	31.0
Earnings replacement rate	**1.56**	**1.80**	**2.02**	**2.22**	**2.38**	**2.57**
50th percentile of returns						
Account balance	1,259,000	844,000	526,000	772,000	484,000	285,000
Savings/Final 5 avg. pay	9.9	11.3	12.6	11.0	11.8	12.7
Earnings replacement rate	**0.66**	**0.75**	**0.84**	**0.91**	**0.98**	**1.05**
5th percentile of returns						
Account balance	555,000	370,000	228,000	333,000	208,000	122,000
Savings/Final 5 avg. pay	4.4	4.9	5.5	4.7	5.1	5.4
Earnings replacement rate	**0.29**	**0.33**	**0.36**	**0.39**	**0.34**	**0.45**
Household begins saving at age 35 (30 years of saving)						
95th percentile of returns						
Account balance	1,440,000	961,000	598,000	813,000	507,000	297,000
Savings/Final 5 avg. pay	12.6	14.3	15.9	12.9	13.7	14.7
Earnings replacement rate	**0.75**	**0.85**	**0.95**	**0.96**	**1.02**	**1.09**
50th percentile of returns						
Account balance	706,000	468,000	289,000	397,000	247,000	145,000
Savings/Final 5 avg. pay	6.2	7.0	7.7	6.3	6.7	7.1
Earnings replacement rate	**0.37**	**0.42**	**0.46**	**0.47**	**0.50**	**0.53**
5th percentile of returns						
Account balance	327,000	214,000	130,000	182,000	113,000	66,000
Savings/Final 5 avg. pay	2.9	3.2	3.5	2.9	3.0	3.2
Earnings replacement rate	**0.17**	**0.19**	**0.21**	**0.22**	**0.23**	**0.24**
Household begins saving at age 45 (20 years of saving)						
95th percentile of returns						
Account balance	565,000	372,000	224,000	310,000	194,000	113,000
Savings/Final 5 avg. pay	5.5	6.2	6.6	5.5	5.8	6.2
Earnings replacement rate	**0.29**	**0.33**	**0.36**	**0.37**	**0.39**	**0.42**
50th percentile of returns						
Account balance	326,000	213,000	128,000	179,000	111,000	65,000
Savings/Final 5 avg. pay	3.2	3.5	3.8	3.2	3.3	3.6
Earnings replacement rate	**0.17**	**0.19**	**0.20**	**0.21**	**0.22**	**0.24**
5th percentile of returns						
Account balance	185,000	119,000	70,000	101,000	62,000	36,000
Savings/Final 5 avg. pay	1.8	2.0	2.1	1.8	1.9	2.0
Earnings replacement rate	**0.10**	**0.11**	**0.11**	**0.12**	**0.13**	**0.13**

Source: Congressional Research Service.

Policy considerations

The uncertain future of Social Security and the declining prevalence of defined-benefit pensions that provide a guaranteed lifelong income have put much of the responsibility for preparing for retirement directly on workers. Saving for retirement will be especially important for workers who are not included in a defined-benefit pension where they are employed, which includes about 80% of all workers in the private sector. Even among those who are saving for retirement, retirement account balances are generally low when compared to household earnings. As the data displayed in **Table 3** showed, the median account balance in 2004 among married-couple households headed by persons 55 to 64 years old was equal to just 1.6 times the median earnings of those households. Among unmarried householders between the ages of 55 and 64, median retirement savings were equal to just 1.4 times median earnings.

The low rate of personal saving in the United States and the lack of any retirement savings accounts among millions of American households indicate that there is a need for greater awareness among the public about the importance of setting aside funds to prepare for life after they have stopped working. Most workers in the United States will need to begin saving more of their income if they wish to maintain a standard of living in retirement comparable to that which they enjoyed while working. The alternatives would be to work longer or to greatly reduce their standard of living in retirement.

Employers in the United States are not required to offer pensions to their employees and workers are not required to save for retirement. Because both of these activities are voluntary, most policy proposals for boosting workers' retirement saving are intended to make workers more aware of the importance of saving and to make the act of saving easier for both workers and employers. Although most defined contribution plans continue to require employees to elect to participate, a growing number of plans have adopted automatic enrollment of eligible workers, and the *Pension Protection Act of 2006* (P.L. 109-280) included provisions intended to encourage more employers to adopt automatic enrollment in their retirement plans.[25] Another option to boost retirement saving would be to promote greater use of payroll deduction for individual retirement accounts (IRAs). Because IRAs are not employer-sponsored plans, there would be little administrative burden for employers, and payroll deduction would be an easy way for workers to send money directly to a retirement account.[26]

The Pension Protection Act also made permanent the Retirement Savings Tax Credit, originally enacted in 2001, and provided for indexing the income thresholds over which the credit is phased out. Some policy analysts have suggested that if this

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[25] See CRS Report RS21954, *Automatic Enrollment in 401(k) Plans*. The PPA also allows taxpayers to instruct the IRS to direct a portion of their income tax refund into an IRA.

[26] See "Pursuing Universal Retirement Security Through Automatic IRAs," joint written statement of David C. John and J. Mark Iwry, testimony before Subcommittee on Long-Term Growth and Debt Reduction, Committee on Finance, United States Senate, June 29, 2006. [http://www.senate.gov/~finance/hearings/testimony/2005test/062906testdjmi.pdf]

credit were made refundable, it would encourage more lower-income workers to save for retirement.[27]   Another proposal would disregard amounts in retirement savings plans for purposes of determining eligibility for certain means-tested federal aid programs. Both of these proposals were included in S. 2431 (Baucus) of the 109th Congress. On the employer side, it has been proposed to give employers a tax credit for the cost of maintaining retirement savings plans to encourage more employers to offer such plans. S. 2431 of the 109th Congress included such a credit.

With respect to promoting secure lifetime income for retirees, policy proposals have focused on providing incentives for people to purchase life annuities. For example, under one proposal, individuals would not pay federal taxes on one-half of the income generated by annuities that promise lifetime payments. There would be an annual limit of $20,000 on the amount of annuity income that an individual could exclude from federal taxes each year.[28]   Another policy option would be to require employers that offer defined contribution plans to offer retiring workers the opportunity to purchase an annuity through the employer, as is currently required of defined benefit plans.

Conclusion

Are Americans saving adequately for retirement? There is no simple answer to this question because circumstances vary so greatly from one household to another. Data from the Federal Reserve Board's Survey of Consumer Finances indicate that fewer than half of all working households participated in an employer-sponsored retirement savings plan in 2004, and fewer than a third of all working households owned an individual retirement account. For this report, we estimated the amounts that married-couple households and unmarried householders with high, medium, and low earnings could accumulate in their retirement accounts by age 65, depending on the percentage of earnings that they save, the age at which they begin saving, and the total real rate of return in stock and bond markets during the period that they are investing. Two of these three variables — the contribution rate and the age at which they begin to save — are more or less under the control of the worker.

As the results displayed in **Figure 5** illustrate, starting to save while young and doing so consistently every year is perhaps the single most effective way to assure that one reaches retirement with adequate savings. For a household with median annual earnings, even a relatively low annual contribution equal to 6% percent of earnings will, at the median likely rate of return, grow over 40 years to an amount that, if converted to an annuity, would replace more than half of the household's average pre-retirement earnings. At a 10% percent contribution rate, the annuity value of the account would replace more than 90% of the household's pre-retirement earnings, assuming rates of return are at the median. It is also important to note that our estimates are based on the assumption that the household contributes to a retirement plan every year for a period of 20, 30, or 40 years. Because of

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[27] See CRS Report RS21795, *The Retirement Savings Tax Credit: A Fact Sheet* by Patrick Purcell.

[28] This proposal was included in H.R. 819/S. 381, "The Retirement Security for Life Act of 2005" of the 109th Congress.

interruptions in employment, unexpected expenses, and other reasons, many households do not contribute to a retirement plan every year.

Unfortunately, we cannot safely assume that rates of return over the next 20, 30, or 40 years will be "average." In our analysis, we simulated the variability in rates of return through a Monte Carlo process. We found that, although the average annual rate of total return over 30 years on the mixed portfolio of stocks and bonds that we chose for our analysis would be 5.5%, there was a 5% chance that the real rate of return would be 1.7% or lower and a 5% chance that it would be 9.3% or higher. This variability in rates of return is something over which workers have no control, and which will inevitably lead to some uncertainty in retirement planning. While it may be easier for workers to focus on what they are likely to accumulate in their retirement accounts "on average," ignoring the variability of investment rates of return could lead to poor decisions that might be avoided if workers were better informed about the way that variability in investment rates of return can affect their retirement savings over time. A worker who is told that the most likely real rate of return on his or her investments is 5.5% might save more or less than if he or she were told that the most likely real rate of return will be between 1.7% and 9.3%. Both statements are true, but the second more clearly conveys the uncertainty that characterizes any estimate of likely future rates of return on investment.

Appendix

Table A1. Household Earnings in 2004, by Age and Marital Status of Householder and Percentile Rank of Earnings

	Married Householder			Unmarried Householder		
Age	75th percentile	50th percentile	25th percentile	75th percentile	50th percentile	25th percentile
25	$60,500	$41,000	$27,271	$52,000	$33,000	$19,200
26	63,400	45,600	30,000	52,784	35,000	20,000
27	73,000	50,000	32,000	56,000	35,000	20,000
28	75,600	54,000	34,150	55,100	36,000	20,000
29	78,000	52,000	34,000	55,000	35,000	22,900
30	82,000	58,200	37,500	55,000	35,000	22,000
31	86,000	55,000	34,000	55,000	34,000	20,000
32	87,000	59,500	35,000	54,000	35,000	20,000
33	90,000	60,000	37,000	54,000	32,000	20,000
34	90,000	60,800	38,000	55,000	35,000	21,000
35	95,000	63,500	42,000	55,000	35,000	20,000
36	95,000	66,000	42,000	60,000	36,000	22,000
37	95,400	65,000	39,440	56,000	35,000	20,000
38	100,000	67,200	42,000	58,800	37,000	20,000
39	100,000	65,000	42,000	56,880	34,187	20,000
40	100,000	70,000	45,400	60,000	37,000	22,500
41	97,000	65,000	42,000	55,000	36,000	22,000
42	102,950	68,990	42,000	55,960	36,000	22,000
43	105,000	69,210	44,000	55,000	34,900	21,000
44	109,000	73,000	45,000	58,000	35,000	20,000
45	109,500	71,200	42,400	57,000	37,000	22,000
46	101,800	70,000	44,000	60,000	40,000	23,215
47	108,944	74,000	47,000	61,000	40,000	21,000
48	111,000	73,000	45,000	63,000	37,000	22,000
49	105,000	73,900	46,200	56,000	36,000	21,000
50	109,400	75,000	48,000	60,000	35,000	20,000
51	105,000	70,000	41,744	55,700	37,000	21,860
52	105,000	73,000	44,920	64,000	38,000	23,000
53	109,000	72,800	44,930	62,000	37,000	24,000
54	112,900	73,500	42,000	58,000	35,000	19,000
55	103,000	69,000	40,000	54,000	34,000	19,000
56	100,000	65,000	37,000	52,000	35,000	23,000
57	105,118	66,000	40,000	56,000	36,000	20,800
58	102,000	63,916	32,000	56,000	32,657	20,000
59	100,000	58,488	36,000	51,600	32,300	20,000
60	90,000	56,500	31,000	52,500	32,000	19,000
61	94,000	55,000	33,000	44,000	28,000	17,000
62	88,000	55,000	28,000	50,000	28,000	14,272
63	85,000	44,000	26,000	46,000	25,000	13,000
64	73,000	41,908	22,833	44,000	26,000	12,800

Source: Congressional Research Service analysis of the March 2005 *Current Population Survey*.

Table A2. Annual Total Return on Stocks and Bonds and Annual Rate of Change in the Consumer Price Index, 1926-2005

Year	S&P 500	AAA Bonds	CPI-U	Year	S&P 500	AAA Bonds	CPI-U
1926	8.6%	6.3%	-1.1%	1966	-10.1%	-0.3%	3.5%
1927	33.6%	6.6%	-2.3%	1967	24.0%	-1.2%	3.0%
1928	39.0%	3.4%	-1.2%	1968	11.1%	22.5%	4.7%
1929	-10.8%	4.3%	0.6%	1969	-8.4%	-2.5%	6.2%
1930	-27.4%	6.3%	-6.4%	1970	3.9%	11.2%	5.6%
1931	-45.2%	-2.4%	-9.3%	1971	14.3%	9.7%	3.3%
1932	-7.6%	12.2%	-10.3%	1972	19.0%	8.3%	3.4%
1933	56.5%	5.3%	0.8%	1973	-14.7%	3.0%	8.7%
1934	3.0%	9.7%	1.5%	1974	-26.5%	0.2%	12.3%
1935	42.8%	6.9%	3.0%	1975	37.2%	11.0%	6.9%
1936	31.9%	6.2%	1.4%	1976	24.0%	14.6%	4.9%
1937	-33.2%	2.6%	2.9%	1977	-7.1%	5.5%	6.7%
1938	27.6%	4.4%	-2.8%	1978	6.6%	1.8%	9.0%
1939	1.6%	4.3%	0.0%	1979	18.6%	-1.6%	13.3%
1940	-7.5%	4.5%	0.7%	1980	32.4%	-5.0%	12.5%
1941	-10.6%	1.8%	9.9%	1981	-4.9%	9.0%	8.9%
1942	16.7%	3.1%	9.0%	1982	21.5%	34.9%	3.8%
1943	26.9%	3.4%	3.0%	1983	22.5%	7.3%	3.8%
1944	19.6%	3.1%	2.3%	1984	6.3%	17.1%	3.9%
1945	37.1%	3.5%	2.2%	1985	31.7%	29.5%	3.8%
1946	-5.7%	2.6%	18.1%	1986	18.6%	20.9%	1.1%
1947	3.6%	0.5%	8.8%	1987	5.3%	-1.6%	4.4%
1948	2.5%	3.7%	3.0%	1988	16.5%	13.8%	4.4%
1949	20.4%	4.3%	-2.1%	1989	31.6%	15.3%	4.6%
1950	29.9%	1.9%	5.9%	1990	-3.1%	8.6%	6.1%
1951	20.4%	-0.2%	6.0%	1991	30.4%	15.9%	3.1%
1952	13.8%	3.4%	0.8%	1992	7.6%	10.6%	2.9%
1953	1.4%	2.1%	0.7%	1993	10.1%	14.7%	2.7%
1954	49.0%	4.7%	-0.7%	1994	1.3%	-2.4%	2.7%
1955	24.5%	1.1%	0.4%	1995	37.5%	22.0%	2.5%
1956	9.8%	-1.8%	3.0%	1996	22.9%	4.2%	2.8%
1957	-9.9%	4.5%	2.9%	1997	33.3%	10.9%	2.2%
1958	43.3%	0.9%	1.8%	1998	28.6%	10.9%	1.5%
1959	12.0%	0.2%	1.7%	1999	21.0%	-3.0%	2.6%
1960	0.5%	6.7%	1.4%	2000	-9.1%	11.7%	3.5%
1961	26.9%	3.7%	0.7%	2001	-11.9%	11.5%	2.6%
1962	-8.7%	6.2%	1.3%	2002	-22.1%	11.2%	1.5%
1963	22.8%	3.2%	1.6%	2003	28.7%	9.2%	2.3%
1964	16.5%	4.0%	1.0%	2004	10.9%	6.5%	2.5%
1965	12.5%	2.1%	1.9%	2005	4.9%	7.8%	4.7%

			Annual average, 1926 to 2005:	10.0%	6.3%	3.0%
			Standard deviation:	19.7%	7.1%	4.3%

Source: Congressional Research Service, compiled from various sources.

Table A3. Retirement Savings and Income Replacement Rates, Based on Annual Total Contributions Equal to 6% of Household Earnings

(Amounts in 2004 dollars)

	Married householder Annual household earnings			Unmarried householder Annual household earnings		
	75th percentile	50th percentile	25th percentile	75th percentile	50th percentile	25th percentile
Household begins saving at age 25 (40 years of saving)						
95th percentile of returns						
Account balance	$2,141,000	$1,447000	$910,000	$1,357,000	$856,000	$503,000
Savings/Final 5 avg. pay	16.8	19.4	21.8	19.4	20.8	22.4
Earnings replacement rate	**1.12**	**1.29**	**1.45**	**1.61**	**1.72**	**1.85**
50th percentile of returns						
Account balance	932,000	625,000	389,000	569,000	357,000	210,000
Savings/Final 5 avg. pay	7.3	8.4	9.3	8.1	8.7	9.3
Earnings replacement rate	**0.49**	**0.56**	**0.62**	**0.67**	**0.72**	**0.77**
5th percentile of returns						
Account balance	426,000	282,000	174,000	253,000	159,000	93,000
Savings/Final 5 avg. pay	3.3	3.8	4.2	3.6	3.8	4.1
Earnings replacement rate	**0.22**	**0.25**	**0.28**	**0.30**	**0.32**	**0.34**
Household begins saving at age 35 (30 years of saving)						
95th percentile of returns						
Account balance	1,084,000	726,000	453,000	617,000	384,000	225,000
Savings/Final 5 avg. pay	9.5	10.8	12.1	9.8	10.4	11.1
Earnings replacement rate	**0.57**	**0.65**	**0.72**	**0.73**	**0.77**	**0.83**
50th percentile of returns						
Account balance	533,000	353,000	218,000	299,000	186,000	109,000
Savings/Final 5 avg. pay	4.7	5.2	5.8	4.7	5.0	5.4
Earnings replacement rate	**0.28**	**0.31**	**0.35**	**0.35**	**0.37**	**0.40**
5th percentile of returns						
Account balance	260,000	170,000	104,000	144,000	90,000	52,000
Savings/Final 5 avg. pay	2.3	2.5	2.8	2.3	2.4	2.6
Earnings replacement rate	**0.14**	**0.15**	**0.17**	**0.17**	**0.18**	**0.19**
Household begins saving at age 45 (20 years of saving)						
95th percentile of returns						
Account balance	458,000	301,000	181,000	251,000	157,000	91,000
Savings/Final 5 avg. pay	4.4	5.0	5.4	4.4	4.7	5.0
Earnings replacement rate	**0.24**	**0.27**	**0.29**	**0.30**	**0.32**	**0.34**
50th percentile of returns						
Account balance	244,000	159,000	95,000	134,000	83,000	48,000
Savings/Final 5 avg. pay	2.4	2.6	2.8	2.4	2.5	2.7
Earnings replacement rate	**0.13**	**0.14**	**0.15**	**0.16**	**0.17**	**0.18**
5th percentile of returns						
Account balance	144,000	93,000	55,000	79,000	49,000	28,000
Savings/Final 5 avg. pay	1.4	1.5	1.6	1.4	1.5	1.5
Earnings replacement rate	**0.07**	**0.08**	**0.09**	**0.09**	**0.10**	**0.11**

Source: Congressional Research Service.

Table A4. Retirement Savings and Income Replacement Rates, Based on Annual Total Contributions Equal to 10% of Household Earnings

(Amounts in 2004 dollars)

	Married householder Annual household earnings			Unmarried householder Annual household earnings		
	75th percentile	50th percentile	25th percentile	75th percentile	50th percentile	25th percentile
Household begins saving at age 25 (40 years of saving)						
95th percentile of returns						
Account balance	3,516,000	2,381,000	1,501,000	2,223,000	1,400,000	825,000
Savings/Final 5 avg. pay	27.6	31.9	36.0	31.7	34.0	36.7
Earnings replacement rate	**1.83**	**2.12**	**2.39**	**2.11**	**2.82**	**3.04**
50th percentile of returns						
Account balance	1,542,000	1,036,000	645,000	960,000	603,000	354,000
Savings/Final 5 avg. pay	12.1	13.9	15.5	13.7	14.6	15.7
Earnings replacement rate	**0.80**	**0.92**	**1.03**	**1.14**	**1.21**	**1.31**
5th percentile of returns						
Account balance	672,000	445,000	274,000	402,000	251,000	148,000
Savings/Final 5 avg. pay	5.3	6.0	6.6	5.7	6.1	6.6
Earnings replacement rate	**0.35**	**0.40**	**0.44**	**0.48**	**0.51**	**0.54**
Household begins saving at age 35 (30 years of saving)						
95th percentile of returns						
Account balance	1,822,000	1,219,000	761,000	1,033,000	644,000	377,000
Savings/Final 5 avg. pay	15.9	18.1	20.3	16.4	17.4	18.6
Earnings replacement rate	**0.95**	**1.08**	**1.21**	**1.22**	**1.30**	**1.39**
50th percentile of returns						
Account balance	897,000	594,000	365,000	502,000	312,000	183,000
Savings/Final 5 avg. pay	7.8	8.8	9.7	8.0	8.4	9.0
Earnings replacement rate	**0.47**	**0.53**	**0.58**	**0.59**	**0.63**	**0.67**
5th percentile of returns						
Account balance	459,000	301,000	184,000	256,000	159,000	93,000
Savings/Final 5 avg. pay	4.0	4.5	4.9	4.1	4.3	4.6
Earnings replacement rate	**0.24**	**0.27**	**0.29**	**0.30**	**0.32**	**0.34**
Household begins saving at age 45 (20 years of saving)						
95th percentile of returns						
Account balance	721,000	474,000	285,000	395,000	247,000	144,000
Savings/Final 5 avg. pay	7.0	7.8	8.5	7.0	7.4	7.9
Earnings replacement rate	**0.38**	**0.42**	**0.45**	**0.47**	**0.50**	**0.53**
50th percentile of returns						
Account balance	410,000	267,000	160,000	225,000	140,000	81,000
Savings/Final 5 avg. pay	4.0	4.4	4.7	4.0	4.2	4.5
Earnings replacement rate	**0.21**	**0.24**	**0.25**	**0.27**	**0.28**	**0.30**
5th percentile of returns						
Account balance	234,000	151,000	89,000	129,000	79,000	46,000
Savings/Final 5 avg. pay	2.3	2.5	2.6	2.3	2.4	2.5
Earnings replacement rate	**0.12**	**0.13**	**0.14**	**0.15**	**0.16**	**0.17**

Source: Congressional Research Service