PERSPECTIVE

The Influence of Automatic Enrollment, Catch-Up, and IRA Contributions on 401(k) Accumulations at Retirement

by Sarah Holden and Jack VanDerhei[1]

INTRODUCTION AND SUMMARY

Over the past quarter century, there has been a shift in the pension landscape in the United States toward defined contribution plans and, in particular, 401(k) plans. At year-end 2004, about 43 million 401(k) plan participants[2] had accumulated $2.1 trillion in plan assets.[3] Nevertheless, whether many individuals' 401(k) plan accumulations will provide significant income in retirement has become a public policy concern in recent years. The validity of such a concern cannot be assessed by looking at the 401(k) accumulations of today's retirees because these individuals have not participated in 401(k) plans throughout their working years.

The Employee Benefit Research Institute (EBRI) and the Investment Company Institute (ICI) have collaborated to develop the EBRI/ICI 401(k) Accumulation Projection Model.[4] This

---

[1] Sarah Holden, Senior Economist, Research Department at the Investment Company Institute, and Jack VanDerhei, Temple University, Employee Benefit Research Institute Fellow. Special thanks to Luis Alonso, Research Analyst at EBRI, who maintains the EBRI/ICI database and to Craig Copeland, Senior Research Associate at EBRI, who tabulated Current Population Survey (CPS) and Survey of Consumer Finances (SCF) data for some modules of the model.

[2] See Cerulli Associates (2004).

[3] See Investment Company Institute (2005).

[4] The EBRI/ICI 401(k) Accumulation Projection Model is part of an ongoing collaborative research effort between the Employee Benefit Research Institute and the Investment Company Institute. In this ongoing research effort, known as the EBRI/ICI Participant-Directed Retirement Plan Data Collection Project, EBRI and ICI gather data from some of their members that serve as plan recordkeepers. The data include demographic information, annual contributions, participant account balances, asset allocations, and loan balances. The year-end 2003 EBRI/ICI database contains information on 15.0 million 401(k) plan participants in 45,152 plans, holding $776.0 billion in assets (see Holden and VanDerhei (August 2004)).

model examines how 401(k) assets *might* contribute to retirement income for future retirees based on decisions workers make throughout their careers: whether or not to participate in the 401(k) plan, what amounts to contribute, how to allocate assets, whether to tap assets prior to retirement, and whether to preserve assets when changing jobs. Holden and VanDerhei (November 2002) present results from this comprehensive model, which projects the portion of pre-retirement income that retirees *might* replace in their first year of retirement with 401(k) accumulations,[5] whether the balances are held with employers or in rollover individual retirement accounts (IRAs).

The model provides a baseline scenario that ages a group of 401(k) participants in their late twenties or early thirties at year-end 2000 through a full career to retirement at age 65. The baseline scenario assumes continuous employment and 401(k) plan coverage for the group's entire working lives. It also assumes that as the group ages they behave similarly to current participants at the same age, tenure, and income levels.

Public Policy Implications

This research makes several findings that have public policy implications, including:
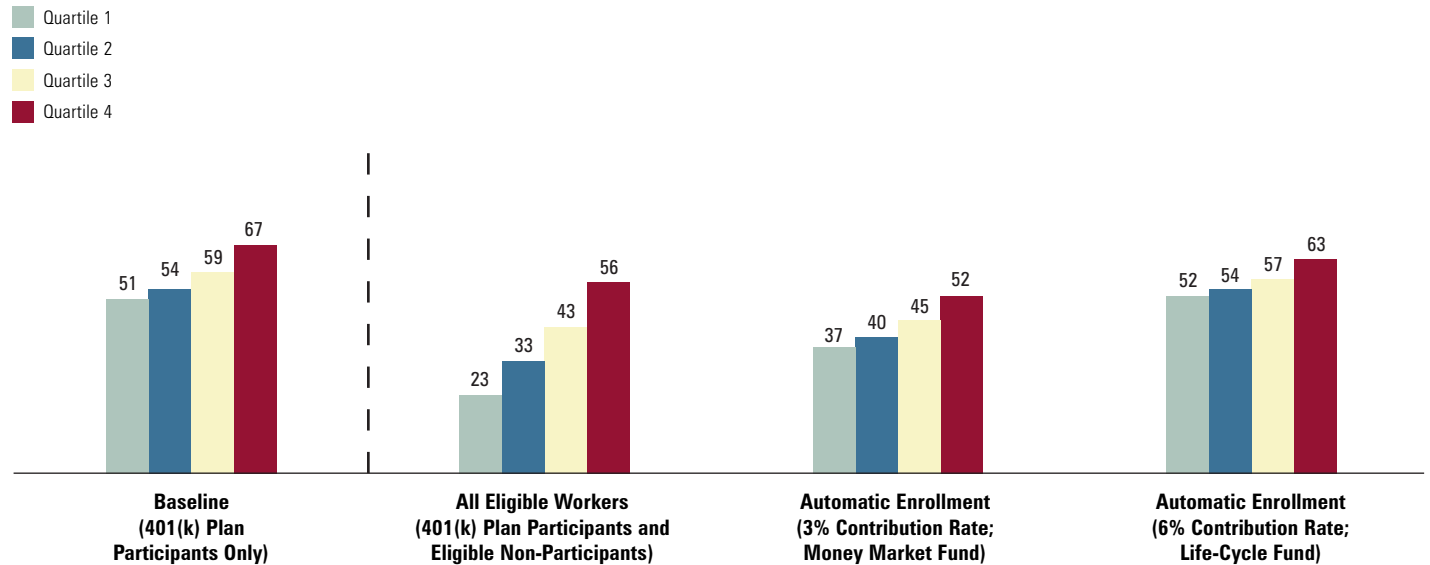
- *Under a wide range of scenarios, workers can save enough through 401(k) plans over a full career to* **replace a significant portion of their pre-retirement income in retirement.**

- ***Automatic enrollment in 401(k) plans increases participation rates dramatically**, particularly among lower income workers. Increased participation improves retirement preparedness for these workers.*

- *The **default contribution rates and investment options** set by employers who offer 401(k) plans with automatic enrollment can have a significant impact on participants' 401(k) accumulations at retirement.*

- ***Catch-up contributions**, a tax incentive that encourages additional saving among workers age 50 or older, primarily increase replacement rates among higher income workers. However, these workers see low income replacement from Social Security, and catch-up contributions encourage them to improve their own retirement preparedness.*

- *Nearly half of all workers do not have a retirement plan at work. **Contributions to IRAs** can help fill gaps in employer-sponsored plan coverage over a career. Current IRA contribution limits allow lower income workers to replicate 401(k) contributions when their employers do not offer a retirement plan at work. Higher income workers cannot replicate their 401(k) benefits with IRAs. Breaks in higher income workers' 401(k) coverage can significantly reduce their retirement preparedness.*

---

[5] Retirees potentially have several sources of income in retirement, including Social Security benefits, income from defined benefit and/or defined contribution retirement plans and IRAs, income from other individual savings, and income from continued employment. The EBRI/ICI projection model in this paper only focuses on the income future retirees are projected to receive from 401(k) accumulations in their first year of retirement.

FIGURE 1

Median Replacement Rates[1] from 401(k) Accumulations[2] for Workers Turning 65 Between 2030 and 2039 by Income Quartile at Age 65

(percent of final five-year average salary)

- Quartile 1
- Quartile 2
- Quartile 3
- Quartile 4

| | 51 | 54 | 59 | 67 | 23 | 33 | 43 | 56 | 37 | 40 | 45 | 52 | 52 | 54 | 57 | 63 |

Baseline (401(k) Plan Participants Only) — **All Eligible Workers (401(k) Plan Participants and Eligible Non-Participants)** — **Automatic Enrollment (3% Contribution Rate; Money Market Fund)** — **Automatic Enrollment (6% Contribution Rate; Life-Cycle Fund)**

[1] In all four simulations presented in this figure, workers experience continuous employment, continuous 401(k) plan coverage, and investment returns based on average annual returns between 1926 and 2001. In the baseline, only 401(k) participants with account balances at year-end 2000 are considered. In the other three scenarios, all eligible workers are considered.

[2] The 401(k) accumulation includes 401(k) balances at employer(s) and rollover IRA balances.

Source: EBRI/ICI 401(k) Accumulation Projection Model

With these assumptions, the baseline case produces an income replacement rate from 401(k) accumulations at age 65 for each individual and reports median replacement rates by income quartile.[6] For example, among individuals turning 65 between 2030 and 2039 whose income is in the lowest quartile for their age, the median replacement rate from their 401(k) accumulations is about half of pre-retirement salary in the first year of retirement (Figure 1). For the highest income quartile, the projected median replacement rate is about two-thirds of salary.[7]

This issue of *Perspective* builds on the model scenarios presented by Holden and VanDerhei (November 2002). It presents new scenarios that examine the role that 401(k) accumulations might play in retirement by analyzing certain factors that influence outcomes for 401(k) participants, including: *plan design*, through automatic enrollment; *tax policy*, through catch-up contributions; and *individuals themselves*, through saving in IRAs when not offered 401(k) plans.

Automatic Enrollment

Many workers do not participate in the 401(k) plans offered by their employers. Replacement rates fall significantly, especially among lower income workers, when the model considers all eligible workers because current non-participants will tend to have much lower 401(k) accumulations when they turn 65 than workers currently participating (Figure 1).

[6] The income replacement rate is the portion of pre-retirement income that a 401(k) plan participant is projected to be able to replace by drawing from his or her 401(k) accumulations at age 65. The median replacement rate is the point where half of 401(k) plan participants in a given income group will be able to replace more than this amount and half will replace less than this amount.

[7] Social Security replacement rates show the reverse pattern: for the lowest income quartile, Social Security is projected to replace about 52 percent of pre-retirement income, while the highest income quartile is projected to have Social Security replace only about 16 percent of salary. (See Holden and VanDerhei (November 2002) and discussion below.)

The difference in replacement rates at retirement between all eligible workers and the baseline (401(k) participants only) diminishes as income rises because participation rates tend to rise as income increases.

One new set of scenarios examines the effect automatic enrollment, a plan design feature, has on replacement rates at retirement. Automatic enrollment changes the worker's decision from having to choose to participate to having to choose not to participate in a 401(k) plan. If an employee does nothing, he or she is automatically enrolled in the plan. The employer sets a default contribution rate and default asset allocation. However, the employees may still choose either not to participate (opt out) or to set their own asset allocations and contribution amounts.

Automatic enrollment appears to significantly increase participation rates. Prior to automatic enrollment, 66 percent of eligible workers in the model at year-end 2000 were participants in 401(k) plans. Immediately after adding automatic enrollment to the model, the participation rate rises to 92 percent of eligible employees. The positive impact of automatic enrollment on participation rates proved even stronger among lower income workers.

The effects of automatic enrollment on replacement rates at retirement depend heavily on the default contribution rate and default investment option that the plan sponsor selects. All else equal, the higher the default contribution rate, the higher the replacement rates at retirement. Given the historical tendency of equity securities to generate higher returns than fixed-income securities, 401(k) plans that set a life-cycle fund[8] as the default investment option tend to have higher forecasted replacement rates than plans that have a money market fund as the default investment option.

Figure 1 highlights the replacement rates for all eligible workers who would have had a full career's exposure to two of the four different automatic enrollment scenarios analyzed in this paper. The first, more conservative, automatic enrollment scenario features a 3 percent default contribution rate with a money market fund as the default investment option; the more aggressive second scenario features a 6 percent default

contribution rate with a life-cycle fund as the default investment option.

The conservative automatic enrollment scenario results in projected median replacement rates that are higher for lower income workers than when automatic enrollment is not available to them. Automatic enrollment has the greatest impact on this group because those in the lowest income quartile are the least likely to participate in a 401(k) plan on their own. Therefore, adding automatic enrollment creates a larger percentage of new participants from this group. The impact of automatic enrollment on higher income quartiles proves less dramatic and, in some cases, diminishes replacement rates because these workers tend to participate when left to enroll on their own. Higher income workers tend to have higher participation rates, contribute more than 3 percent of salary, and select more aggressive investments in the absence of automatic enrollment.

On the other hand, the second automatic enrollment scenario in Figure 1 highlights projected results if the plan sponsor selects as the default a 6 percent contribution rate and a life-cycle fund that invests in equities when the worker is young and rebalances to be more concentrated in fixed-income securities as the worker ages. In this scenario, median replacement rates at age 65 are projected to be higher among all eligible workers across all income quartiles than without automatic enrollment.

---

[8] A life-cycle "fund" is a pooled investment portfolio, such as a mutual fund, collective trust, life insurance separate account, or other pooled investment, that rebalances away from equity securities and into fixed-income securities as the target date—usually the expected retirement date of the individuals investing in the fund—approaches.

Catch-Up Contributions

The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) introduced "catch-up" contributions, so that individuals age 50 or older could make additional tax-deferred contributions to qualified retirement plans and IRAs above the deferred annual contribution limits. This tax policy change encourages increased savings by individuals at a point in their lives when increased saving is possible (e.g., children are educated and grown; house has been purchased).[9]

A new EBRI/ICI model scenario captures this by assuming that all 401(k) participants age 50 or older who are projected to contribute at the limit in a given year also make the additional catch-up contribution. The model forecasts that individuals in the highest income quartile when they reach age 65 generally would have higher projected replacement rates as a result of taking advantage of catch-up contributions.

Saving in IRAs When Not in 401(k) Plans

Given that many individuals change jobs and many employers do not offer 401(k) plans to their workers, it can be assumed that many 401(k) plan participants at year-end 2000 may not always work for an employer with such a plan. Income replacement rates at retirement from 401(k) accumulations are dramatically lower when workers do not always find themselves in 401(k) plans throughout their careers. Another new scenario shows the effects of individuals' taking advantage of IRAs when they are not offered 401(k) plans. This scenario assumes participants contribute to IRAs in an effort to replicate their 401(k) contribution experience, while considering IRA contribution limits.

Although projected replacement rates at age 65 increase across all income groups when individuals not offered 401(k) plans contribute to IRAs, the results are most promising for lower income quartiles at retirement. Contribution limits for IRAs generally allow sufficient saving for lower income individuals to replicate their 401(k) experience. Higher income participants find themselves restricted by the lower IRA contribution limits, and thus do not do as well as they would if they always work for employers offering 401(k) plans.

Outline

The next section briefly describes the EBRI/ICI 401(k) Accumulation Projection Model and presents the original baseline results. For comparison, projected Social Security replacement rates in the first year of retirement are also presented. The third section adds non-participants to the model and examines the effect that automatic enrollment has on replacement rates among all eligible workers. The fourth section models the effects that catch-up contributions have on income replacement rates at retirement among 401(k) plan participants. The fifth section analyzes how IRA contributions can benefit workers when their employers do not offer 401(k) plans. Following the conclusion, references are presented.

EBRI/ICI 401(k) ACCUMULATION PROJECTION MODEL[10]

The starting point for projecting 401(k) accumulations and replacement rates at retirement is the EBRI/ICI database at year-end 2000, which contains information on actual 401(k) participant account balances at their current employers, asset allocations, loan balances, and annual incomes (Figure 2). Participants are then forecast to engage in activity in 401(k) plans over the remainder of their projected careers. As participants age, their behavior changes and reflects their own personal characteristics combined with the typical behaviors observed among millions of 401(k) participants at different ages, tenures, and income levels in the EBRI/ICI database.
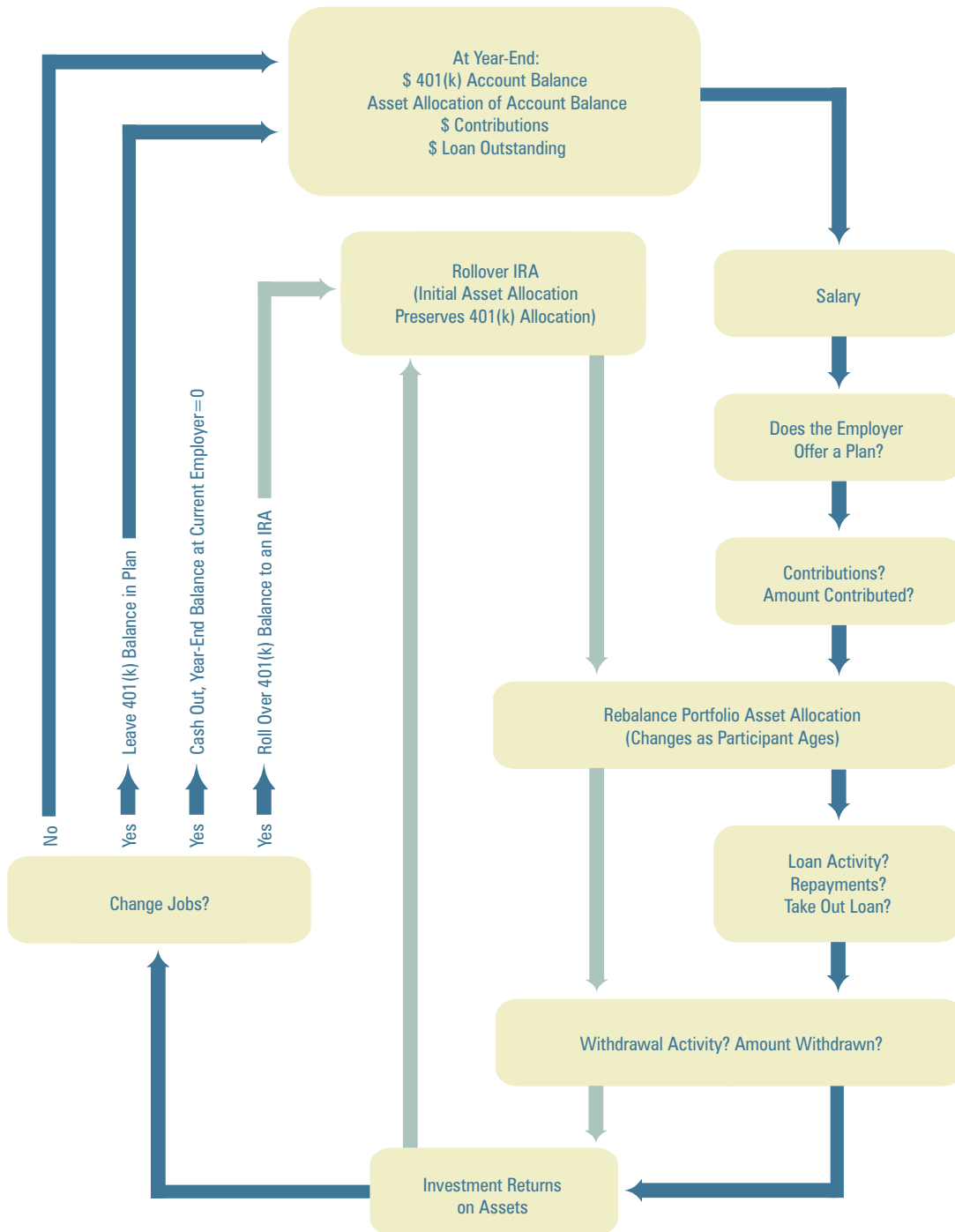
In addition, the model also factors in behaviors typical at job change (Figure 2). First, the model determines whether an individual changes jobs in any given year. If he or she does, the model determines whether the individual leaves the 401(k) balance in the previous employer's plan, cashes it out, or rolls it over into an IRA. If a rollover IRA is created, then typical IRA behaviors are modeled, including asset allocation decisions and IRA withdrawal activity.

---

[9] The life-cycle pattern of saving suggests that older individuals are able to save at higher rates because they no longer face the expenses of buying a home and/or putting children through college. An augmented version of the life-cycle theory predicts that the optimal savings pattern increases with age. For a summary discussion of life-cycle models, see Browning and Crossley (Summer 2001). For a more extensive discussion, see Engen, Gale, and Uccello (December 1999). In addition, Mitchell and Utkus (2003) discuss life-cycle savings and behavioral finance models in the context of retirement plan design considerations.

[10] For a complete description of the model, see Holden and VanDerhei (November 2002 and November 2002—Appendix).

FIGURE 2

Diagram of Annual Growth Cycle of 401(k) Accumulations[1] in the EBRI/ICI 401(k) Accumulation Projection Model

At Year-End:
$ 401(k) Account Balance
Asset Allocation of Account Balance
$ Contributions
$ Loan Outstanding

Rollover IRA
(Initial Asset Allocation
Preserves 401(k) Allocation)

Salary

Does the Employer
Offer a Plan?

Contributions?
Amount Contributed?

Rebalance Portfolio Asset Allocation
(Changes as Participant Ages)

Leave 401(k) Balance in Plan

Cash Out, Year-End Balance at Current Employer=0

Roll Over 401(k) Balance to an IRA

No

Yes

Yes

Yes

Change Jobs?

Loan Activity?
Repayments?
Take Out Loan?

Withdrawal Activity? Amount Withdrawn?

Investment Returns
on Assets

[1] In the model, both 401(k) balances at current and previous employers and rollover IRA balances are projected.

Source: EBRI/ICI 401(k) Accumulation Projection Model (See Holden and VanDerhei (November 2002—Appendix)

In order to analyze a full career working at employers with 401(k) plans, the baseline results are presented for participants who were born between 1965 and 1974 (and thus were between 26 and 35 years old in 2000) and would be turning 65 years old between 2030 and 2039. The "401(k) accumulation" at the end of the individual's career is the sum of all 401(k) balances at their employers as well as IRA balances resulting from any rollovers from 401(k) accounts. The model converts the 401(k) accumulations into an income stream—an annuity or set of installment payments—using current life expectancies at age 65 and projected discount rates. The replacement rates calculated compare the income or install-ment payments generated in the first year of retirement to the projected final five-year average pre-retirement income.[11]

Baseline Model Results

The baseline case of the model takes the 401(k) participants through a career with continuous employment, continuous 401(k) plan coverage, and historical financial market returns (based on U.S. financial market experience from 1926 through 2001).[12] In this baseline case, replacement rates at age 65 range from about half to about two-thirds of pre-retirement income. For example, the median individual among future retirees reaching age 65 between 2030 and 2039 in the lowest income quartile is projected to see distributions from 401(k) accumulations replace about 51 percent of pre-retirement income in the

Median Replacement Rates for Participants Turning 65 Between 2030 and 2039 by Income Quartile at Age 65
(percent of final five-year average salary)
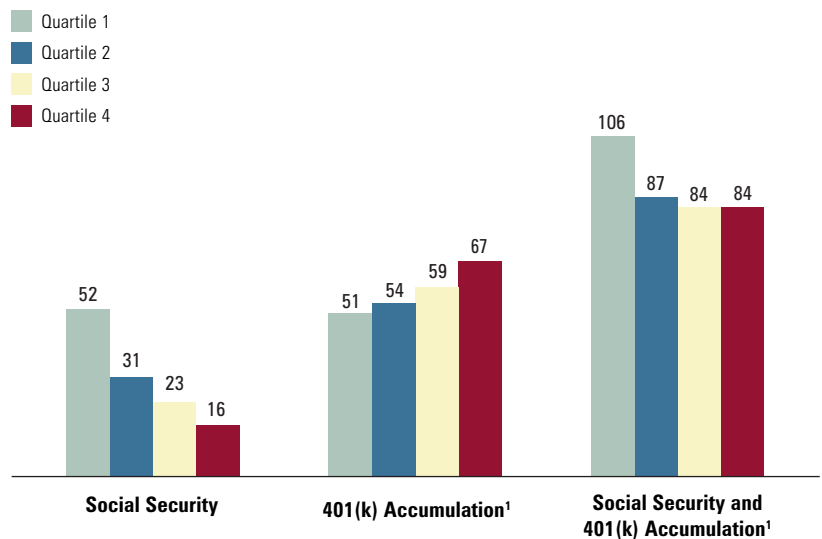
[1] The 401(k) accumulation includes 401(k) balances at employer(s) and rollover IRA balances.
Source: EBRI/ICI 401(k) Accumulation Projection Model

first year of retirement (Figure 3). The median individual in the highest income quartile at age 65 is projected to replace about 67 percent of pre-retirement income using distributions from 401(k) accumulations.[13]

For comparison, the model also projects the Social Security benefits in the first year of retirement.[14] By design, replacement rates from Social Security fall as income rises. The median individual in the lowest income quartile at age 65 is projected to see Social Security replace about half of projected pre-retirement income at age 65, while the median individual in the highest income quartile is projected to have a Social Security replacement rate of only 16 percent if the current benefit structure is maintained (Figure 3).

---

[11] The 401(k) distributions are not indexed for inflation over retirement, while Social Security payments are. In addition, if the individual elects a set of installment payments rather than an annuity, the amount that may be reasonably withdrawn each year after the first year may vary as future market fluctuations affect the account going forward.

[12] Holden and VanDerhei (November 2002) also consider projections for many different investment return scenarios including: the worst 50-year return period for U.S. equities (1929 to 1978); a bear market (three consecutive years of -9.3 percent annual returns on equities) at the beginning, middle, or end of individuals' careers; and a bull market (three consecutive years of +31.2 percent annual returns on equities) at the beginning, middle, or end of individuals' careers.
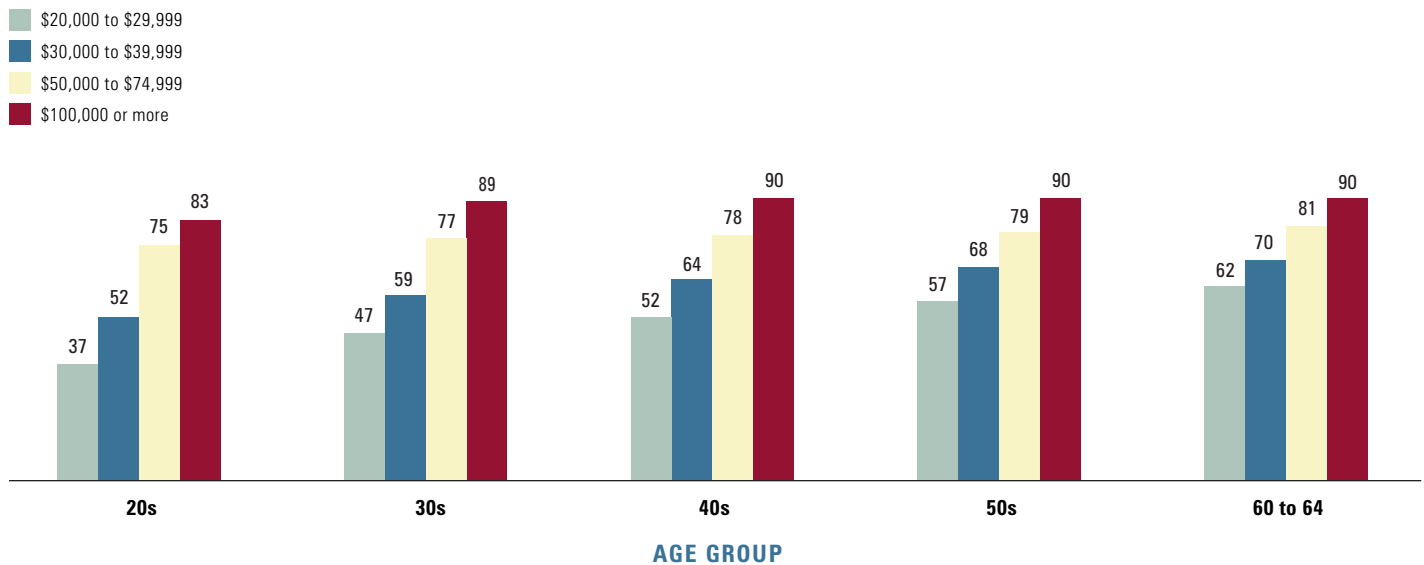
[13] Among participants reaching age 65 between 2030 and 2039, the real (in 2000 dollars) cut-off points for the income quartiles are: first quartile—$36,700; second quartile—$56,400; and third quartile—$87,200. Thus, the highest income quartile at age 65 has a real income of $87,200 or more.

[14] Technically, this is called the primary insurance amount (PIA). The PIA was calculated for the individual participant's earnings history and did not consider the possibility of a spousal benefit, which can be substantially larger than an individual's own benefit in some cases. The PIA calculated for each individual is the sum of three separate percentages of portions of their average indexed monthly earnings (AIME). The portions depend on the year in which the worker reaches retirement. For example, for 2005 the PIA was 90 percent of the first $627 of their AIME plus 32 percent of their AIME over $627 and through $3,779 plus 15 percent of their AIME over $3,779 (see the Social Security Administration's website, www.ssa.gov, for benefit formulas).

FIGURE 4

401(k) Plan Participation Rates by Selected Employee Age and Salary Groups, 2003

(percent of eligible employees participating in age and salary group)

- $20,000 to $29,999
- $30,000 to $39,999
- $50,000 to $74,999
- $100,000 or more

Age Group	$20,000 to $29,999	$30,000 to $39,999	$50,000 to $74,999	$100,000 or more
20s	37	52	75	83
30s	47	59	77	89
40s	52	64	78	90
50s	57	68	79	90
60 to 64	62	70	81	90

AGE GROUP

Source: Fidelity Investments, Building Futures, Volume V: How Workplace Savings Are Shaping the Future of Retirement

AUTOMATIC ENROLLMENT

The EBRI/ICI 401(k) Accumulation Projection Model is an extension of the EBRI/ICI project's extensive analysis of millions of 401(k) plan *participants*. A significant policy concern is that many employees do not participate in the 401(k) plans sponsored by their employers (in some cases because the employees are not eligible). Participation rates are the lowest among lower income workers (Figure 4). Some of these non-participants may not join the plan because of inertia or confusion.[15] Automatic enrollment uses employees' inactivity to their advantage by making them automatic savers.

With automatic enrollment, the employer notifies the employee that a certain percentage of his or her salary will be contributed into the 401(k) plan unless the employee responds and cancels the enrollment within a certain time period. The employer sets the initial contribution rate[16] and allocates the contribution to a default investment option. Most employers pick modest contribution rates as the default, likely to lessen the burden of the automatic enrollment on the reluctant employees. Profit Sharing/401(k) Council of America (PSCA; 2004) reports that 58 percent of plans with automatic enrollment set the employee contribution rate at 3 percent of salary and another 22 percent of plans with automatic enrollment chose 2 percent of salary (Figure 5).[17] While this is greater than the zero percent contribution rate that non-participants choose, these automatic contribution rates generally are lower than average contribution rates of 401(k) participants in the EBRI/ICI database (Figure 6). In addition, in many cases the default contribution rate in the automatic enrollment plans is lower than the contribution rate needed to take full advantage of the employer match.[18]

---

[15] For example, Investment Company Institute (Spring 2000) surveyed households with 401(k) plans and households offered 401(k) plans but not participating. Non-participants were asked their reasons for not participating in 401(k) plans. Respondents were allowed to give multiple reasons; about a third of non-participants indicated that they were not participating because the 401(k) plan's features were confusing.

[16] Another element of plan design that may be coupled with automatic enrollment is to automatically increase the contribution rate over time. For example, Thaler and Benartzi (2004) developed Save More Tomorrow, or SMarT™. Utkus (November 2002) reports on the successful implementation of voluntary adoption of SMarT contribution rules at two divisions of one of The Vanguard Group's corporate recordkeeping clients.

[17] Vanguard (July 2001) also reports that most plan sponsors chose a default contribution rate of 3 percent or less (while about a quarter of plan sponsors selected a default contribution rate of 4 percent or higher). Hewitt (2005) reports that about a third of plan sponsors with automatic enrollment select a default contribution rate of 2 percent or less; about half choose 3 percent; and 17 percent select a default contribution rate of 4 percent or more.

[18] Holden and VanDerhei (October 2001) find more than half of participants offered a match in 1999 were offered a match on up to at least 6 percent of salary or more.

Default Contribution Rate in Plans with Automatic Enrollment
(percent of plans)

PERCENT OF SALARY DEFERRED
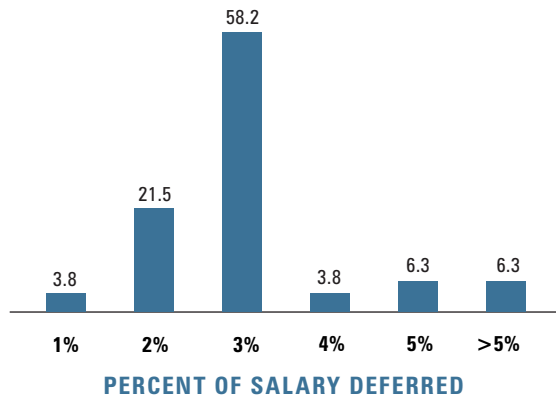
Note: Percentages do not add to 100 percent because of rounding.
Source: Profit Sharing/401(k) Council of America (PSCA), 47th *Annual Survey of Profit Sharing and 401(k) Plans, Reflecting 2003 Plan Year Experience*

Eligible Non-Participants

To project the impact of automatic enrollment on 401(k) accumulations at retirement, the EBRI/ICI model must first produce information for non-participants. To generate non-participants, the model uses participation behavior by age and income to estimate a participation probability for a given 401(k) participant in the model.[19] For example, about half of employees in their twenties and earning between $30,000 and $39,999 participate in the 401(k) plan when eligible (Figure 4). Thus, for each 401(k) plan participant in his or her twenties with $30,000 to $39,999 in salary, an identical non-participant is created for the analysis. At year-end 2000, the total population of 3.8 million eligible employees consists of 2.5 million 401(k) plan participants with account balances and 1.3 million non-participants, which results in a participation rate of 66 percent at the start of the projection model (Figure 7, top panel).[20]

Participation rates tend to rise with age and income (Figure 4).[21] As the population of all eligible employees moves through their careers, the

Average Participant Before-Tax Contribution Rate by Selected Participant Age and Salary Groups, 1999
(percent of salary contributed)

$20,000 to $40,000
>$40,000 to $60,000
>$60,000 to $80,000
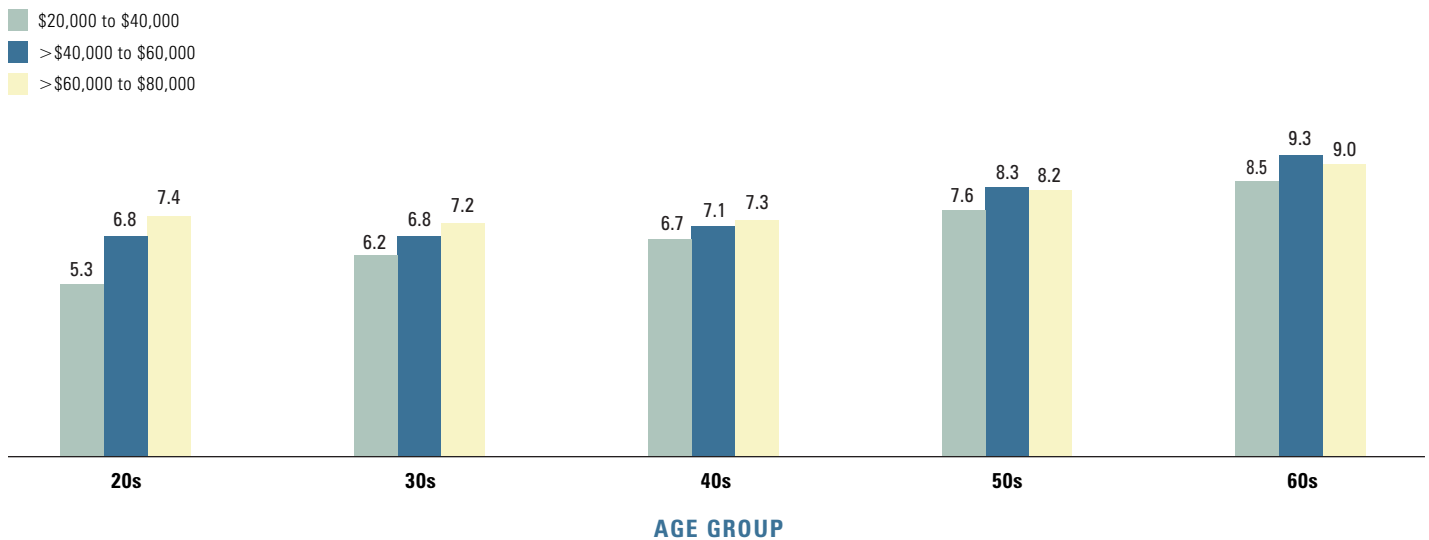
AGE GROUP

Source: EBRI/ICI Participant-Directed Retirement Plan Data Collection Project (see Holden and VanDerhei (October 2001))

---

[19] See Fidelity (2004) for the full range of age and income groups analyzed.

[20] To analyze replacement rates after a full career with exposure to 401(k) plans, results for a subset of the entire model database are often highlighted in this paper. There are about 0.6 million 401(k) participants in the model database that were born between 1965 and 1974 and drawn from the EBRI/ICI year-end 2000 database. The procedure to create eligible non-participants added about 0.5 million eligible non-participants to this birth cohort in the model. The participation rate for this birth cohort is 54 percent at the beginning of the projection and 74 percent by the end when there is no automatic enrollment. With automatic enrollment, the participation rate for this group is 91 percent at the beginning of the projection and 97 percent at the end.
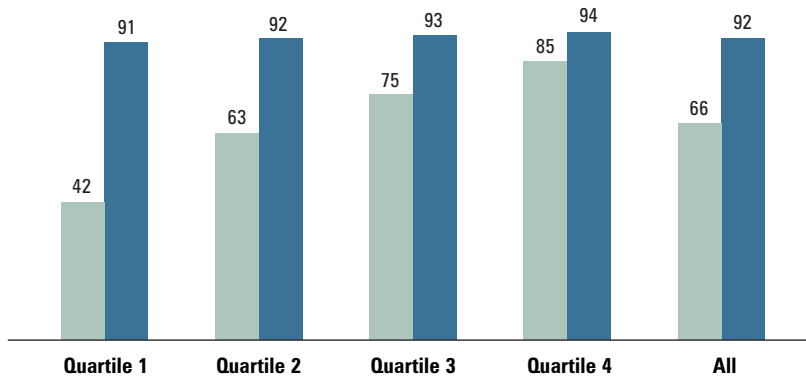
[21] Other research finds this pattern; for example, Copeland (October 2004) finds that participation rates in employer-sponsored plans (whether defined contribution, defined benefit, or both) tend to rise with income (and education) and with age through age 54. Choi et al. (2001 and 2004) also find that participation tends to rise with tenure. Although no tenure effect is modeled because the participation decision in the model is only made at job change, the model assumes that once an individual becomes a participant he or she continues to participate whenever offered a plan from that first point of participation onward.
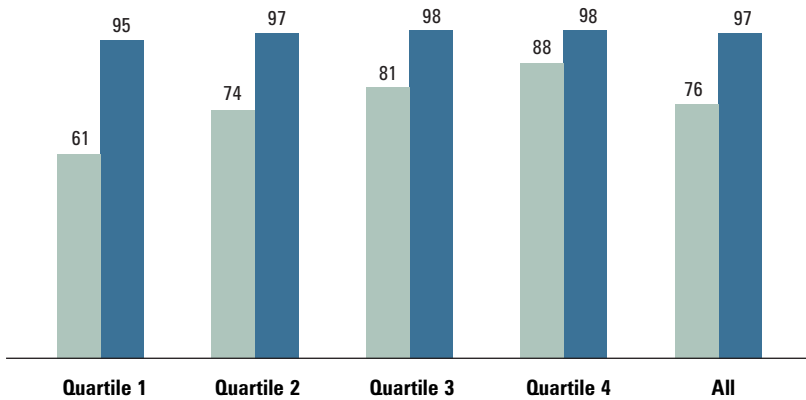
FIGURE 7

Participation Rates Before and After Automatic Enrollment at the Beginning and End of the Projection by Income Quartile
(percent of eligible workers)

■ Before Automatic Enrollment
■ After Automatic Enrollment

Beginning of Projection (Year-End 2000)

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	All
Before Automatic Enrollment	42	63	75	85	66
After Automatic Enrollment	91	92	93	94	92

End of Projection (At Age 64)

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	All
Before Automatic Enrollment	61	74	81	88	76
After Automatic Enrollment	95	97	98	98	97

Source: EBRI/ICI 401(k) Accumulation Projection Model

probability that an employee will choose to participate in the 401(k) plan when offered increases. Thus, each time a non-participant changes jobs, the model determines whether he or she will participate in the new 401(k) plan based on the individual's new age and new income at the time of job change. In addition, as long as the current employer offers a 401(k) plan, any employee who previously participated in a 401(k) plan continues to do so in the future.[22] By the end of the projection model, 76 percent of all eligible workers are participating in a 401(k) plan at age 64 (Figure 7, bottom panel). Next, with both participants and non-participants in the model, a range of automatic enrollment designs and participant reactions are simulated.

Replacement Rates Among All Eligible Workers

The EBRI/ICI 401(k) Accumulation Projection Model's baseline results present the median replacement rates by income quartile at age 65 for 401(k) plan *participants* who had account balances at year-end 2000. The baseline does not include the eligible workers who had not yet participated in their current employer's plan by year-end 2000. Incorporating non-participants lowers the median replacement rates for all age and income groups at age 65 (compared with the baseline) because current non-participants tend to have lower 401(k) accumulations and replacement rates at retirement

---

[22] Participation does not imply contributions in every year to the 401(k) plan, but that the contribution activity will be modeled after the contribution activity observed among 401(k) plan participants with account balances in any given year. Analysis of EBRI/ICI 401(k) plan participants in calendar-year 2000 finds that 91 percent of participants had contributions into their 401(k) accounts (employee, employer, or both) in that year (see Holden and VanDerhei (November 2002)). Similarly, analysis of EBRI/ICI 401(k) plan participants drawn from the 1999 database finds that 92 percent of participants made employee contributions in that year (see Holden and VanDerhei (October 2001)).

even if they begin to participate later in their careers. Including current non-participants produces a relevant measure against which to analyze the effects of automatic enrollment.

In the baseline model, the median individual among participants in the lowest income quartile at age 65 is projected to see his or her 401(k) accumulations replace about 51 percent of pre-retirement income (Figure 8, top panel). When all eligible employees are included in the model, the median replacement rate for the lowest income quartile is only about 23 percent of pre-retirement income (Figure 8, bottom panel). The reduction in replacement rates is less dramatic among the higher income quartiles because these workers tend to have higher participation rates in the absence of automatic enrollment. For example, among the highest income quartile, the projected replacement rate at age 65 is 67 percent of pre-retirement income in the baseline model and 56 percent when all eligible workers are included.

As Figure 8 also shows, there is a range of results for participants. The 25th percentile is the replacement rate that three-quarters of the individuals in a given income quartile are forecasted to meet or exceed. The 75th percentile is the projected replacement rate that a quarter of the individuals would meet or exceed.

Distribution of Replacement Rates[1] from 401(k) Accumulations[2] for Participants Turning 65 Between 2030 and 2039 by Income Quartile
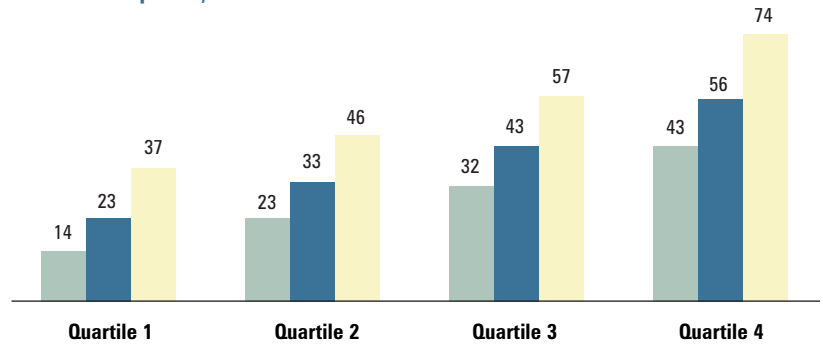(percent of final five-year average salary)

- 25th Percentile
- Median
- 75th Percentile

Baseline Model (401(k) Participants Only)
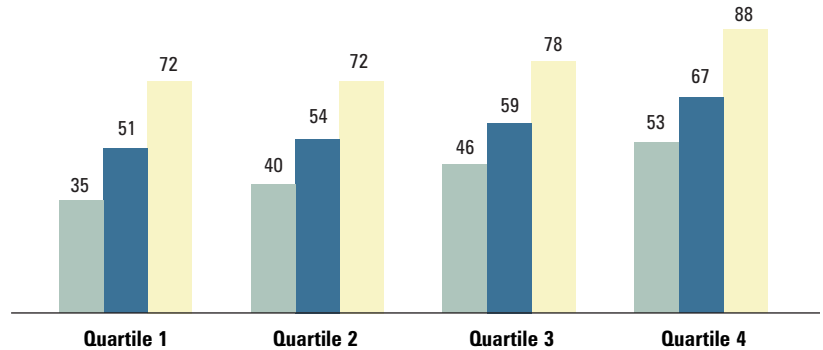
All Eligible Workers (401(k) Participants and Eligible Non-Participants)

[1] Both simulations assume continuous employment and continuous offering of 401(k) plans by employers.
[2] The 401(k) accumulation includes 401(k) balances at employer(s) and rollover IRA balances.
Source: EBRI/ICI 401(k) Accumulation Projection Model

Empirical Research on Automatic Enrollment

Automatic enrollment is relatively new and therefore only limited empirical information exists to assess how it would affect participation rates, average contribution rates, and average asset allocations over an entire career. Moreover, the model must also know how to estimate which employees and how long employees will remain with the default choices. For this set of simulations, the model's automatic enrollment assumptions are based on an analysis of data for a health services company with approximately 30,000 employees by Choi, Laibson, Madrian, and Metrick (2001 and 2004).[23]

The health services company implemented an automatic enrollment program on April 1, 1998 that applied to employees hired on or after that date. The default contribution rate was initially set at 3 percent of salary and the initial default investment fund was a money market fund. Employees were given 30 days to opt out of the plan. The employer match rate for the plan was 50 percent of up to 6 percent of pay after one year of employment.

As it is designed to do, automatic enrollment dramatically increases participation rates, especially among newer employees.[24] Automatic enrollment also has an impact on the distribution of 401(k) plan participants' contribution rates. Choi et al. (2001) find that, prior to automatic enrollment, the most common contribution rate was 6 percent of compensation, which was the maximum amount matched by the employer. Among employees with less than two years of tenure hired after the automatic enrollment program was implemented, 72 percent contributed at the default contribution rate of 3 percent.

Choi et al. (2001) find similar results with respect to asset allocation before and after automatic enrollment. Only 18 percent of participants with less than two years of tenure hired prior to automatic enrollment had all of their 401(k) balances in the money market fund (which became the default fund under automatic enrollment). This figure increased to 71 percent for those hired after automatic enrollment was installed.

While the combined impact of a lower than typical contribution rate and a conservative asset allocation will offset at least some of the benefits of the increased participation rates associated with the adoption of an automatic enrollment program, Choi et al. (2001) find that the percentage of participants hired during automatic enrollment that remained at the contribution and asset allocation defaults decreased substantially with increasing tenure. By the time employees have 46 months of tenure with this company, the percentage still at the defaults decreased to approximately 30 percent.[25]

Automatic Enrollment in the Projection Model

In order to forecast the impact of automatic enrollment on a broader population of workers over an entire career, the projection model immediately implements the automatic enrollment behaviors observed in the sample health services company analyzed by Choi et al. (2001 and 2004) in the year 2000 at all companies offering 401(k) plans. Workers have continuous employment at firms offering 401(k) plans with automatic enrollment. Automatic enrollment takes place immediately at year-end 2000, which brings many non-participants into 401(k) plans at the beginning of the projection model.

---

[23] Choi et al. (2001) also study two other large companies' 401(k) plans in addition to the large health services company (that was initially analyzed in Madrian and Shea (May 2000)). Choi et al. (2004) consider 11 large companies with 401(k) plans implementing a variety of changes (e.g., automatic enrollment, eligibility rules, savings survey).

[24] For example, prior to automatic enrollment, Choi et al. (2001) find that only about a third of new employees (three to five months of tenure) were participating in the 401(k) plan; after automatic enrollment, 87 percent of new employees were participating in the plan. The impact of automatic enrollment diminishes with increasing job tenure given that an increasing proportion of eligible employees would elect to participate with time in the absence of automatic enrollment. Nonetheless, the difference in the participation rates between the two groups is still 35 percentage points after 24 to 26 months of tenure.

[25] See Choi et al. (2004). In addition, Choi et al. (2001) find that workers with lower incomes are more likely to select and remain with the automatic enrollment defaults.

Percentage of Participants Choosing Automatic Enrollment Defaults by Salary Group
(percent of participants in salary group)
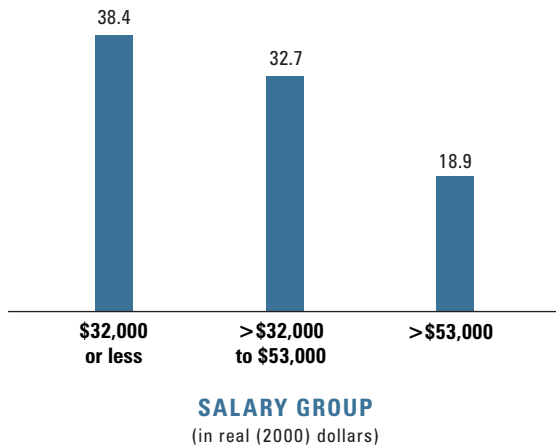
Source: Authors' tabulations based on Choi, Laibson, Madrian, and Metrick (2001)

For eligible non-participating workers, the projection model uses a three-step process that takes place at job change after year-end 2000 to determine enrollment. First, the model determines whether the worker becomes a 401(k) participant based on the employee's age and salary (Figure 4).[26] Second, the model determines whether the participant contributes the automatic enrollment default rate or an amount based on contribution behavior observed among EBRI/ICI 401(k) plan participants. Third, the model determines whether the participant accepts the default automatic enrollment asset allocation or selects asset allocation in line with their age as observed among EBRI/ICI 401(k) plan participants. The model assumes that the percentage of participants choosing the automatic enrollment defaults (the second and third steps) depends on the employee's income (Figure 9). For example, a worker in his or her twenties with a salary of $32,000 would have a 52 percent chance of becoming a participant (Figure 4) and then a 38 percent chance of staying with the automatic enrollment defaults (Figure 9).

Automatic Enrollment Projection Results

Figure 10 compares the replacement rates of four different automatic enrollment scenarios with the replacement rates among all eligible workers without automatic enrollment. The model analyzes two different default contribution rates—3 percent of salary and 6 percent of salary—and two different default asset allocations—a money market fund and a life-cycle fund.[27]

For eligible workers born between 1965 and 1974, the impact of a full career with employers offering automatic enrollment with a 3 percent of salary contribution rate and a money market fund varies from an increase of 14 percentage points in the median replacement rate for those in the lowest income quartile at age 65 to a decrease of 4 percentage points in the median replacement rate for those in the highest income quartile (Figure 10). The replacement rates rise for the lowest two income groups because the effect of increasing participation rates for these employees more than offsets the potential downside of reducing contribution rates and/or investing more conservatively. In contrast, employees in the highest income quartile already have such high participation rates even in the absence of automatic enrollment that there is very little to be gained by increasing participation. Rather, projected replacement rates are reduced by automatic enrollment's lower contribution rates and/or more conservative investment strategies.
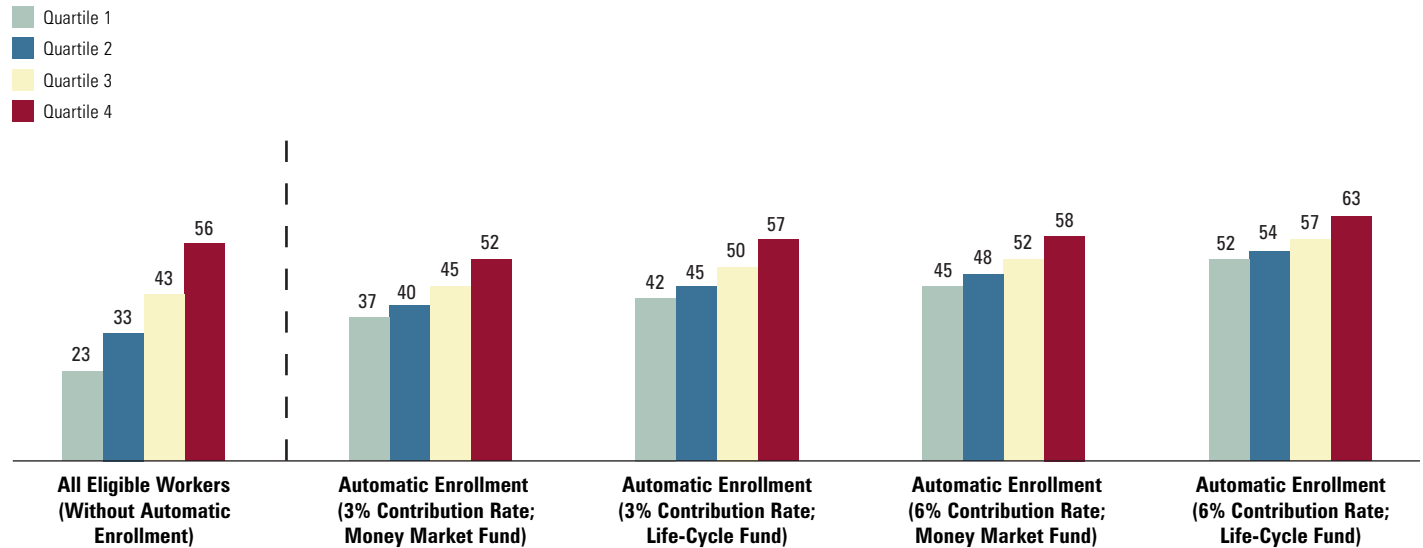
---

[26] Once non-participating workers become participants, they continue to be participants and skip this first step at the next job change. However, all workers (participants and non-participants alike) experience the decision of going with automatic enrollment defaults or making their own contribution rate and asset allocation decisions at each job change. Unfortunately, at this time, there are no empirical estimates available to incorporate "learning" into the model. It is possible that employees may "learn" from their automatic enrollment experience at a previous job that they do not want to anchor their contribution rates and/or asset allocation at the defaults. In addition, one would expect that the portion of employees who have already switched out of the defaults would continue this behavior upon job change. However, the decision to remain with automatic enrollment defaults is made at job change and depends on salary, without any reflection on prior experience in 401(k) plans.

[27] The 3 percent default contribution rate and money market fund analysis is based on the results from Choi et al. (2001 and 2004). The 6 percent default contribution rate and life-cycle fund analyses assume that workers respond to these defaults as they did to the 3 percent contribution rate and money market fund defaults. In addition, the model assumes a 50 percent of salary employer match for participants automatically enrolled in the plan with the default options.

FIGURE 10

Median Replacement Rates from 401(k) Accumulations[1] for All Eligible Workers[2] Turning 65 Between 2030 and 2039 by Income Quartile at Age 65

(percent of final five-year average salary)

- Quartile 1
- Quartile 2
- Quartile 3
- Quartile 4

All Eligible Workers (Without Automatic Enrollment): 23, 33, 43, 56

Automatic Enrollment (3% Contribution Rate; Money Market Fund): 37, 40, 45, 52

Automatic Enrollment (3% Contribution Rate; Life-Cycle Fund): 42, 45, 50, 57

Automatic Enrollment (6% Contribution Rate; Money Market Fund): 45, 48, 52, 58

Automatic Enrollment (6% Contribution Rate; Life-Cycle Fund): 52, 54, 57, 63

[1] The 401(k) accumulation includes 401(k) balances at employer(s) and rollover IRA balances.
[2] All eligible workers includes 401(k) plan participants with account balances at year-end 2000 and eligible non-participants.
Source: EBRI/ICI 401(k) Accumulation Projection Model

The automatic enrollment scenario featuring a 3 percent contribution rate and a life-cycle fund increases projected median replacement rates at age 65 across all income quartiles compared with the scenario without automatic enrollment (Figure 10). This result is driven by the equity returns in the life-cycle fund, because equity securities have historically had higher returns than fixed-income securities in the United States.[28]

Automatic enrollment with a 6 percent contribution rate, regardless of the default investment, is projected to improve outcomes for all income groups (Figure 10). The combination of the 6 percent default contribution rate and the life-cycle fund produces the highest replacement rates at retirement among the four automatic enrollment combinations analyzed.

---

[28] In the projection model, the future equity returns are similar to historical returns experienced by the S&P 500 between 1926 and 2001 (see "large company stocks total returns" in Ibbotson (2002)). Between 1926 and 2001, about two-thirds of the time, equity returns in any given year have fluctuated between –7 percent and 33 percent. The total return used for bonds, GICs, money market funds, and other investments in the projection is the "long-term government bonds total returns" from the beginning of 1926 to the end of 2001 (see Ibbotson (2002)). Historically, about two-thirds of the time, these returns in any given year have fluctuated between -1 percent and 14 percent.

CATCH-UP CONTRIBUTIONS

The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) increased annual contribution limits to 401(k) and other retirement plans (including IRAs). In addition, EGTRRA permits "catch-up" contributions by individuals age 50 or older and already contributing at the tax-deferred limit. For example, in 2005, any participant age 50 or older already contributing $14,000 (the 402(g) limit) to a 401(k) plan, could make a catch-up contribution of an additional $4,000 (Figure 11).[29] The EBRI/ICI projection model examines the impact of this increased saving opportunity.[30]

The model assumes that any individual age 50 or older who would have contributed at the 402(g) limit in the model in any given year (after 2001), will also make a catch-up contribution of the entire amount allowed.[31] Assuming that these participants make catch-up contributions of the full amount may overstate the effects of catch-up contributions. However, limiting the catch-up contributions to participants already contributing at the 402(g) limit reduces the modeled impact. This is because many 401(k) plan participants cannot contribute to the 402(g) limit because of lower plan-imposed limits[32] or nondiscrimination testing.[33] Any participants who are prevented from reaching the 402(g) limit by either plan design or nondiscrimination testing are not recognized as eligible to make catch-up contributions by the model.

Internal Revenue Code Deferred Contribution Limits in 401(k) Plans, 2001–2006

Legend:
- 402(g) Limit
- 401(k) Catch-Up

2001: $10,500
2002: $11,000 / $1,000
2003: $12,000 / $2,000
2004: $13,000 / $3,000
2005: $14,000 / $4,000
2006[1]: $15,000 / $5,000

[1] After 2006, these limits are indexed for inflation in $500 increments.
Source: Authors' Summary of U.S. Internal Revenue Code

The availability of catch-up contributions increases the projected replacement rate of the median individual in the fourth income quartile at age 65 by 3 percentage points compared with the model baseline, to 70 percent of pre-retirement income. Because individuals in the lower income quartiles generally are less likely to be contributing at the limit, the impact of catch-up contributions on the median replacement rates in the other income quartiles was indistinguishable from zero.[34]

---

[29] This assumes that the plan allows catch-up contributions. PSCA (2004) reports that nearly all member plans allowed catch-up contributions in 2003. Utkus and Mottola (April 2005) report that 86 percent of 401(k) plans in Vanguard's recordkeeping system offered catch-up contributions in 2004.

[30] Holden and VanDerhei (November 2002) and the model scenarios presented in this paper assume that the limit increases legislated in EGTRRA continue throughout the projection.

[31] ICI research into IRA catch-up contribution activity found that households taking advantage of catch-up contributions to IRAs did so to the limit (see Holden et al. (February 2005)). Thus, it was assumed that 401(k) plan participants making catch-up contributions contribute the entire amount allowed.

[32] For example, Holden and VanDerhei (October 2001) find that only 11 percent of participants making contributions were at the 402(g) limit (in 1999), but, among those not contributing at the limit, 52 percent could not have done so because of formal plan-imposed limits. PSCA (2004) reports that 8.6 percent of their member plans limit the contributions of highly compensated participants by plan design.

[33] PSCA (2004) reports that 9.3 percent of plans limited contributions of highly compensated employees when contributions reached the maximum allowed by the nondiscrimination tests and another 18.8 percent of plans returned excess contributions to participants after the plan year ended.

[34] Utkus and Mottola (April 2005) also find that participants with higher household incomes are more likely to take advantage of catch-up contributions. They discern catch-up contribution activity across participants who are age 50 or older in all income groups: for example, 5 percent of participants age 50 or older and earning less than $50,000 made catch-up contributions in 2004; 7 percent of those earning $50,000 to $74,999; 12 percent of those earning $75,000 to $99,999; 18 percent of those earning $100,000 to $124,999; 22 percent of those earning $125,000 to $149,999; and 32 percent of those earning $150,000 or more.

FIGURE 12

Distribution of Number of Jobs Held Over Projected Career[1]
(percent of participants at age 65 between 2030 and 2039)[2]
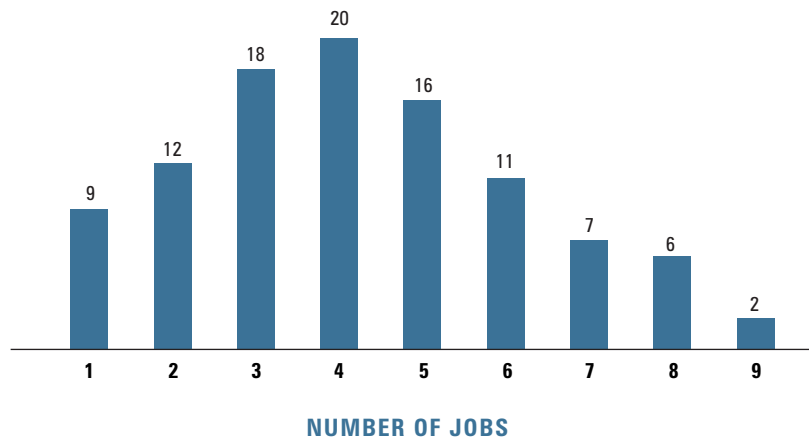
NUMBER OF JOBS

[1] Experience from 2001 through age 65 among 401(k) participants with account balances at year-end 2000 and born between 1965 and 1974.
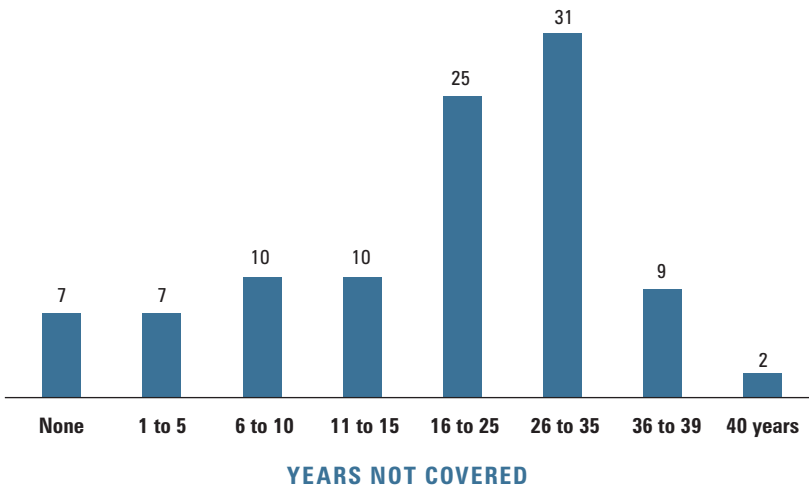
[2] Percentages do not add to 100 percent because of rounding.

Source: EBRI/ICI 401(k) Accumulation Projection Model

FIGURE 13

Distribution of Number of Years Out of a 401(k) Plan Over Projected Career[1]
(percent of participants at age 65 between 2030 and 2039)[2]

YEARS NOT COVERED

[1] Experience from 2001 through age 65 among 401(k) participants with account balances at year-end 2000 and born between 1965 and 1974.

[2] Percentages do not add to 100 percent because of rounding.

Source: EBRI/ICI 401(k) Accumulation Projection Model

SAVING IN IRAs WHEN NOT IN 401(k) PLANS

Some research suggests that 401(k) plan participants are different from other workers because they are "savers," or individuals who are inclined to save.[35] Thus, a new projection scenario assumes that if these workers find themselves without 401(k) plans, they would attempt to replicate their 401(k) savings experience with contributions to IRAs. Based on job duration behavior observed in the Survey of Consumer Finances (SCF), participants in the EBRI/ICI 401(k) Accumulation Projection Model typically are projected to work at several different employers over the course of their careers. By age 65, only 9 percent of the 401(k) participants with account balances at year-end 2000 and born between 1965 and 1974 are projected to have had only one job their entire career; about 54 percent had three to five jobs; and about a quarter had six to nine jobs (Figure 12). As a result, because many employers do not offer a 401(k) plan,[36] only 7 percent of participants born between 1965 and 1974 were projected to have 401(k) plan coverage for their entire careers (Figure 13).
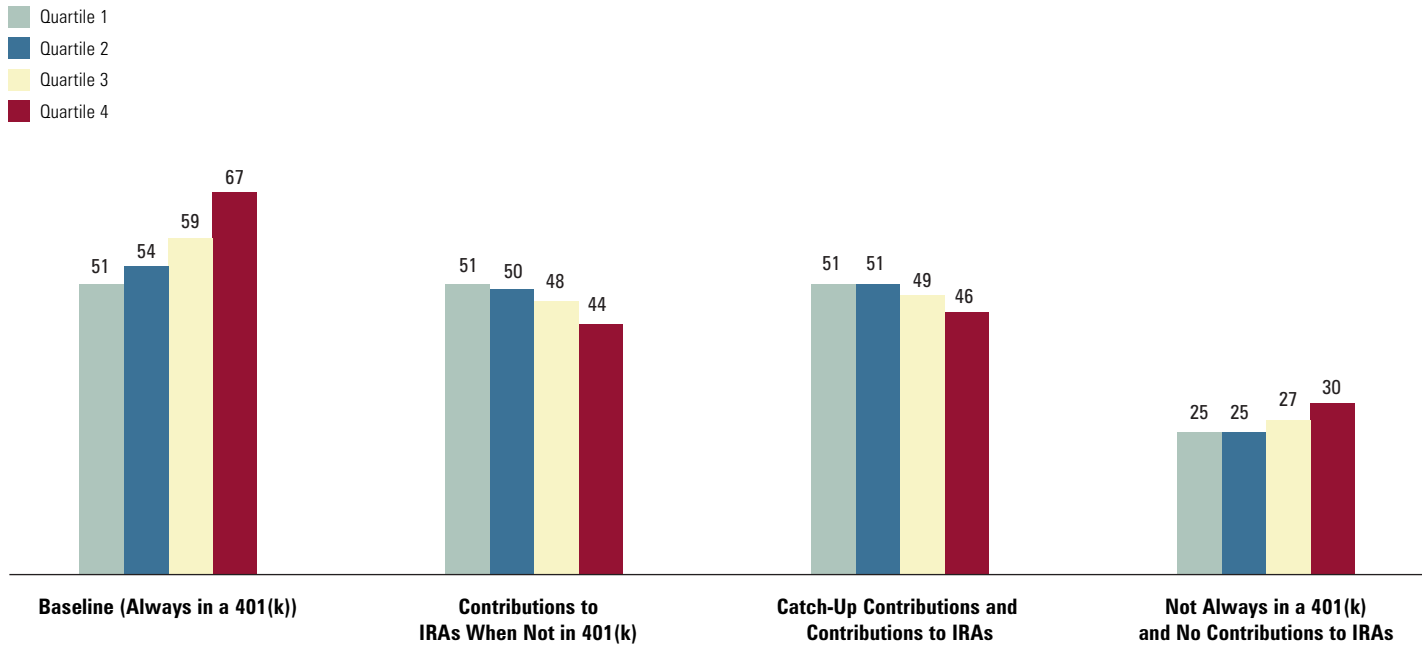
When workers do not always have 401(k) plan coverage, replacement rates fall significantly compared with the baseline model that assumes continuous coverage. For example, in the lowest income quartile at age 65, the baseline replacement rate from 401(k) accumulations in the first year of retirement is about 51 percent of projected pre-retirement income. This is about halved to 25 percent of projected pre-retirement income when 401(k) coverage is not continuous and no other plan is allowed to take its place (Figure 14). Replacement rates fall even more as income rises. For individuals in the highest income quartile, not

---

[35] For example, Pence (June 2002) finds that 401(k) plan participants have greater interest in saving compared with other workers and Ippolito (1997) argues that firms that offer defined contribution plans attract workers who are savers.

[36] See U.S. Department of Labor, Employee Benefits Security Administration (Summer 2004), which reports that 29 percent of private wage and salary workers were active participants in defined contribution plans only, 14 percent were active participants in both defined benefit and defined contribution plans, and 7 percent were in private defined benefit plans only.

FIGURE 14

Median Replacement Rates from 401(k) Accumulations[1] for Participants Turning 65 Between 2030 and 2039, by Income Quartile at Age 65

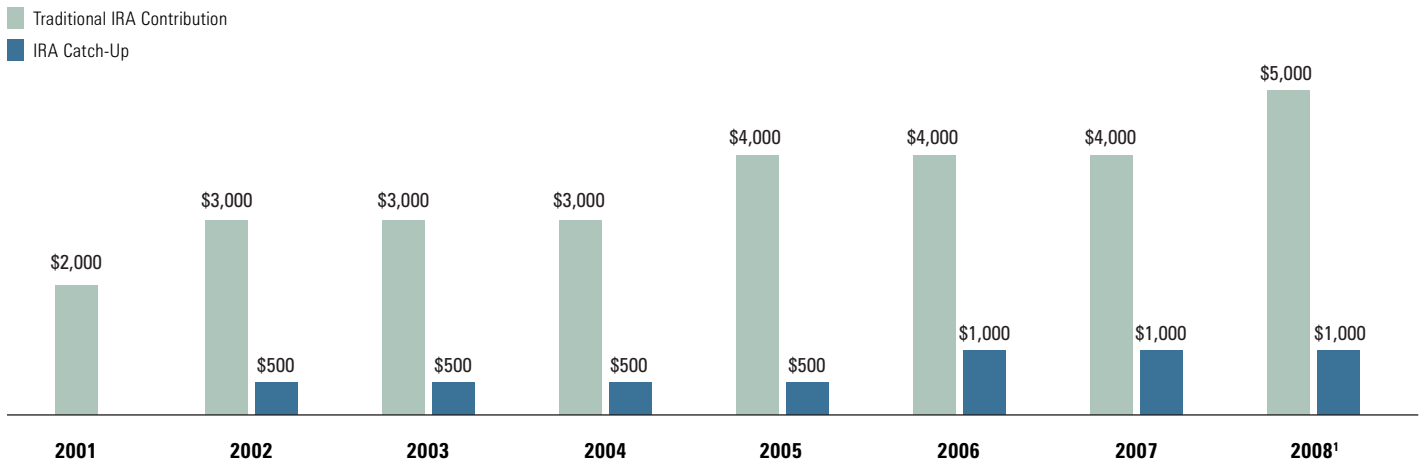(percent of final five-year average salary)

- Quartile 1
- Quartile 2
- Quartile 3
- Quartile 4

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Baseline (Always in a 401(k))	51	54	59	67
Contributions to IRAs When Not in 401(k)	51	50	48	44
Catch-Up Contributions and Contributions to IRAs	51	51	49	46
Not Always in a 401(k) and No Contributions to IRAs	25	25	27	30

[1] The 401(k) accumulation includes 401(k) balances at employer(s) and rollover IRA balances.
Source: EBRI/ICI 401(k) Accumulation Projection Model

FIGURE 15

Internal Revenue Code Traditional IRA Contribution Limits, 2001–2008

- Traditional IRA Contribution
- IRA Catch-Up

	2001	2002	2003	2004	2005	2006	2007	2008[1]
Traditional IRA Contribution	$2,000	$3,000	$3,000	$3,000	$4,000	$4,000	$4,000	$5,000
IRA Catch-Up		$500	$500	$500	$500	$1,000	$1,000	$1,000

[1] After 2008, traditional IRA contributions are indexed for inflation in $500 increments. IRA catch-up contributions are not indexed for inflation.
Source: Authors' Summary of U.S. Internal Revenue Code

always having a 401(k) plan reduces their median replacement rate by 37 percentage points.

The question that arises is: To what extent could IRA contributions make up for a lack of 401(k) coverage? The model assumes IRA contributions only as a substitute for the 401(k) activity typically observed. Thus, the model uses the 401(k) contribution decision variables to determine whether the individual contributes to an IRA when without access to a 401(k) plan. Because IRA contribution limits are lower than 401(k) plan contribution limits (Figures 11 and 15), individuals may not be able to contribute as much as they want, or are able, to contribute. The model assumes that each individual tries to contribute to the IRA what would have been contributed by the employee and employer combined in a given year to the 401(k) account. However, if the total contribution that would have occurred in the 401(k) plan is higher than the IRA limit, then the individual can only contribute the IRA limit.

Availability of an IRA during lapses in 401(k) coverage essentially restores the lower income quartiles' replacement rates back to baseline results. This is because the 401(k) plan contribution amounts among lower income quartiles tend to be close to the IRA contribution limits. Higher income quartiles are constrained by the lower IRA limits, which prevent them from replicating their 401(k) contribution possibilities. For example, in the highest income quartile, the median replacement rate improves by about 14 percentage points when these workers make IRA contributions when without 401(k) plans, but cannot reach the baseline result (Figure 14).

CONCLUSION

Because current retirees' 401(k) accumulations are not representative of what a full career with exposure to 401(k) plans *might* generate at retirement, EBRI and ICI developed a model to simulate several projected retirement scenarios for a group of 401(k) plan participants born between 1965 and 1974 after essentially a full career's exposure to 401(k) plans. Workers' retirement savings behaviors are shaped by plan design and tax policy, as well as individuals' innate personal characteristics.

This paper examines the influence of automatic enrollment in the plan design on replacement rates among all eligible workers. Because many employees do not choose to participate in 401(k) plans, non-participants were added to the model to analyze the impact of automatic enrollment on replacement rates at retirement. Empirical research finds that automatic enrollment is successful at increasing participation rates, which moves many employees from a zero contribution rate to a positive contribution rate.

Lower income individuals benefit the most from automatic enrollment. However, among higher income employees, conservative default investment options and modest default contribution rates in some cases have a negative effect if the employee would have contributed at a higher rate and/or chosen a less conservative investment option without automatic enrollment.

EGTRRA changed tax policy by increasing contribution limits and allowing catch-up contributions for older participants. This paper examines the impact of catch-up contributions on replacement rates from 401(k) accumulations at age 65. The projections suggest that catch-up contributions, which are available to participants who are age 50 or older and already contributing at the limit, primarily increase higher income participants' projected replacement rates.

Finally, a new projection scenario analyzes the impact of contributions to IRAs when employees are not offered 401(k) plans. If employees use IRAs during lapses in 401(k) coverage, lower income participants do not fall behind because contributions to their 401(k) accounts tend to be close to IRA limits, which are lower than 401(k) limits. On the other hand, higher income workers are not able to replicate their 401(k) contribution experience with IRAs during periods of time when they are not offered a 401(k) plan.

REFERENCES[37]

Browning, Martin, and Thomas F. Crossly. "The Life-Cycle Model of Consumption and and Saving," *Journal of Economic Perspectives*, Vol. 15, No. 3, Summer 2001: pp. 3–22.

Cerulli Associates. "Retirement Markets 2004," *Cerulli Quantitative Update*, Boston, MA: Cerulli Associates, Inc., 2004.

Choi, James J., David Laibson, Brigitte C. Madrian, and Andrew Metrick. "Saving For Retirement on the

---

[37] See Holden and VanDerhei (November 2002 and November 2002–Appendix) for complete references for all components of the EBRI/ICI 401(k) Accumulation Projection Model.

Path of Least Resistance," originally prepared for *Tax Policy and the Economy 2001*, updated draft: July 19, 2004.

Choi, James J., David Laibson, Brigitte Madrian, and Andrew Metrick. "For Better or For Worse: Default Effects and 401(k) Savings Behavior," *Pension Research Council Working Paper*, PRC WP 2002-2, Philadelphia, PA: Pension Research Council, The Wharton School, University of Pennsylvania, November 9, 2001.

Copeland, Craig. "Employment-Based Retirement Plan Participation: Geographic Differences and Trends," *EBRI Issue Brief*, No. 274, Washington, DC: Employee Benefit Research Institute, October 2004.

Engen, Eric M., William G. Gale, and Cori E. Uccello. "The Adequacy of Household Saving," *Brookings Papers on Economic Activity*, Vol. 2, Washington, DC: Brookings Institution, December 1999: pp. 65–188.

Federal Reserve Board. *Survey of Consumer Finances*. Available: http://www.federalreserve.gov/pubs/oss/oss2/scfindex.html. Accessed 6/15/2005.

Fidelity Investments. *Building Futures, Volume V: How Workplace Savings Are Shaping the Future of Retirement*. Boston, MA: Fidelity Investments, 2004.

Hewitt Associates. *2005 Trends and Experience in 401(k)Plans*. Lincolnshire, IL: Hewitt Associates, LLC, 2005.

Holden, Sarah, Kathy Ireland, Vicky Leonard-Chambers, and Michael Bogdan. "The Individual Retirement Account at Age 30: A Retrospective," *ICI Perspective*, Vol. 11, No. 1, Washington, DC: Investment Company Institute, February 2005.

Holden, Sarah, and Jack VanDerhei. "401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2003," *ICI Perspective*, Vol. 10, No. 2, and *EBRI Issue Brief*, No. 272, Washington, DC: Investment Company Institute and Employee Benefit Research Institute, August 2004.

Holden, Sarah, and Jack VanDerhei. "Can 401(k) Accumulations Generate Significant Income for Future Retirees?" *ICI Perspective*, Vol. 8, No. 3, and *EBRI Issue Brief*, No 251, Washington, DC: Investment Company Institute and Employee Benefit Research Institute, November 2002.

Holden, Sarah, and Jack VanDerhei. "Appendix: EBRI/ICI Accumulation Projection Model," *ICI Perspective*, Vol. 8, No. 3A, Washington, DC: Investment Company Institute, November 2002—Appendix.

Holden, Sarah, and Jack VanDerhei. "Contribution Behavior of 401(k) Plan Participants," *ICI Perspective*,

Vol. 7, No. 4, and *EBRI Issue Brief*, No. 238, Washington, DC: Investment Company Institute and Employee Benefit Research Institute, October 2001.

Ibbotson Associates. *SBBI (Stocks, Bonds, Bills, and Inflation) 2002 Yearbook: Market Results for 1926–2001*. Chicago, IL: Ibbotson Associates, Inc., 2002.

Investment Company Institute. *2005 Investment Company Fact Book, 45th Edition*. Washington, DC: Investment Company Institute, 2005.

Investment Company Institute. "401(k) Plan Participants: Characteristics, Contributions, and Account Activity," *ICI Research Series*, Washington, DC: Investment Company Institute, Spring 2000.

Ippolito, Richard A. *Pension Plans and Employee Performance: Evidence, Analysis, and Policy*. Chicago, IL: The University of Chicago Press, 1997.

Madrian, Brigitte C., and Dennis F. Shea. "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior," *NBER Working Paper*, No. 7682, Cambridge, MA: National Bureau of Economic Research, May 2000.

Mitchell, Olivia, and Stephen P. Utkus. "Lessons from Behavioral Finance for Retirement Plan Design," *Pension Research Council Working Paper*, PRC WP 2003-6, Philadelphia, PA: Pension Research Council, The Wharton School, University of Pennsylvania, 2003.

Pence, Karen M. "Nature or Nurture: Why Do 401(k) Participants Save Differently than Other Workers?" *Finance and Economics Discussion Series Paper*, Washington, DC: Board of Governors of the Federal Reserve System, June 2002.

Profit Sharing/401(k) Council of America. *47th Annual Survey of Profit Sharing and 401(k) Plans: Reflecting 2003 Plan Year Experience*. Chicago, IL: Profit Sharing/401(k) Council of America, 2004.

Social Security Administration, "Primary Insurance Amount." Available: http://www.ssa.gov/OACT/COLA/piaformula.html. Accessed 6/27/2005.

Thaler, Richard H., and Shlomo Benartzi. "Save More Tomorrow™: Using Behavioral Economics to Increase Employee Saving," J*ournal of Political Economy*, Vol. 112, No. 1, Pt. 2, 2004: pp. S164–S187.

U.S. Department of Labor, Employee Benefits Security Administration. *Private Pension Plan Bulletin, Abstract of 1999 Form 5500 Annual Reports*. Washington, DC: U.S. Department of Labor, Summer 2004.

Utkus, Stephen P. *A Recent Successful Test of the SMarT Program*. Valley Forge, PA: The Vanguard Center for Retirement Research and The Vanguard Group, November 2002.

Utkus, Stephen P., and Gary R. Mottola. *Catch-Up Contributions in 2004: Plan Sponsor and Participant Adoption*. Valley Forge, PA: The Vanguard Center for Retirement Research and The Vanguard Group, April 2005.

Utkus, Stephen P., and Jean A. Young. *Lessons From Behavioral Finance and the Autopilot 401(k) Plan*. Valley Forge, PA: The Vanguard Center for Retirement Research and The Vanguard Group, April 2004.

The Vanguard Center for Retirement Research. *Automatic Enrollment: Vanguard Client Experience*. Valley Forge, PA: The Vanguard Group, July 2001.

The Vanguard Center for Retirement Research. *Automatic Enrollment: Benefits and Costs of Adoption*. Valley Forge, PA: The Vanguard Group, May 2001.

Back issues of *Perspective*, written by Institute staff, leading scholars, and other contributors, address public policy issues of importance to mutual funds and their shareholders. Contact the Institute's Research Department at 202/326-5913 for more information. For a complete list of back issues of *Perspective*, visit the Institute's public policy website at www.ici.org/perspective/index.html.