

# How Much Would it Take? Achieving Retirement Income Equivalency between Final-Average-Pay Defined Benefit Plan Accruals and Voluntary Enrollment 401(k) Plans in the Private Sector

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## Introduction

The June 2013 *EBRI Issue Brief* provided a comparative analysis of future benefits from private-sector, voluntary-enrollment (VE) 401(k) plans and stylized, final-average-pay defined benefit (DB) plans.<sup>1</sup> The methodology in that *Issue Brief* utilized simulation models developed and utilized for more than a decade at the Employee Benefit Research Institute (EBRI) to project likely account balances in 401(k) plans, as well as individual retirement account (IRA) rollover balances that originated in 401(k) plans. The models are based on information collected from tens of millions of 401(k) participant accounts dating back in some cases as far as 1996.<sup>2</sup> This information allows EBRI's models to reflect real-world activity on account balances, asset allocation and contribution behaviors.

In addition to modeling the behavior of participants in those 401(k) plans, the EBRI Retirement Security Projection Model<sup>®</sup> (RSPM) also simulates whether an employee's current job will terminate each year and, if so, whether his or her 401(k) balances are retained in a 401(k) plan, rolled over to an IRA or cashed out. Moreover, RSPM simulates the likelihood that an employee's subsequent employer(s) will sponsor 401(k) plans and the conditional probability that the employee will choose to participate in those plans, if offered. A distribution of plan-specific data from approximately 1,000 large defined contribution (DC) plans for salaried employees is used to assign plan parameters such as match rates, maximum amounts of compensation matched and nonelective contributions.

Careful consideration of each of these factors is critical to accurately simulate account balances at retirement age, but certain macro assumptions are also required. For example, the future rates of return on the various asset classes were assumed to follow one of two different types of distributions outlined in the June 2013 *EBRI Issue Brief*. Under those baseline assumptions, returns were generated from stochastic annual returns with a log-normal distribution and an arithmetic mean of 8.6 percent real return for stocks and 2.6 percent real return for bonds. Sensitivity analysis is conducted in this study by reducing the returns by 200 basis points (2 percentage points).

Once the 401(k) participant is projected to reach retirement age (age 65 in this analysis), a nominal annuity is assumed to be purchased for all 401(k) and IRA rollover balances by the employee. While the likelihood that such a transaction will take place with all balances is typically low, this step is required to compare the account balances with the monthly income that would be generated by a DB plan. Another macro assumption that is required in this type of comparison involves the predicted annuity purchase price for the year each annuitant turns 65 (a calculation that is a function both of changes in mortality experience, as well as discount rates). As described in the June 2013 *EBRI Issue Brief*, the conversion of account balances to monthly retirement income was based on annuity purchase prices reflecting average bond rates over the past 27 years. As part of the sensitivity analysis used in that report, conversions were also performed assuming annuity purchase prices that were much larger (reflecting the historically low bond rates at the time).

At that point, the previous study performed a pairwise comparison between that value and what would have been available under the final-average plan under the same employment, wage and eligibility history. Rather than trying to reflect the real-world variation in DB accruals, the baseline analysis used the median accrual rate in the sample (1.5 percent of final compensation per year of participation) as the stylized value for the baseline counterfactual simulations.<sup>3</sup> Several graphs and tables were produced to show the percentile distribution of the relative gaps between the retirement-income outcomes from a VE 401(k) plan compared with the final-average DB plan, by income

quartile, as well as by number of years of plan eligibility. This analysis was conducted for the baseline assumptions as well as for several sensitivity analyses.

## Modifications for the Current Research

Since the publication of the June 2013 *EBRI Issue Brief*, several questions have been posed dealing with how the results might differ if different accrual rates were assumed for the stylized DB plan. The current research expands upon the June 2013 *EBRI Issue Brief* by computing for each simulated employee iteration what final-average DB accrual would provide the same amount of retirement income at age 65 as would be produced by the annuitized value of the projected sum of the 401(k) and IRA rollover balances.

## Results

Figure 1A shows the median of the final-average DB plan generosity parameters required for equivalence with the VE 401(k) plan among male employees currently ages 25–29, by salary quartile and years of eligibility, assuming the baseline (historical) rates of returns for stocks and bonds and the baseline assumption for the annuity purchase price (reflecting average bond rates over the last 27 years). Figure 1B provides the same analysis for females.

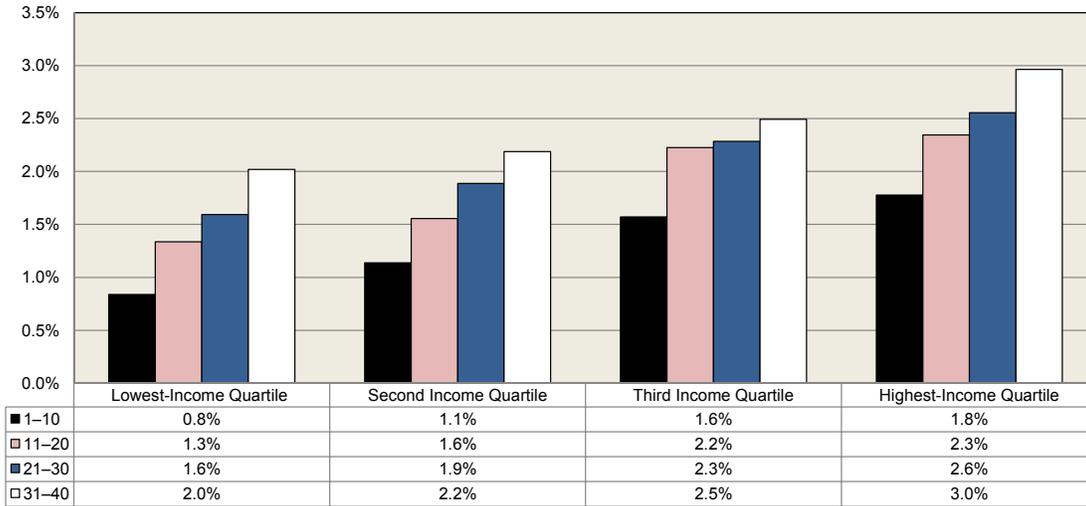
Given their higher conditional probabilities of participation in a VE 401(k) plan when eligible, one would expect that higher-income employees would need a higher DB accrual rate to produce an equivalent level of retirement income as the 401(k) plan. This is indeed what is observed in both Figures 1A and Figure 1B; for all years-of-eligibility categories, the larger income quartiles have higher “break-even” accrual rates. For example, the median DB accrual that males (Figure 1A) with 31–40 years of plan eligibility would need to generate the same retirement income that they are projected to have with a 401(k) is 2.0 percent of final compensation, if they are in the lowest-income quartile. This increases to 2.2 percent for the next income quartile and 2.5 percent for the third income quartile. Those in the highest-income quartile would need a 3.0 percent accrual for equivalency.

Given their longer life expectancies at age 65 (and hence higher annuity purchase prices in the individual market), females would be expected to need lower DB accrual rates for equivalency. And, in fact, comparing Figures 1A and 1B shows that for most combinations of years-of-eligibility category and income quartile the median DB accrual rate for females is less than, or equal to, the corresponding rate for males.

Figures 2A and 2B show the impact of reducing the assumed rates of return by 200 basis points on the DB accrual rates needed for equivalency for males and females, respectively. Because the lower rates of return would reduce the expected account balances, the DB plan would require a lower accrual rate to provide an equivalent benefit. For example, the median DB accrual that males (Figure 2A) with 31–40 years of plan eligibility in their careers would need to have the same retirement income that they are projected to have with a 401(k) plan is 1.4 percent of final compensation, if they are in the lowest-income quartile. This is a 30 percent reduction compared with the 2.0 percent value under the baseline return assumptions in Figure 1A.

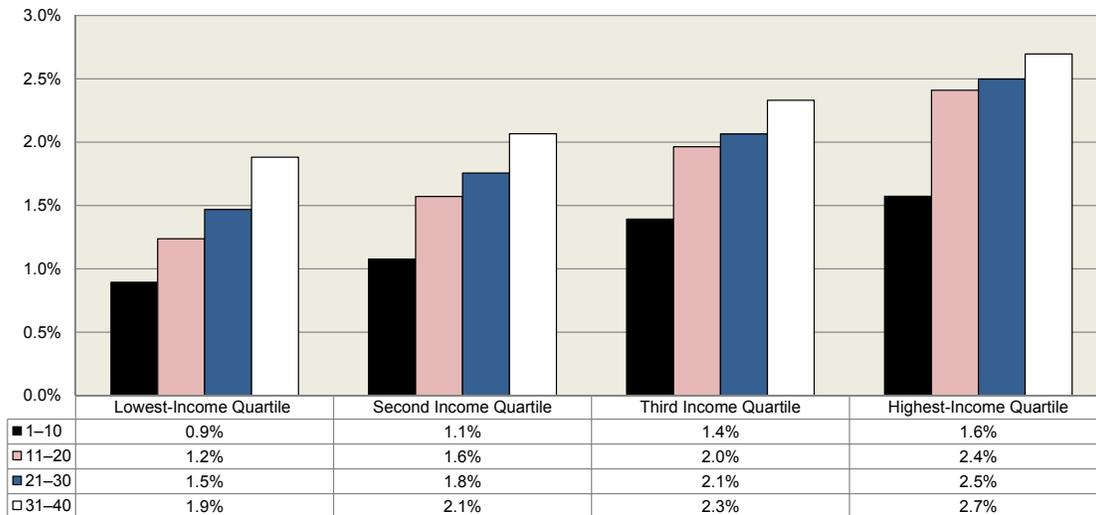
Figures 3A and 3B show the impact of assuming future annuity purchase prices are equivalent to today’s historically high rates. Because the higher annuity purchase prices would reduce the expected monthly retirement income that can be generated from the 401(k) and IRA account balances, the DB plan would require a lower accrual rate to provide an equivalent benefit. For example, the median DB accrual that males (Figure 3A) with 31–40 years of plan eligibility would need to have the same retirement income that they are projected to have with a 401(k) plan is 1.6 percent of final compensation, if they are in the lowest-income quartile. This is a 20 percent reduction compared with the 2.0 percent value under the baseline assumptions in Figure 1A.

**Figure 1A**  
**Median of Final-Average DB<sup>a</sup> Plan Generosity Parameters Needed for**  
**Equivalence With VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29,**  
**by Salary Quartile and Years of Eligibility: Baseline Assumptions for Males**



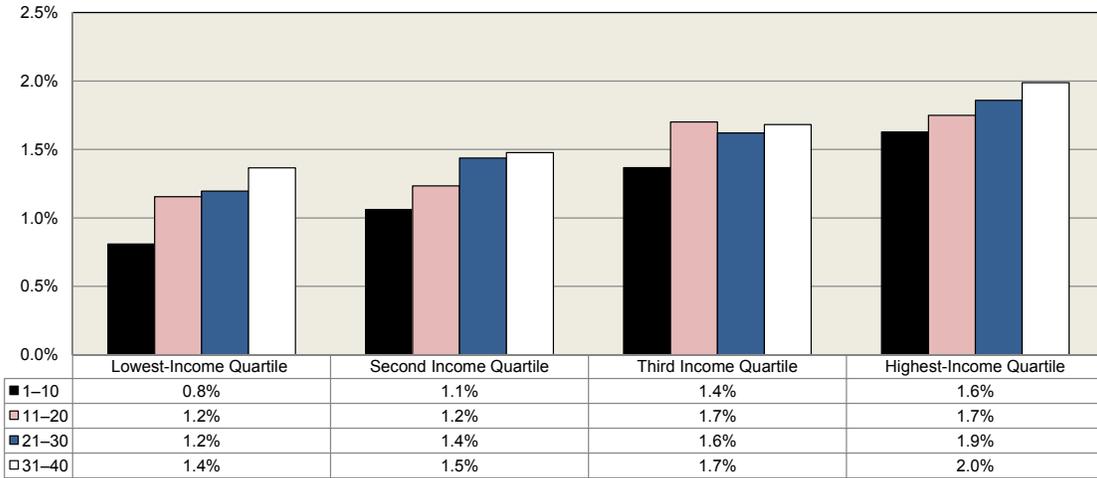
Source: Employee Benefit Research Institute Retirement Security Projection Model<sup>®</sup> Version 1931.  
 The numbers represent the annual accrual percentage that would be multiplied by final-average salary and years of participation.  
 Assumptions: historical rates of return; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participations follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 11.61 (males age 65 with today's longevity assumptions but priced when average corporate bond rate = 6.85%).  
<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

**Figure 1B**  
**Median of Final-Average DB<sup>a</sup> Plan Generosity Parameters Needed for**  
**Equivalence With VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29,**  
**by Salary Quartile and Years of Eligibility: Baseline Assumptions for Females**



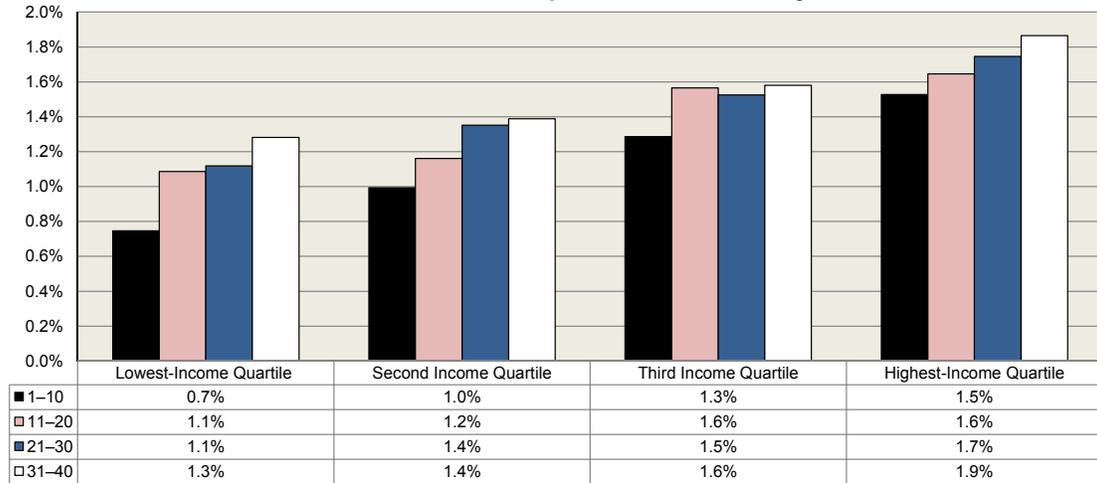
Source: Employee Benefit Research Institute Retirement Security Projection Model<sup>®</sup> Version 1931.  
 The numbers represent the annual accrual percentage that would be multiplied by final-average salary and years of participation.  
 Assumptions: historical rates of return; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participations follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 12.34 (females age 65 with today's longevity assumptions but priced when average corporate bond rate = 6.85%).  
<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

**Figure 2A**  
**Median of Final-Average DB<sup>a</sup> Plan Generosity Parameters Needed for Equivalence With VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29, by Salary Quartile and Years of Eligibility: Benchmark Male-Adjusted Annuity Purchase Prices and Return Assumptions Decreased by 200 Basis Points**



Source: EBRI Retirement Security Projection Model<sup>®</sup> Version 1933.  
 The numbers represent the annual accrual percentage that would be multiplied by final average salary and years of participation.  
 Assumptions: historical rates of return less 200 basis points; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participants follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 11.61.  
<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

**Figure 2B**  
**Median of Final Average DB<sup>a</sup> Plan Generosity Parameters Needed for Equivalence with VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29, by Salary Quartile and Years of Eligibility: Benchmark Female-Adjusted Annuity Purchase Prices and Return Assumptions Decreased by 200 Basis Points**



Source: EBRI Retirement Security Projection Model<sup>®</sup> Version 1941.  
 The numbers represent the annual accrual percentage that would be multiplied by final average salary and years of participation.  
 Assumptions: historical rates of return less 200 basis points; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participants follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 12.34.  
<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

Finally, Figures 4A and 4B show the impact of simultaneously reducing the assumed rates of return by 200 basis points and assuming future annuity purchase prices are equivalent to today's historically high rates. Because both of these modifications would reduce the median DB accrual needed for equivalency separately, one would expect an even larger decrease when they are combined. This is indeed what is seen in these figures. For example, the median DB accrual that males (Figure 4A) with 31–40 years of plan eligibility would need to have the same retirement income that they are projected to have with a 401(k) plan is 1.1 percent of final compensation, if they are in the lowest-income quartile. This represents a 45 percent reduction from the 2.0 percent value under the baseline assumptions in Figure 1A.

## Future Research

Since the passage of the Pension Protection Act (PPA) in 2006, several EBRI studies<sup>4</sup> have focused on the likely impact of automatic enrollment (AE) on 401(k) participants. While most industry data shows that the number of recently hired workers eligible for participation in an AE 401(k) plan has been increasing steadily since 2007, there are still a number of assumptions with respect to opt-out behavior for plans with automatic escalation of contributions that need to wait for additional empirical data before parameterization of the models can take place with increased precision.<sup>5</sup> Therefore, despite the upward trend in AE adoption, VE 401(k) plans were the only type of DC plan modeled in the June 2013 *Issue Brief*.

A follow-up publication will repeat the analysis for AE plans as soon as there is sufficient time-series information and a corresponding analysis of median DB accrual rates required for equivalent retirement income will be undertaken.<sup>6</sup>

## Summary

Over the past 30-odd years, the number of defined benefit (DB) pension plans has continued to decline, while defined contribution (DC) plans have increased. Today, some workers are covered both by DB and DC plans, while others are offered only a DC plan, and some have only a DB plan. Still others have no workplace retirement plan at all.

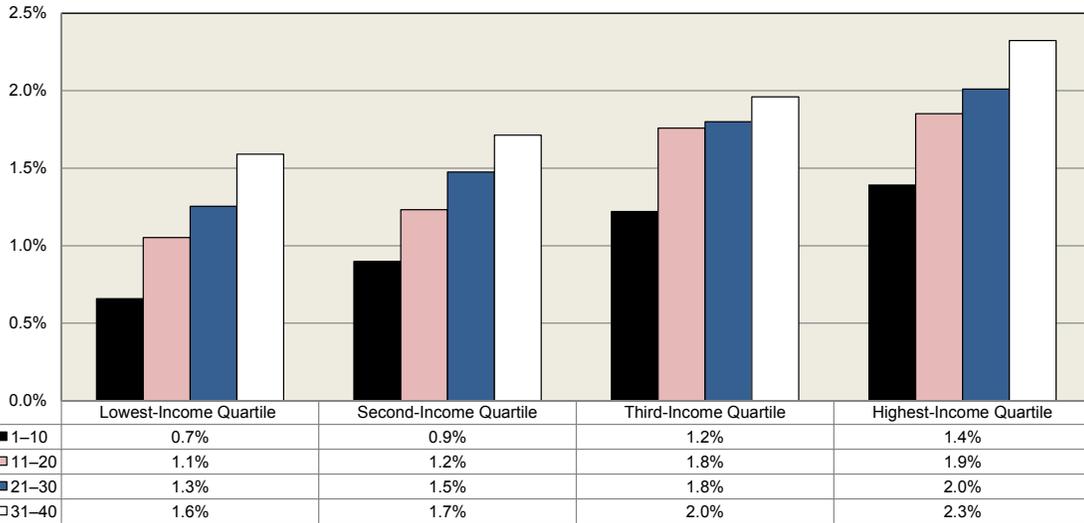
As noted in earlier EBRI publications, a rapidly growing public policy concern facing the United States is whether future generations of retired Americans, particularly those in the Baby Boomer and Gen X cohorts, will have adequate retirement incomes. There have been several policy studies in recent years that suggest that the decreasing relevance of DB plans relative to DC plans (such as 401(k)s) since the 1980s will have a negative impact on the percentage of future retirees who will achieve a specified level of retirement income adequacy.

In considering these shifts in plan availability and design, plan sponsors, providers, and policy makers naturally look for comparisons in the outcomes provided, the benefits actually produced based on the application of real-world savings rates, employer contributions and worker tenure within these program designs. Unfortunately, the comparisons are frequently limited by a paucity of real-world data.

This research expands upon work previously published (June 2013 *EBRI Issue Brief*), by computing for a number of simulated employee contingencies (such as job turnover) what level of final-average DB accrual would provide an equal amount of retirement income at age 65 as would be produced if the projected sum of voluntary enrollment 401(k) and IRA rollover balances were annuitized. In so doing, it provides a comparison in median outcomes for a variety of assumptions, both market returns and annuity purchase prices, and should provide a much-needed reference point for policy makers in evaluating these plan designs in view of both current and future workforce trends.

Figure 3A

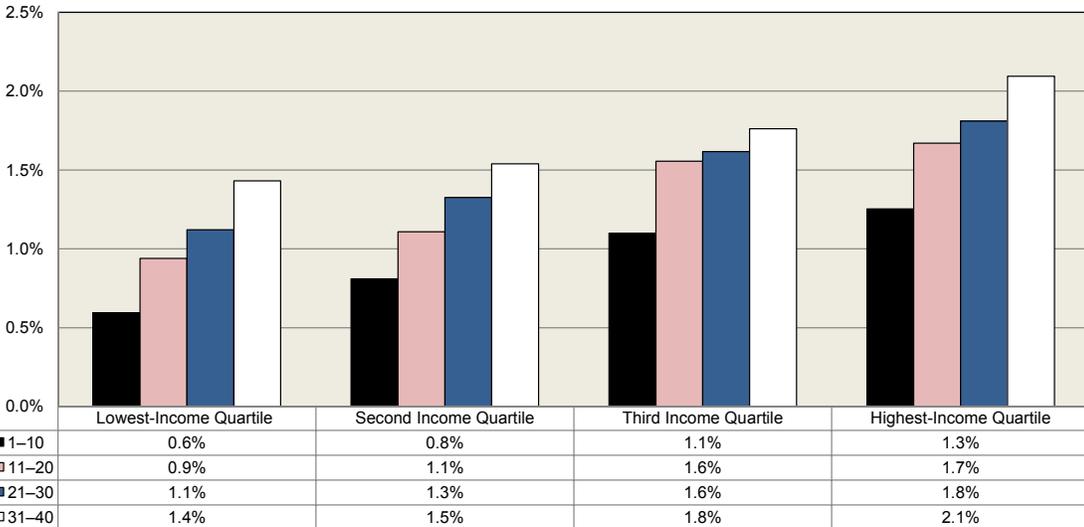
**Median of Final-Average DB<sup>a</sup> Generosity Parameters Needed for Equivalence With VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29, by Salary Quartile and Years of Eligibility: Today’s Male-Adjusted Annuity Purchase Prices**



Source: EBRI Retirement Security Projection Model<sup>®</sup> Version 1934.  
 Assumptions: historical rates of return; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participants follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 14.7.  
<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

Figure 3B

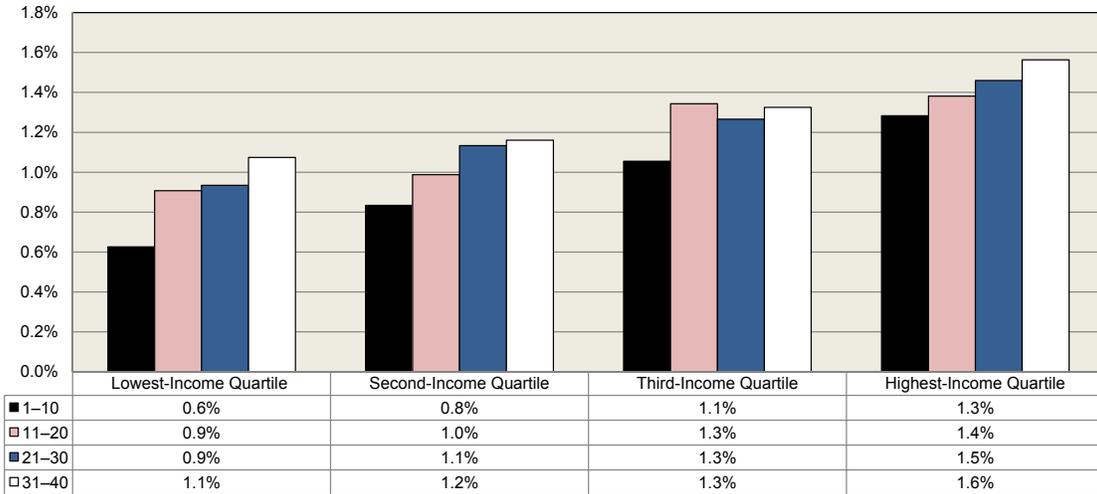
**Median of Final-Average DB<sup>a</sup> Plan Generosity Parameters Needed for Equivalence With VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29, by Salary Quartile and Years of Eligibility: Today’s Female-Adjusted Annuity Purchase Prices**



Source: EBRI Retirement Security Projection Model<sup>®</sup> Version 1942.  
 Assumptions: historical rates of return; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participants follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 16.31.  
<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

Figure 4A

**Median of Final-Average DB<sup>a</sup> Plan Generosity Parameters Needed for Equivalence with VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29, by Salary Quartile and Years of Eligibility: Today’s Male-Adjusted Annuity Purchase Prices and Return Assumptions Decreased by 200 Basis Points**

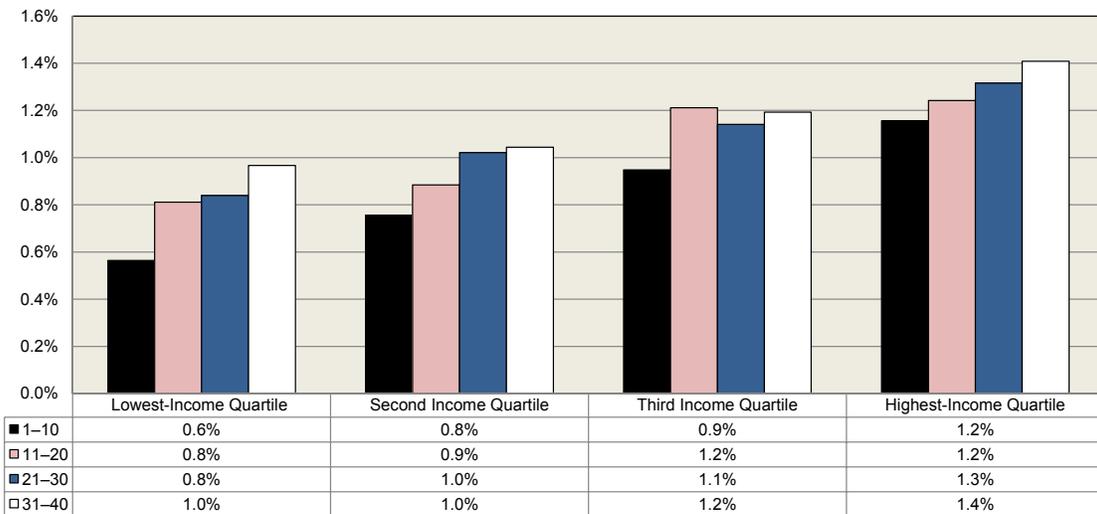


Source: EBRI Retirement Security Projection Model<sup>®</sup> Version 1939.  
 Assumptions: historical rates of return less 200 basis points; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participants follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 14.7.

<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

Figure 4B

**Median of Final-Average DB<sup>a</sup> Plan Generosity Parameters Needed for Equivalence With VE<sup>b</sup> 401(k) Plan Among Employees Currently Ages 25–29, by Salary Quartile and Years of Eligibility: Today’s Female-Adjusted Annuity Purchase Prices and Return Assumptions Decreased by 200 Basis Points**



Source: EBRI Retirement Security Projection Model<sup>®</sup> Version 1943.  
 Assumptions: historical rates of return less 200 basis points; fees of 0.78%; average wage growth 3.9% until age 55 and 2.8% thereafter; participation probability = (1+unconditional probability)/2 once they have participated; cashouts for defined contribution follow Vanguard 2012 experience; cashouts for defined benefit participants follow Vanguard 2012 experience assuming employees react to the lump-sum distribution (LSD) amount in the same manner as the account balance in the 401(k) plan; annuity purchase price = 16.31.

<sup>a</sup> Defined benefit.  
<sup>b</sup> Voluntary enrollment.

## Appendix A: Brief Chronology of the EBRI Retirement Security Projection Model®

<b>2001</b>	<p>The Retirement Security Projection Model® (RSPM) grew out of a multi-year project to analyze the future economic well-being of the retired population at the state level. The Employee Benefit Research Institute (EBRI) and the Milbank Memorial Fund, working with the office of the governor of Oregon, set out in the late 1990s to see if this situation could be evaluated for the state. The resulting analysis (VanDerhei and Copeland, September 2001c) focused primarily on simulated retirement wealth with a comparison to ad hoc thresholds for retirement expenditures.</p>
	<p>The April 2001 EBRI Issue Brief (VanDerhei and Copeland, April 2001) highlighted the changes in private pension plan participation for defined benefit (DB) and defined contribution (DC) plans and used the model to quantify how much the importance of individual account plans was expected to increase because of these changes.</p>
<b>2002</b>	<p>With the assistance of the Kansas Insurance Department, EBRI was able to create the EBRI Retirement Readiness Rating™ (RRR) based on a full stochastic decumulation model that took into account the household's longevity risk, post-retirement investment risk, and exposure to potentially catastrophic nursing-home and home-health-care risks. The first state-level RSPM results were presented to the Kansas' Long-Term Care Services Task Force on July 11, 2002 (VanDerhei and Copeland, July 2002), and the results of the Massachusetts study were presented on Dec. 1, 2002 (VanDerhei and Copeland, December 2002).</p>
<b>2003</b>	<p>RSPM was expanded to a national model -- the first national, micro-simulation, retirement-income adequacy model, built in part from administrative 401(k) data. The initial results were presented at the EBRI December 2003 policy forum (VanDerhei and Copeland, November 2003).</p>
<b>2004</b>	<p>The basic model was subsequently modified to quantify the beneficial impact of a mandatory contribution of 5 percent of compensation for testimony for the Senate Special Committee on Aging (VanDerhei, January 2004).</p> <p>The model was enhanced to allow an analysis of the impact of annuitizing defined contribution and individual retirement account (IRA) balances at retirement age (VanDerhei and Copeland, May 2004).</p>
<b>2005</b>	<p>Additional refinements were introduced to evaluate the impact of purchasing long-term care insurance on retirement income adequacy (VanDerhei, March 2005).</p>
<b>2006</b>	<p>The model was used to evaluate the impact of DB freezes on participants by simulating the minimum employer-contribution rate that would be needed to financially indemnify the employees for the reduction in their expected retirement income under various rate-of-return assumptions (VanDerhei, March 2006).</p> <p>Later that year, an updated version of the model was developed to enhance the EBRI interactive Ballpark E\$timate® by providing Monte Carlo simulations of the replacement rates needed for specific probabilities of retirement-income adequacy under alternative-risk-management treatments (VanDerhei, September 2006).</p>
<b>2008</b>	<p>RSPM was significantly enhanced for the May 2008 EBRI policy forum by allowing automatic enrollment of 401(k) participants with the potential for automatic escalation of contributions to be included (VanDerhei and Copeland, June 2008).</p>

<b>2009</b>	Additional modifications were added for a Pension Research Council presentation that involved a “winners/losers” analysis of DB freezes and the enhanced employer contributions provided to DC plans at the time the DB plans were frozen (Copeland and VanDerhei, 2010).
	Also in 2009, a new subroutine was added to allow simulations of various styles of target-date funds for a comparison with participant-directed investments (VanDerhei, June 2009).
<b>2010</b>	In April 2010, the model was completely re-parameterized with 401(k)-plan design parameters for sponsors that had adopted AE provisions (VanDerhei, April 2010).
	A completely updated version of the national model was produced for the May 2010 EBRI Policy Forum and used in the July 2010 <i>EBRI Issue Brief</i> (VanDerhei and Copeland, 2010).
	The new model was used to analyze how eligibility for participation in a DC plan impacts retirement income adequacy in September 2010 (VanDerhei, September 2010), and was later used to compute Retirement Savings Shortfalls (RSS) for Baby Boomers and Generation Xers in October 2010 (VanDerhei, October 2010a).
	In October testimony before the Senate Health, Education, Labor and Pensions Committee on “The Wobbly Stool: Retirement (In)security in America,” the model was used to analyze the relative importance of employer-provided retirement benefits and Social Security (VanDerhei, October 2010b).
	The November Issue Brief expanded upon earlier work by EBRI to provide the first results of a new simulation model that estimated the impact of changing 401(k) plan design variables and assumptions on retirement income adequacy. Previous research had demonstrated the large potential impact of auto-enrollment (AE) on retirement income adequacy. Until recently however, there was extremely limited evidence on the impact of automatic contribution escalation (VanDerhei and Lucas, November 2010).
<b>2011</b>	In February the model was used to analyze the impact of the 2008–2009 crisis in the financial and real estate markets on retirement income adequacy (VanDerhei, February 2011).
	An April 2011 article introduced a new method of analyzing the results from RSPM (VanDerhei, April 2011). Rather than simply computing an overall percentage of the simulated life paths in a particular cohort that would not have sufficient retirement income to pay for the simulated expenses, the new method computed the percentage of households that would meet that requirement more than a specified percentage of times in the simulation.
	As explored in the June 2011 <i>EBRI Issue Brief</i> , the RSPM allowed retirement-income adequacy to be assessed at retirement ages later than 65 (VanDerhei and Copeland, June 2011).
	In a July 2011 <i>EBRI Notes</i> article (VanDerhei, July 2011), RSPM was used to provide preliminary evidence of the impact of the “20/20 caps” on projected retirement accumulations proposed by the National Commission on Fiscal Responsibility and Reform.
	The August 2011 <i>EBRI Notes</i> article (VanDerhei, August 2011) used RSPM to analyze the impact of DB plans in achieving retirement income adequacy for Baby Boomers and Generation Xers.

	In September, it was used to support testimony before the Senate Finance Committee (VanDerhei, September 2011) in analyzing the potential impact of various types of tax-reform options on retirement income. This was expanded in the November 2011 EBRI Issue Brief (VanDerhei, November 2011).
<b>2012</b>	A March 2012 <i>EBRI Notes</i> article (VanDerhei, March 2012) used new survey results to update the analysis of the potential impact of various types of tax-reform options on retirement income.
	The May 2012 <i>EBRI Notes</i> article (VanDerhei, May 2012) provided 2012 updates for the previously published RRRs as well as the RSS.
	The June 2012 <i>EBRI Notes</i> article (VanDerhei, June 2012) introduced severity categories in the RSS projections for Gen Xers.
	The August 2012 <i>EBRI Notes</i> article (VanDerhei, August 2012) provided additional evidence on whether deferring retirement to age 70 would provide retirement income adequacy for the vast majority of Baby Boomers and Gen Xers.
	The September 2012 <i>EBRI Notes</i> article (VanDerhei, September 2012) analyzed the impact of increasing the default-contribution rate for AE 401(k) plans with automatic escalation of contributions.
	The November 2012 <i>EBRI Notes</i> article (VanDerhei, November 2012) reclassified the RRRs to provide additional information on those substantially above the threshold, close to the threshold, and substantially below the threshold.
<b>2013</b>	The March 2013 <i>EBRI Notes</i> article (VanDerhei and Adams, March 2013) used a modified version of RSPM to assess the probability that respondent households would not run short of money in retirement if they did, in fact, accumulate the amount they said would be required in the 2013 Retirement Confidence Survey.
	The June 2013 <i>EBRI Issue Brief</i> (VanDerhei, June 2013a) used RSPM to provide a direct comparison of the likely benefits under specific types of DC and DB retirement plans.
	The June 2013 <i>EBRI Notes</i> article (VanDerhei, June 2013b) used RSPM to show that 25–27 percent of Baby Boomers and Gen Xers who would have had adequate retirement income under return assumptions based on historical averages were simulated to end up running short of money in retirement if today’s historically low interest rates were assumed to be a permanent condition.
	The August 2013 <i>EBRI Issue Brief</i> (VanDerhei, August 2013) [not in References] used RSPM to analyze the Obama administration’s FY 2014 budget proposal to include a cap on tax-deferred retirement savings that would limit the amounts accumulated in specified retirement accounts to that necessary to provide the maximum annuity permitted for a tax-qualified DB plan under current law.

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## Endnotes

- <sup>1</sup> VanDerhei (June 2013a). The original study also included a comparative analysis of cash balance plans.
- <sup>2</sup> For more information on the EBRI/ICI 401(k) database, see VanDerhei et al (October 2013).
- <sup>3</sup> A sensitivity analysis was also performed using the 75<sup>th</sup> percentile accrual rate (1.82 percent).
- <sup>4</sup> See VanDerhei (September 2007), VanDerhei and Copeland (June 2008), VanDerhei (April 2010) and VanDerhei and Lucas (November 2010).
- <sup>5</sup> See VanDerhei and Lucas (November 2010) for additional detail.
- <sup>6</sup> The move to automatic enrollment will have another benefit beyond that provided by increased participation and the possible escalation of employee contributions over time. As more 401(k) sponsors default employees initially into target-date funds as part of the qualified default investment alternative (QDIA), the extreme positions often found in participant-directed asset allocations (e.g., young employees with no equity exposure or employees on the verge of retirement with extremely high equity allocations) are replaced with allocations that are considered more age-appropriate by most experts. See VanDerhei (June 2009) for more detail.