

The Importance of Defined Benefit Plans for Retirement Income Adequacy

By Jack VanDerhei, Employee Benefit Research Institute

Introduction¹

According to EBRI estimates,² the percentage of private-sector workers participating in an employment-based defined benefit plan decreased from 38 percent in 1979 to 15 percent in 2008. Although much of this decrease took place by 1997,³ there have been a number of recent developments⁴ that have made defined benefit sponsors in the private sector re-examine the costs and benefits of providing retirement benefits through the form of a tax-qualified defined benefit plan.⁵ However, these plans still cover millions of U.S. workers and have long been valued as an integral component of retirement income adequacy for their households. In this article, EBRI's Retirement Security Projection Model⁶ (RSPM) is used to evaluate the importance of defined benefit plans for households, assuming they retire at age 65.

In 2010, EBRI determined that the overall retirement income adequacy for households currently ages 36–62 had substantially improved since 2003 (VanDerhei and Copeland, 2010), in part due to the advent of automatic enrollment and automatic escalation in 401(k) plans. However, almost one-half of Baby Boomers and Gen Xers were determined to be at risk of not having sufficient retirement income to cover even basic expenses and uninsured health care costs. The results, not surprisingly, were even worse for low-income households, as 70 percent of households in the lowest one-third when ranked by preretirement income were classified as "at risk." Moreover, 41 percent of those in the lowest preretirement income quartile are predicted to run short of money within 10 years of retirement.

Although the 2010 version of RSPM assumed all households retired at age 65, the model was updated in 2011 to allow retirement income adequacy simulations for deferred retirement ages through age 84 (VanDerhei and Copeland, 2011). The percentage of households with adequate retirement income at a 50, 70, or 80 percent probability level obviously increased as the deferral period beyond age 65 increased, but the results cast suspicions on the conventional wisdom that merely working a few more years beyond age 65 would be adequate for all retirees (especially for those in the lowest-income quartile).

The Importance of Defined Benefit Plans for Retirement Income Adequacy

Previous EBRI studies were able to document the degree to which eligibility for participation in defined contribution plans matters with respect to "at-risk" status. For example, the at-risk probability for Gen Xers varies from 60 percent for those with no future years of eligibility in a defined contribution plan to 20 percent for those with 20 or more years. However, RSPM had never been used in the past to quantify the importance of accruals in defined benefit plans.⁷ For purposes of this article, it is assumed that all households retire when the oldest wage earner reaches age 65.⁸ Each household was bifurcated in terms of whether it had a defined benefit accrual at age 65⁹ to assess the impact of these benefits on retirement income adequacy.¹⁰ The results were run for all Baby Boom and Gen Xer households and found that overall the presence of a defined benefit accrual at age 65 reduces the at-risk percentage by 11.6 percentage points.

Figure 1 shows the impact of a defined benefit accrual at age 65 on at-risk probabilities by age cohort. The greatest impact is on the Early Boomers, as the percentage of households without any defined benefit accruals considered to be at risk of insufficient retirement income is 67 percent compared with only 41 percent for their counterparts with some defined benefit accruals. As expected, the defined benefit advantage (as measured by the gap between the two at-risk percentages) narrows for younger cohorts. For Late

Boomers the at-risk percentage is 59 percent for those with no defined benefit accruals versus 38 percent for those with some defined benefit accrual. The gap narrows even more for the Gen Xers: 55 percent for those with no defined benefit accruals versus 38 percent for those with some defined benefit accrual.

Figure 2 provides similar information to Figure 1 although this time the impact is displayed as a function of pre-retirement income level.¹¹ The greatest defined benefit advantage (as measured by the gap between the two at-risk percentages) is for the lowest-income quartile: the percentage of households without any defined benefit accruals considered to be at risk of insufficient retirement income is 86 percent compared with only 68 percent for their counterparts with some defined benefit accruals. The absolute value of the differences decrease as the relative preretirement income quartiles increase (10.3 percentage points for the second-income quartile, 9.0 percentage points for the third-income quartile and 8.7 percentage points for the highest-income quartile); however, the relative value (when compared with the at-risk levels for those without defined benefit accruals) remain quite high.¹²

Figure 3 shows the impact of a defined benefit accrual at age 65 on at-risk probabilities by age cohort and preretirement income level. In each case the greatest defined benefit advantage (as measured by the gap between the two at-risk percentages) is for the lowest-income quartile. The absolute difference for the lowest-income quartile is 20.0 percentage points for Early Boomers and 20.7 percentage points for the Late Boomers. It decreases somewhat for Gen Xers but still decreases the at-risk rating for the lowest-income quartile in that cohort by 15.8 percentage points.

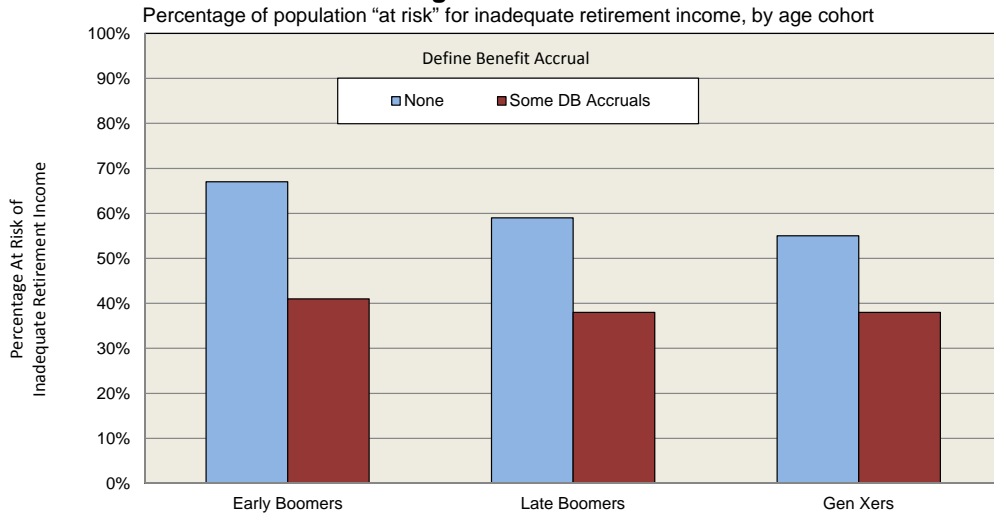
Even though the overall finding that the presence of a defined benefit accrual at age 65 reduces the at-risk percentage by 11.6 percentage points is quite impressive, this impact is undoubtedly muted to some extent by the interaction of defined contribution plan accumulations. Although the greater heterogeneity produced by defined contribution plans precludes a simple bifurcation of whether or not a plan balance exists at age 65, this analysis is able to distinguish the overall impact of eligibility in a defined contribution plan by tracking the number of future years of simulated eligibility and displaying the impact of the presence of a defined benefit accrual in one of four categories:

- Zero future years of eligible participation.
- 1–9 future years of eligible participation.
- 10–19 future years of eligible participation.
- 20 or more future years of eligible participation.

Figure 4 provides the results for this analysis. As expected, the overall impact of a defined benefit accrual at age 65 is much larger for those households with no future years of eligible participation in a defined contribution plan (23.6 percentage points) and decreases as the future years of defined contribution eligibility increases (11.3 percentage points for 1–9 years, 8.5 percentage points for 10–19 years, and 6.4 percentage points for those with 20 or more years).

Figure 5 provides additional information on how the relative value of the defined benefit accruals impact retirement income adequacy. Whereas Figures 1–4 bifurcate households by whether there is a defined benefit accrual at age 65, Figure 5 categorizes any positive value for a defined benefit accrual¹³ into quartiles for each income group. The largest reduction in at-risk ratings between the highest and lowest income-specific defined benefit value quartiles takes place for the lowest-income quartile. For these households, the at-risk ratings drop 36 percentage points, from 82 percent to 46 percent. Households in the second income

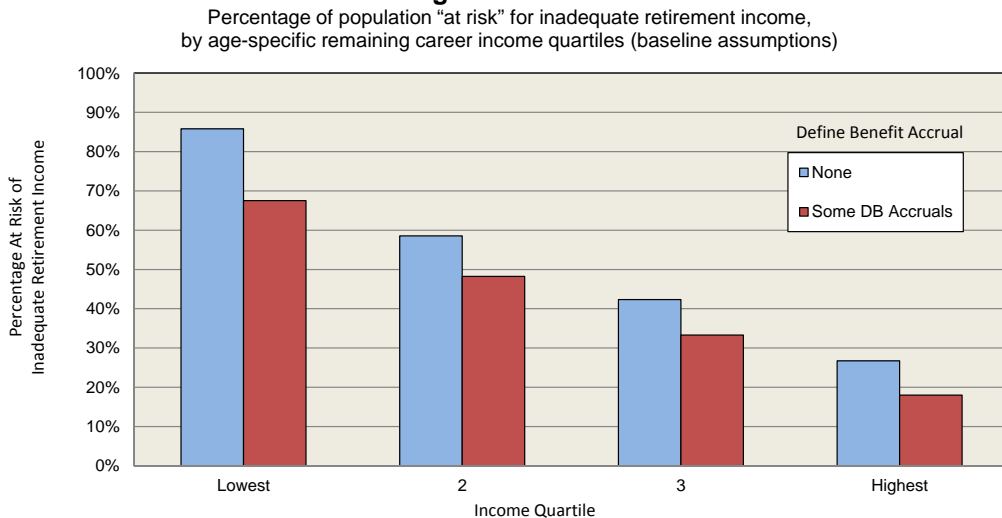
Figure 1
Impact of Age and Presence of Defined Benefit Accrual
at Retirement Age on At-Risk* Probabilities



Source: EBRI/ERF Retirement Security Projection Model[®] version 110714e.

* An individual or family is considered to be "at risk" in this version of the model if their aggregate resources in retirement are not sufficient to meet aggregate minimum retirement expenditures defined as a combination of deterministic expenses from the Consumer Expenditure Survey (as a function of income) and some health insurance and out-of-pocket health-related expenses, plus stochastic expenses from nursing home and home health care expenses (at least until the point they are picked up by Medicaid). The resources in retirement will consist of Social Security (either status quo or one of the specified reform alternatives), account balances from defined contribution plans, IRAs and/or cash balance plans, annuities from defined benefit plans (unless the lump-sum distribution scenario is chosen), and (in some cases) net housing equity (either in the form of an annuity or as a lump-sum distribution). This version of the model is constructed to simulate "basic" retirement income adequacy; however, alternative versions of the model allow similar analysis for replacement rates, standard-of-living, and other ad hoc thresholds.

Figure 2
Impact of Income and Presence of Defined Benefit Accrual
at Retirement Age on At-Risk* Probabilities

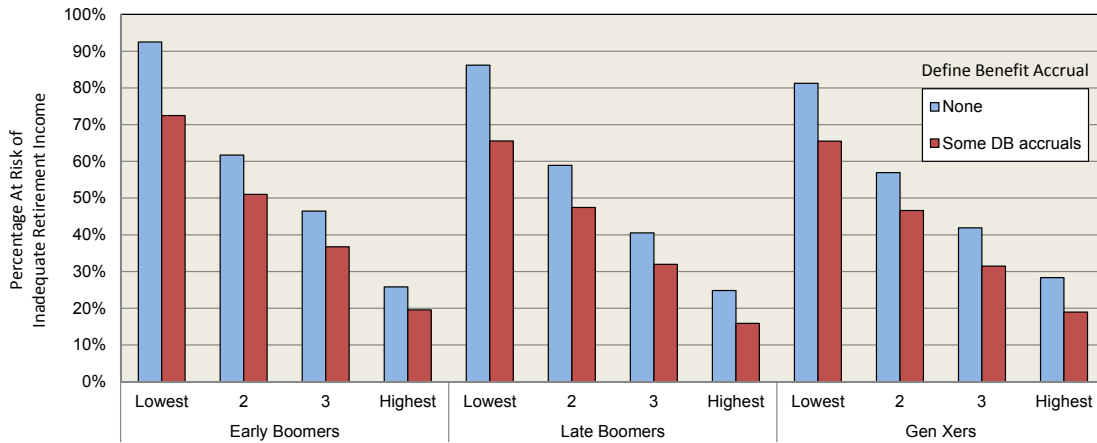


Source: EBRI/ERF Retirement Security Projection Model[™] version 110714e.

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Figure 3
Impact of Age and Income and Presence of Defined Benefit Accrual
at Retirement Age on At-Risk* Probabilities

Percentage of population "at risk" for inadequate retirement income, by age and age-specific remaining career income quartiles (baseline assumptions)

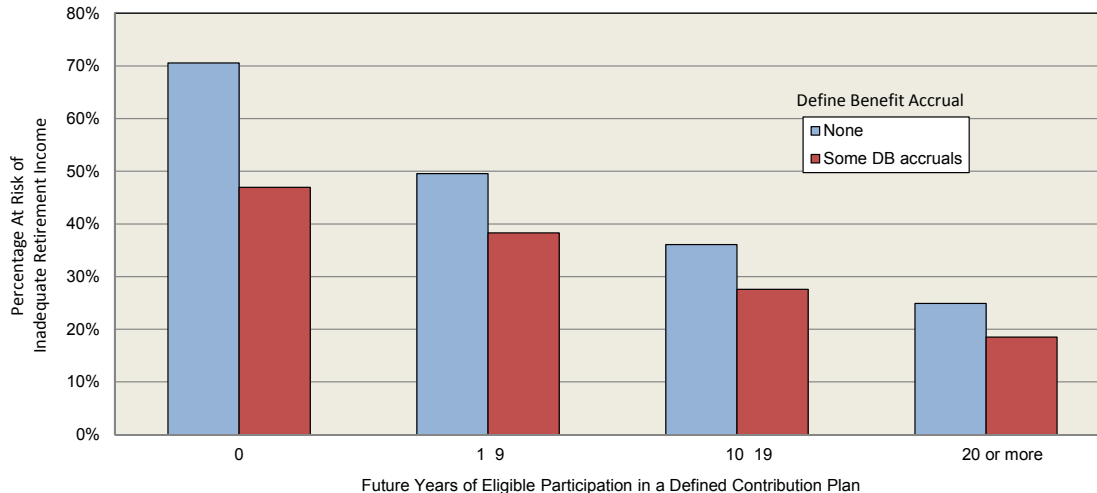


Source: EBRI/ERF Retirement Security Projection Model® version 110714e.

* An individual or family is considered to be "at risk" in this version of the model if their aggregate resources in retirement are not sufficient to meet aggregate minimum retirement expenditures defined as a combination of deterministic expenses from the Consumer Expenditure Survey (as a function of income) and some health insurance and out-of-pocket health-related expenses, plus stochastic expenses from nursing home and home health care expenses (at least until the point they are picked up by Medicaid). The resources in retirement will consist of Social Security (either status quo or one of the specified reform alternatives), account balances from defined contribution plans, IRAs and/or cash balance plans, annuities from defined benefit plans (unless the lump-sum distribution scenario is chosen), and (in some cases) net housing equity (either in the form of an annuity or as a lump-sum distribution). This version of the model is constructed to simulate "basic" retirement income adequacy; however, alternative versions of the model allow similar analysis for replacement rates, standard-of-living, and other ad hoc thresholds.

Figure 4
Impact of Presence of Defined Benefit Accrual at Retirement Age
and Future Years of Eligibility for Participation in a
Defined Contribution Plan on At-Risk* Probabilities

Percentage of population "at risk" for inadequate retirement income, by future years of eligible participation in a defined contribution plan (baseline assumptions)

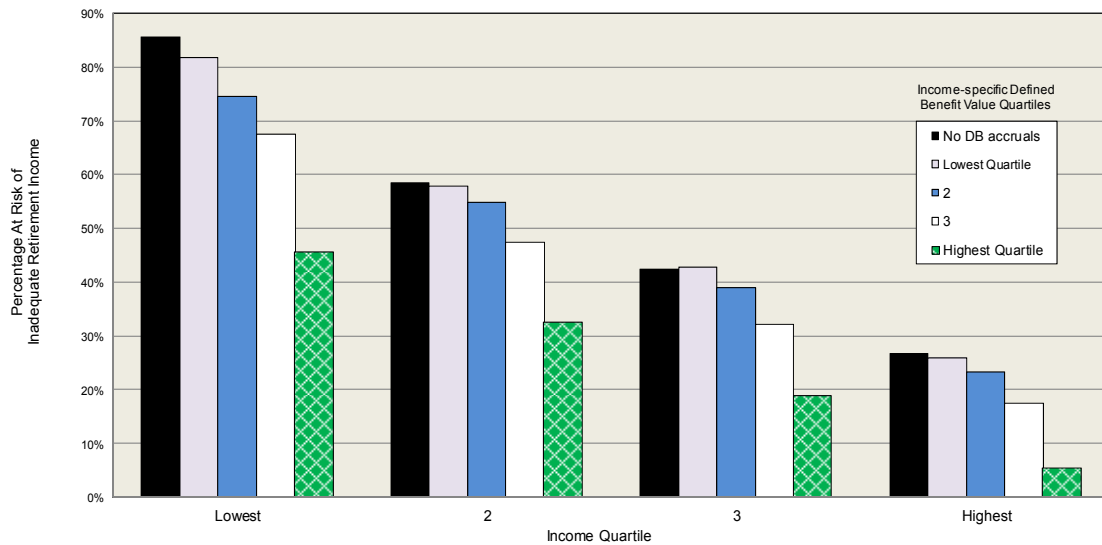


Source: EBRI/ERF Retirement Security Projection Model® version 110714e.

* An individual or family is considered to be "at risk" in this version of the model if their aggregate resources in retirement are not sufficient to meet aggregate minimum retirement expenditures defined as a combination of deterministic expenses from the Consumer Expenditure Survey (as a function of income) and some health insurance and out-of-pocket health-related expenses, plus stochastic expenses from nursing home and home health care expenses (at least until the point they are picked up by Medicaid). The resources in retirement will consist of Social Security (either status quo or one of the specified reform alternatives), account balances from defined contribution plans, IRAs and/or cash balance plans, annuities from defined benefit plans (unless the lump-sum distribution scenario is chosen), and (in some cases) net housing equity (either in the form of an annuity or as a lump-sum distribution). This version of the model is constructed to simulate "basic" retirement income adequacy; however, alternative versions of the model allow similar analysis for replacement rates,

Figure 5
Impact of Income and Relative Value of Defined Benefit Accrual
at Retirement Age on At-Risk* Probabilities

Percentage of population "at risk" for inadequate retirement income, by age-specific remaining career income quartiles and income-specific defined benefit value quartiles (baseline assumption)



Source: EBR/ERF Retirement Security Projection Model® version 110714e.

* An individual or family is considered to be "at risk" in this version of the model if their aggregate resources in retirement are not sufficient to meet aggregate minimum retirement expenditures defined as a combination of deterministic expenses from the Consumer Expenditure Survey (as a function of income) and some health insurance and out-of-pocket health-related expenses, plus stochastic expenses from nursing home and home health care expenses (at least until the point they are picked up by Medicaid). The resources in retirement will consist of Social Security (either status quo or one of the specified reform alternatives), account balances from defined contribution plans, IRAs and/or cash balance plans, annuities from defined benefit plans (unless the lump-sum distribution scenario is chosen), and (in some cases) net housing equity (either in the form of an annuity or as a lump-sum distribution). This version of the model is constructed to simulate "basic" retirement income adequacy; however, alternative versions of the model allow similar analysis for replacement rates, standard-of-living, and other ad hoc thresholds.

quartile drop 25 percentage points (from an at-risk rating of 58 percent for those in the lowest defined benefit value quartile to 33 percent for those in the highest defined benefit value quartile) while those in the third and highest income quartile drop 24 and 21 percentage points, respectively.

Summary

This article shows the tremendous importance of defined benefit plans in achieving retirement income adequacy for Baby Boomers and Gen Xers. Overall, the presence of a defined benefit accrual at age 65 reduces the "at-risk" percentage by 11.6 percentage points. The defined benefit plan advantage (as measured by the gap between the two at-risk percentages) is particularly valuable for the lowest-income quartile but also has a strong impact on the middle class (the reduction in the at-risk percentage for the second and third income quartiles combined is 9.7 percentage points, which corresponds to a 19.5 percent relative reduction).

It should be noted that this analysis does NOT attempt to do a comparison between the relative effectiveness of defined benefit vs. defined contribution plans in providing retirement income adequacy; however, it does show that when the value of a defined benefit plan is analyzed for those without any future eligibility in a defined contribution plan, the impact on the at-risk ratings increases to 23.6 percentage points. In other words, for those households without future years of defined contribution eligibility, the presence of a defined benefit accrual at age 65 is sufficient to save nearly 1 out of 4 of these households in the Baby Boom and Gen X cohorts from becoming "at risk" of running short of money in retirement for basic expenses and uninsured medical expenses.

Appendix

Brief Chronology of RSPM

The original version of Retirement Security Projection Model[®] (RSPM) was used to analyze the future economic well-being of the retired population at the state level. The Employee Benefit Research Institute and the Milbank Memorial Fund, working with the governor of Oregon, set out to see if this situation could be addressed for Oregon. The analysis¹⁴ focused primarily on simulated retirement wealth with a comparison to ad hoc thresholds for retirement expenditures, but the results made it clear that major decisions lie ahead if the state's population is to have adequate resources in retirement.

Subsequent to the release of the Oregon study, it was decided that the approach could be carried to other states as well. Kansas and Massachusetts were chosen as the next states for analysis. Results of the Kansas study were presented to the state's Long-Term Care Services Task Force on July 11, 2002,¹⁵ and the results of the Massachusetts study were presented on Dec. 1, 2002.¹⁶ With the assistance of the Kansas Insurance Department, EBRI was able to create Retirement Readiness Ratings 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. This was followed by the expansion of RSPM, as well as the Retirement Readiness Ratings produced by it, to a national model and the presentation of the first micro-simulation retirement income adequacy model built in part from administrative 401(k) data at the EBRI December 2003 policy forum.¹⁷ The basic model was then modified for Senate Aging testimony in 2004 to quantify the beneficial impact of a mandatory contribution of 5 percent of compensation.¹⁸

The first major modification of the model occurred for the EBRI May 2004 policy forum. In an analysis to determine the impact of annuitizing defined contribution and IRA balances at retirement age, VanDerhei and Copeland (2004) were able to demonstrate that for a household seeking a 75 percent probability of retirement income adequacy, the additional savings that would otherwise need to be set aside each year until retirement to achieve this objective would decrease by a median amount of 30 percent. Additional refinements were introduced in 2005 to evaluate the impact of purchasing long-term care insurance on retirement income adequacy.¹⁹

The model was next used in March of 2006 to evaluate the impact of defined benefit 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.²⁰ Later that year, an updated version of the model was developed to enhance the EBRI interactive Ballpark E\$timate[®] worksheet by providing Monte Carlo simulations of the necessary replacement rates needed for specific probabilities of retirement income adequacy under alternative risk management treatments.²¹

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.²² Additional modifications were added in 2009 for a Pension Research Council presentation that involved a winners/losers analysis of defined benefit freezes and the enhanced defined contribution employer contributions provided as a quid pro quo.²³

A new subroutine was added to the model to allow simulations of various styles of target-date funds for a comparison with participant-directed investments in 2009.²⁴ In April 2010, the model was completely reparameterized with 401(k) plan design parameters for sponsors that have adopted automatic enrollment provisions.²⁵ A completely updated version of the national model was produced for the May 2010 EBRI policy forum and used in the July 2010 *Issue Brief*.²⁶

The new model was used to analyze how eligibility for participation in a defined contribution plan impacts retirement income adequacy in September 2010.²⁷ It was also used to compute Retirement Savings Shortfalls for Boomers and Gen Xers in October 2010.²⁸

In October 2010 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.²⁹

In February 2011, the model was used to analyze the impact of the 2008/9 crisis in the financial and real estate markets on retirement income adequacy.³⁰

An April 2011 article introduced a new method of analyzing the results from the RSPM.³¹ Instead of simply computing an overall percentage of the simulated life paths in a particular cohort that will not have sufficient retirement income to pay for the simulated expenses, the new method computes what percentage of the households will meet that requirement more than a specified percentage of times in the simulation.

Finally, the June 2011 *EBRI Issue Brief* allowed retirement income adequacy to be assessed at retirement ages later than 65.³²

Retirement Income and Wealth Assumptions

RSPM is based in part on a 13-year time series of administrative data from several million 401(k) participants and tens of thousands of 401(k) plans,³³ as well as a time series of several hundred plan descriptions used to provide a sample of the various defined benefit and defined contribution plan provisions applicable to plan participants. In addition, several public surveys based on participants’ self-reported answers (the Survey of Consumer Finances [SCF], the Current Population Survey [CPS], and the Survey of Income and Program Participation [SIPP]) were used to model participation, wages, and initial account balance information.

This information is combined to model participation and initial account balance information for all defined contribution participants, as well as contribution behavior for non-401(k) defined contribution plans. Asset allocation information is based on previously published results of the EBRI/ICI Participant-Directed Retirement Plan Data Collection Project, and employee contribution behavior to 401(k) plans is provided by an expansion of a method developed in VanDerhei and Copeland (2008) and further refined in VanDerhei (2010).

A combination of Form 5500 data and self-reported results was also used to estimate defined benefit participation models; however, it appears information in the latter is rather unreliable with respect to estimating current and/or future accrued benefits. Therefore, a database of defined benefit plan provisions for salary-related plans was constructed to estimate benefit accruals.

Combinations of self-reported results were used to initialize IRA accounts. Future IRA contributions were modeled from SIPP data, while future rollover activity was assumed to flow from future separation from employment in those cases in which the employee was participating in a defined contribution plan sponsored by the previous employer. Industry data are used to estimate the relative likelihood that the balances are rolled over to an IRA, left with the previous employer, transferred to a new employer, or used for other purposes.

Defined Benefit Plans

A stochastic job duration algorithm was estimated and applied to each individual in RSPM to predict the number of jobs held and age at each job change. Each time the individual starts a new job, RSPM simulates whether or not it will result in coverage in a defined benefit plan, a defined contribution plan, both, or

neither. If coverage in a defined benefit plan is predicted, time series information from the Bureau of Labor Statistics (BLS) is used to predict what type of plan it will be.³⁴

While the BLS information provides significant detail on the generosity parameters for defined benefit plans, preliminary analysis indicated that several of these provisions were likely to be highly correlated (especially for integrated plans). Therefore, a time series of several hundred defined benefit plans per year was coded to allow for assignment to the individuals in RSPM.³⁵

Although the Tax Reform Act of 1986 at least partially modified the constraints on integrated pension plans by adding Sec. 401(l) to the Internal Revenue Code, it would appear that a significant percentage of defined benefit sponsors have retained Primary Insurance Amount (PIA)-offset plans. In order to estimate the offset provided under the plan formulas, RSPM computes the employee's Average Indexed Monthly Earnings, Primary Insurance Amount, and covered compensation values for the birth cohort.

Defined Contribution Plans

Previous studies on the EBRI/ICI Participant-Directed Retirement Plan Data Collection Project have analyzed the average account balances for 401(k) participants by age and tenure. Recently published results (VanDerhei, Holden, and Alonso, 2009) show that the year-end 2008 average balance ranged from \$3,237 for participants in their 20s with less than three years of tenure with their current employer to \$172,555 for participants in their 60s who have been with the current employer for at least 30 years (thereby effectively eliminating any capability for IRA rollovers).

Unfortunately, the EBRI/ICI database does not currently provide detailed information on other types of defined contribution plans, nor does it allow analysis of defined contribution balances that may have been left with previous employers. RSPM uses self-reported responses for whether an individual has a defined contribution balance to estimate a participation model, and the reported value is modeled as a function of age and tenure.

The procedure for modeling participation and contribution behavior and asset allocation for defined contribution plans that have not adopted automatic enrollment is described in VanDerhei and Copeland (2008). The procedure for modeling contribution behavior (with and without automatic escalation of contributions) for 401(k) plans is described in VanDerhei (2010). Asset allocation for automatic enrollment plans is assumed to follow average age-appropriate target-date funds as described in VanDerhei (2009). Investment returns are based on those used in Park (2009).

Social Security Benefits

Social Security's current-law benefits are assumed to be paid and received by those qualifying for the benefits under the baseline scenario. This funding could either be from an increase in the payroll tax or from a general revenue transfer. The benefits are projected for each cohort assuming the intermediate assumptions within the 2009 OASDI Trustee's Report. A second alternative is used where all recipients' benefits are cut 24 percent on the date that the OASDI Trust Fund is depleted (2037).

Expenditure Assumptions

The expenditures used in the model for the elderly consist of two components—deterministic and stochastic expenses. The deterministic expenses include those expenses that the elderly incur in their basic daily life, while the stochastic expenses in this model are exclusively health-event related—such as an admission to a nursing home or the commencement of an episode of home health care—that occur only for a portion of retirement (if ever), not on an annual or certain basis.

Deterministic Expenses

The deterministic expenses are broken down into seven categories—food, apparel and services (dry cleaning, haircuts), transportation, entertainment, reading and education, housing, and basic health expenditures. Each of these expenses is estimated for the elderly (65 or older) by family size (single or couple) and family income (less than \$20,000, \$20,000–\$39,999, and \$40,000 or more in 2008 dollars) of the family/individual.

The estimates are derived from the 2008 Consumer Expenditure Survey (CES) conducted by the Bureau of Labor Statistics of the U.S. Department of Labor. The survey targets the total noninstitutionalized population (urban and rural) of the United States and is the basic source of data for revising the items and weights in the market basket of consumer purchases to be priced for the Consumer Price Index. Therefore, an expense value is calculated using actual experience of the elderly for each family size and income level by averaging the observed expenses for the elderly within each category meeting the above criteria. The basic health expenditure category has additional data needs besides just the CES.

Health

The basic health expenditures are estimated using a somewhat different technique and are comprised of two parts. The first part uses the CES as above to estimate the elderly's annual health expenditures that are paid out-of-pocket or are not fully reimbursed (or not covered) by Medicare and/or private Medigap health insurance.

The second part contains insurance premium estimates, including Medicare Part B and Part D premiums. All of the elderly are assumed to participate in Part B and Part D, and the premium is determined annually by the Medicare program and is the same nationally with an increasing contribution from the individual/family on the basis of their income. For the Medigap insurance premium, it is assumed all of the elderly purchase a Medigap policy. A national estimate is derived from a 2005 survey done by Thestreet.com that received average quotes for Plan F in 47 states and the District. The estimates are calculated based on a 65-year-old female. The 2005 premium level is the average of the 47 state average quotes. The 2010 premium level was estimated by applying the annual growth rates in the Part B premiums from 2006 through 2010 to the average 2005 premium.

This approach is taken for two reasons. First, sufficient quality data do not exist for the matching of retiree medical care (as well as the generosity of and cost of the coverage) and Medigap policy use to various characteristics of the elderly. Second, the health status of the elderly at the age of 65 is not known, let alone over the entire course of their remaining life. Thus, by assuming everyone one has a standard level of coverage eliminates trying to differentiate among all possible coverage types as well as determining whether the sick or healthy have the coverage. Therefore, averaging of the expenses over the entire population should have offsetting effects in the aggregate.

The total deterministic expenses for the elderly individual or family are then the sum of the values in all the expense categories for family size and family income level of the individual or family. These expenses make up the basic annual (recurring) expenses for the individual or family. However, if the individual or family meet the income and asset tests for Medicaid, Medicaid is assumed to cover the basic health care expenses (both parts), not the individual or family. Furthermore, Part D and Part B premium relief for the low-income elderly (not qualifying for Medicaid) is also incorporated.

Stochastic Expenses

The second component of health expenditures is the result of simulated health events that would require long-term care in a nursing home or home-based setting for the elderly. Neither of these simulated types of care would be reimbursed by Medicare because they would be for custodial (not rehabilitative) care. The

incidence of the nursing home and home health care and the resulting expenditures on the care are estimated from the 1999 and 2004 National Nursing Home Survey (NNHS) and the 2000 and 2007 National Home and Hospice Care Survey (NHHCS). NNHS is a nationwide sample survey of nursing homes, their current residents and discharges that was conducted by the National Center for Health Statistics from July through December 1999 and 2004. The NHHCS is a nationwide sample survey of home health and hospice care agencies, their current and discharge patients that was conducted by the National Center for Health Statistics from August 2000 through December 2000 and from August 2007 through February 2008.

For determining whether an individual has these expenses, the following process is undertaken. An individual reaching the Social Security normal retirement age has a probability of being in one of four possible assumed "health" statuses:

- Not receiving either home health or nursing home care,
- Home health care patient,
- Nursing home care patient,
- Death,

based upon the estimates of the use of each type of care from the surveys above and mortality. The individual is randomly assigned to each of these four categories with the likelihood of falling into one of the four categories based upon the estimated probabilities of each event. If the individual does not need long-term care, no stochastic expenses are incurred. Each year, the individual will again face these probabilities (the probabilities of being in the different statuses will change as the individual becomes older after reaching age 75 then again at age 85) of being in each of the four statuses. This continues until death or the need for long-term care.

For those who have a resulting status of home health care or nursing home care, their duration of care is simulated based upon the distribution of the durations of care found in the NNHS and NHHCS. After the duration of care for a nursing home stay or episode of home health care, the individual will have a probability of being discharged to one of the other three statuses based upon the discharge estimates from NNHS and NHHCS, respectively. The stochastic expenses incurred are then determined by the length of the stay/number of days of care times the per diem charge estimated for the nursing home care and home health care, respectively.

For any person without the need for long-term care, this process repeats annually. The process repeats for individuals receiving home health care or nursing home care at the end of their duration of stay/care and subsequently if not receiving the specialized care again at their next birthday. Those who are simulated to die, of course, are not further simulated.

As with the basic health care expenses, the qualification of Medicaid by income and asset levels is considered to see how much of the stochastic expenses must be covered by the individual to determine the individual's final expenditures for the care. Only those expenditures attributable to the individual—not the Medicaid program—are considered as expenses to the individual and as a result in any of the "deficit" calculations.

Total Expenditures

The elderly individuals' or families' expenses are then the sum of their assumed deterministic expenses based upon their retirement income plus any simulated stochastic expenses that they may have incurred. In each subsequent year of life, the total expenditures are again calculated in this manner. The base year's expenditure value estimates excluding the health care expenses, are adjusted annually using the assumed general inflation rate of 2.8 percent from the 2009 OASDI Trustees Report, while the health care expenses are adjusted annually using the 4.0 percent medical consumer price index that corresponds to the average annual level from 2004–2009.³⁶

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Endnotes

¹ A previous version of this article appeared in VanDerhei (July, 2011).

² www.ebri.org/publications/benfaq/index.cfm?fa=retfaq14, last accessed July 26, 2011.

³ For a historical review of causes of this decline, see Olsen and VanDerhei (1997).

⁴ See VanDerhei (2007) for a summary of the responses of defined benefit sponsors to the implementation of the new funding requirements under the Pension Protection Act of 2006 as well as the potential pension expense volatility under new FASB requirements.

⁵ This does not necessarily imply that many existing defined benefit sponsors have or will terminate their existing defined benefit plans. Instead, the process of freezing these plans for current and/or new workers has increased substantially in recent years. For more information on the impact of plan freezes on workers, see VanDerhei (March 2006). For an analysis of whether "frozen" workers have been financially indemnified via enhanced employer contribution to defined contribution plans, see Copeland and VanDerhei (2010).

⁶ A brief description of RSPM is included in the appendix.

⁷ This was primarily due to the increased likelihood of future eligibility in a defined contribution plan relative to a defined benefit plan.

⁸ This assumption will be relaxed in a later study.

⁹ The term "accrual at age 65" does not denote that an employee age 65 accrued a benefit in that year. Instead, it is meant to indicate that they had a previously accrued benefit that has not been cashed out prior to age 65.

¹⁰ It is important to note that this is not the same as assessing the importance of all defined benefit plan accruals. Whenever an employee is assumed to leave a job in RSPM, the present value of the vested defined benefit accrual from the current job is compared with the year-specific involuntary cash-out threshold and converted to a terminated vested status if greater. Any present values less than the threshold are assumed to be cashed out.

¹¹ Specifically, each household is placed into one of four quartiles based on age-specific remaining career income.

¹² The value of the absolute difference divided by the at-risk percentage without defined benefit accruals is 21 percent for the lowest-income quartile, 18 percent for the second-income quartile, 21 percent for the third-income quartile, and 33 percent for the highest-income quartile.

¹³ Cash balance values were annuitized based on immediate annuity purchase prices at age 65.

¹⁴ VanDerhei and Copeland (2001).

¹⁵ VanDerhei and Copeland (July 2002).

¹⁶ VanDerhei and Copeland (December 2002).

¹⁷ VanDerhei and Copeland (2003)

¹⁸ VanDerhei (January 2004).

¹⁹ VanDerhei (2005).

²⁰ VanDerhei (March 2006).

²¹ VanDerhei (September 2006)

²² VanDerhei and Copeland (2008).

²³ Copeland and VanDerhei (2010).

²⁴ VanDerhei (2009).

²⁵ VanDerhei (April 2010).

²⁶ VanDerhei and Copeland (2010).

²⁷ VanDerhei (September 2010).

²⁸ VanDerhei (October 2010a).

²⁹ VanDerhei (October 2010b).

³⁰ VanDerhei (February 2011).

³¹ VanDerhei (April 2011).

³² VanDerhei and Copeland (June 2011).

³³ The EBRI/ICI Participant-Directed Retirement Plan Data Collection Project is the largest, most representative repository of information about individual 401(k) plan participant accounts. As of December 31, 2009, the database included statistical information about:

- 20.7 million 401(k) plan participants, in
- 51,852 employer-sponsored 401(k) plans, holding
- \$1.21 trillion in assets.

The EBRI/ICI project is unique because it includes data provided by a wide variety of plan record keepers and, therefore, portrays the activity of participants in 401(k) plans of varying sizes—from very large corporations to small businesses—with a variety of investment options.

³⁴ The model is currently programmed to allow the employee to participate in a nonintegrated career average plan; an integrated career average plan; a five-year final average plan without integration; a three-year final average plan without integration; a five-year final average plan with covered compensation as the integration level; a three-year final average plan with covered compensation as the integration level; a five-year final average plan with a PIA offset; a three-year final average plan with a PIA offset; a cash balance plan, or a flat benefit plan.

³⁵ BLS information was utilized to code the distribution of generosity parameters for flat benefit plans.

³⁶ While the medical consumer price index only accounts for the increases in prices of the health care services, it does not account for the changes in the number and/or intensity of services obtained. Thus, with increased longevity, the rate of health care expenditure growth will be significantly higher than the 4.0 percent medical inflation rate, as has been the case in recent years.