

The Changing Face of Private Retirement Plans

by Jack VanDerhei, Temple University and EBRI Fellow,
and Craig Copeland, EBRI

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- A rapidly growing public policy concern facing the United States is whether future generations of retired Americans, particularly those in the “baby boom” generation, will have adequate retirement incomes. One reason is that Social Security’s projected long-term financial shortfall could result in a reduction in the current-law benefit promises made to future generations of retirees. Another reason is that many baby boomers will be retiring with employment-based defined contribution (DC) plans, as opposed to the “traditional” defined benefit (DB) plans that historically have been the predominant source of employer-provided retirement income.
- These factors are likely to reduce the amount of life annuity benefits that future retirees will receive relative to current retirees, raising questions as to whether other sources of retirement income—such as individual account plans (DC plans and individual retirement accounts, or IRAs)—will make up the difference.
- This *Issue Brief* highlights the changes in private pension plan participation for DB and DC plans and provides some possible explanations for these changes. Results are presented from the Employee Benefit Research Institute’s (EBRI) Retirement Income Projection Model that quantify how much the importance of individual account plans is expected to increase because of these changes. This *Issue Brief* also discusses the risk of outliving one’s assets, since a greater fraction of pension wealth is projected to come from “nonguaranteed” sources.
- Results of the model are compared by gender for cohorts born between 1936 and 1964 in order to estimate the percentage of retirees’ retirement wealth that will be derived from DB plans versus DC plans and IRAs over the next three decades. Under the model’s baseline assumptions, both males and females are found to have an appreciable drop in the percentage of private retirement income that is attributable to defined benefit plans (other than cash balance plans). In addition, results show a clear increase in the income retirees will receive that will have to be managed by the retiree. This makes the risk of longevity more central to retirees’ expenditure decisions.
- The implications of these model results for retirees are significant. First, individuals—rather than the pension plan sponsor—increasingly will have to manage their retirement assets and bear the risk of investment losses. Second, since most retirees’ non-Social Security retirement income will be distributed as a lump sum or in periodic payments (from a defined contribution plan or IRA) rather than as a regular paycheck for life (from a defined benefit plan), retirees will need either to purchase an annuity from an insurance company or carefully manage their individual rate of spending in order to avoid outliving their assets.

Jack VanDerhei, Temple University and EBRI Fellow, and Craig Copeland, EBRI, wrote this *Issue Brief* with assistance from the Institute's research and editorial staffs. Any views expressed in this report are those of the authors and should not be ascribed to the officers, trustees, or other sponsors of EBRI, EBRI-ERF, or their staffs. Neither EBRI nor EBRI-ERF lobbies or takes positions on specific policy proposals. EBRI invites comment on this research.

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Introduction

A rapidly growing public policy concern facing the United States is whether future

generations of retired Americans, particularly those in the “baby boom” generation,¹ will have adequate retirement incomes. One reason is that Social Security’s projected long-term financial shortfall could result in a reduction in the current-law benefit promises made to future generations of retirees.² Another reason is that many baby boomers will be retiring with employment-based defined contribution (DC) plans, as opposed to the “traditional” defined benefit (DB) plans that historically have been the predominant source of employer-provided retirement income. Both of these factors are likely to reduce the amount of life annuity benefits³ that future retirees will receive relative to current retirees, raising questions as to whether other sources of retirement income—such as individual account plans (DC plans and individual retirement accounts, or IRAs)—will make up the difference.

This *Issue Brief* highlights changes in private pension plan participation for DB and DC plans and provides some possible explanations for them. Next, results are presented from the Employee Benefit Research Institute’s (EBRI) Retirement Income Projection Model that quantify how much the importance of individual account plans is expected to increase because of

these changes. Because individual account plans tend to pay lump-sum benefits⁴ at retirement rather than life annuities, this *Issue Brief* concludes by discussing the risk of outliving one’s assets.

DB Vs. DC Plans

Although both qualified DC and DB plans are tax-favored vehicles for providing

retirement income, they differ in a variety of important ways. One is how plan contributions are made. Under a DC plan, employer contributions are based on a predetermined formula,⁵ and, most frequently, all contributions (made by both employers and/or employees) are placed in individual accounts on behalf of each participant. In comparison, DB plans are typically noncontributory, and plan contributions are held in one trust on behalf of all participants. Employers offering DB plans must make contributions based on federal funding rules and regulations in order to maintain the plan’s qualified (tax-favored) status.

Another important way DC and DB plans differ is in which party directly assumes the investment risk on plan assets and whether that investment risk directly affects plan benefits. The overwhelming majority of DC plans offer participants a choice of account investment options, and plan participants directly assume all investment risk. DC plan benefits are determined by

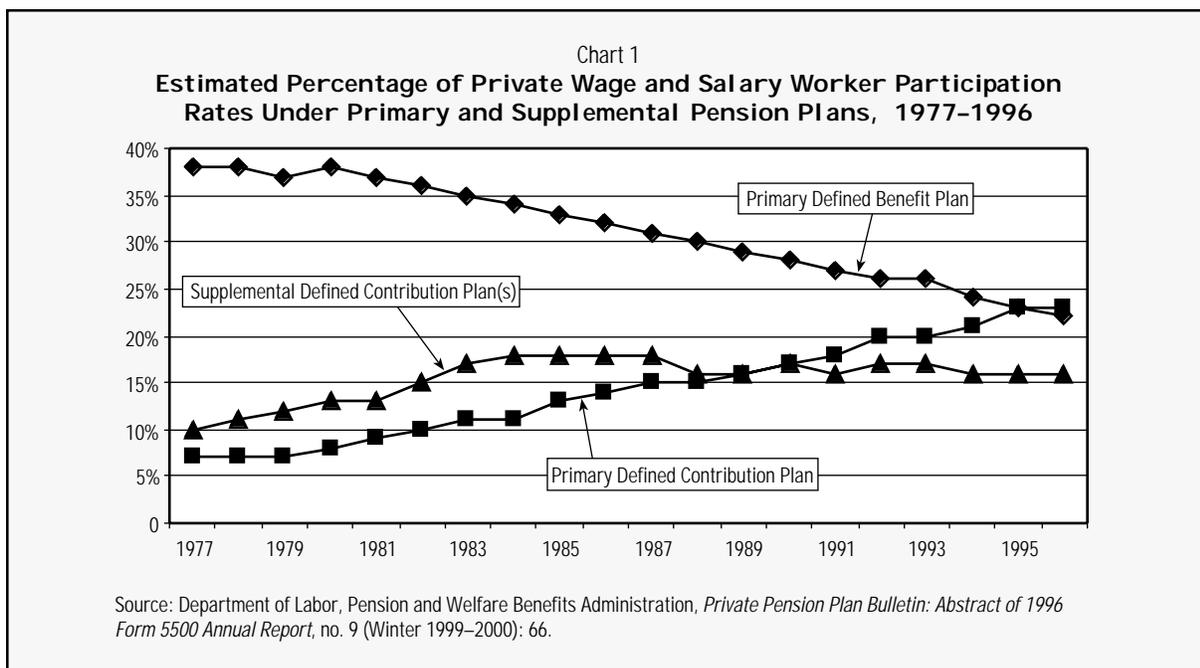
¹ The post-World War II demographic wave of children born between 1946–1964, consisting of about 77 million people.

² Based on current intermediate projections, after the trust fund is depleted in 2037 current-law benefits would need to be reduced by more than 20 percent across-the-board.

³ Social Security pays life annuity benefits, and most traditional, employer-sponsored defined benefit plans pay benefits in the form of life annuities. In general, life annuity benefits are payments made on a periodic basis, often monthly, for the life of the beneficiary. In addition, life annuities frequently have additional provisions for benefit payments to the beneficiary’s spouse or widow/widower.

⁴ Lump-sum benefits provide the beneficiary with his or her total accrued plan benefit generally in a single payment.

⁵ Technically, most private qualified defined contribution plans are either money purchase or profit sharing (Sec. 401(k) plans are of this type). Under the former, the plan sponsor typically commits to a fixed percentage of compensation each year. For a profit-sharing plan, plan contributions may be made on a discretionary basis by the plan sponsor, but how these contributions are allocated among individual employee accounts must be based on a specified, predetermined formula meeting certain requirements if the plan is to qualify for tax-favored status.



plan contributions,⁶ any plan forfeitures,⁷ and investment returns on account assets. That is, employers do not guarantee a specific benefit level to DC plan participants, and benefits are directly related to investment returns. In comparison, employers offering DB plans have fiduciary responsibilities for investing trust assets on behalf of plan participants, and employers directly assume all investment risk.⁸ DB benefit formulas directly determine plan benefits owed to participants. That is, employers guarantee specific benefit levels to DB plan participants regardless of the plan assets' investment performance.

A third important way DB and DC plans differ is the form in which they generally pay plan benefits. As indicated above, DC plans usually offer lump-sum benefits, meaning that the entire amount of accumulated assets in the account are paid out at one time. If the retiree needs this amount to ensure adequate retirement income over the course of his or her retirement, he or she must manage (e.g., invest and spend) the amount in a manner that ensures that outcome. Otherwise, the retiree runs the risk of outliving his or her lump-sum

benefit and having an inadequate retirement income. Alternatively, DB plans tend to offer life annuities (a set amount paid out regularly over time, typically monthly, for as long as the beneficiary lives), which beneficiaries are not responsible for managing. (However, lump-sum distributions are increasingly available in DB plans.⁹)

Participation Trends

According to estimates from the U.S. Department of Labor, the percentage of private wage

and salary workers participating in a primary DB plan decreased from 38 percent in 1977 to 22 percent in 1996 (the most recent data available, chart 1). During that same period, the percentage participating in a primary DC plan increased from 7 percent to 23 percent, and the percentage of those participating in supplemental DC plans gradually increased from 10 percent to 16 percent.

Not surprisingly, higher DC plan participation rates have led to an increase in the percentage of house-

⁶ Employer contributions may be subject to vesting rules, such that participants do not have full legal right to employer contributions made on their behalf until they have reached a certain minimum number of years of service.

⁷ Forfeitures arise when employers terminate employment and leave nonvested benefits in the plan. Nonvested portions of any terminating employees' accounts may be used to reduce employer contributions or may be reallocated among the remaining defined contribution plan participants.

⁸ Investment risk affects defined benefit plan participants' benefits indirectly. Poor investment returns, for example, may affect the funding status of the plan

itself. However, the Pension Benefit Guaranty Corporation insures defined benefit accruals up to a limit, thereby reducing that risk. Poor investment performance also may indirectly affect plan benefits if it results in a curtailment of future benefit accruals or affect the employer's ability to provide ad hoc benefit increases to retirees. Some employers offer ad hoc benefit increases to offset the effects of inflation on the value of DB plan benefits.

⁹ Seventy-six percent of full-time workers participating in a DB plan in a medium or large establishment were not offered a lump-sum distribution in 1997 (U.S. Department of Labor, 1998). This is down from 85 percent in 1995 (U.S. Department of Labor, 1999).

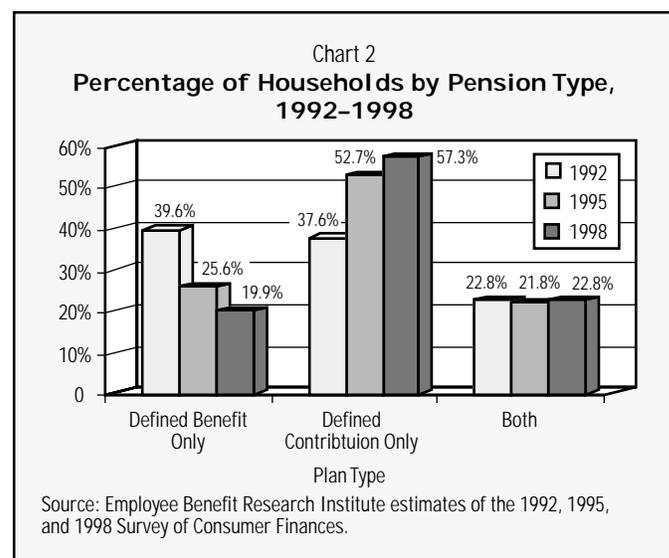
holds that likely will rely primarily on DC plans for retirement income. But, these higher DC participation rates are also accompanied by a dramatic increase in the percentage of households that may have DC plans as their *only* source of employment-based retirement income. In a recent EBRI study of households' pension participation rates from the Survey of Consumer Finances (SCF),¹⁰ the percentage of households with only a DB plan decreased from 39.6 percent in 1992 to 19.9 percent in 1998 (chart 2). Meanwhile, the percentage of households with only a DC plan increased from 37.6 percent to 57.3 percent, and the percentage of households with both DB and DC plans remained steady at 22.8 percent. These findings applied universally across household demographics.

In addition to the fact that DC plans are becoming an increasingly important source of future retirement income, DB plans increasingly are adopting DC-like features that may result in fewer life annuity payments for future retirees. Lump-sum payment options are becoming more frequent among DB plans. This is due in part to the conversion of traditional DB plans to cash balance plans. Cash balance plans are DB plans under which employers usually communicate benefits as "account balances." Although cash balance plan "account balances" are notional only, cash balance plans generally offer benefits in the form of lump-sum distributions.¹¹

Why the Shift to DC Plans?

Two prevailing reasons behind the increasing role of DC plans and the trend toward incorporating DC plan features in DB plans are shifts in the work force and changes in the business environment.¹² The increasing role of DC plans can further be explained by the fact that DB plan requirements under the Employee Retirement Income Security Act of 1974 (ERISA) and various tax laws have grown in number since the

1970s, and those requirements have also changed many times over their evolution. In contrast, DC plan regulations are not as numerous, nor have they changed as frequently over their development. Plan sponsors point to the growing administrative burdens and costs of operating a DB plan as a major disincentive to operating this type of retirement plan.



Research has found that changes in the work force during the late 1970s to early 1980s (such as changes in union participation, firm sizes, and industry sectors) can only explain some of the increasing prevalence of DC plans.¹³ However, in recent surveys, plan sponsors who switched from DB to DC plans said that their primary motivation for doing so was "matching worker characteristics to plan characteristics" (Quick, 1999). Younger and more mobile workers are thought not to appreciate traditional DB plans, which are "back-loaded," meaning that older workers accrue benefits that are more valuable as a percentage of compensation than do younger workers. Generally, back-loaded DB plans provide the majority of plan benefits in the final several years before retirement. In contrast, most DC plan benefits are less age-sensitive. Thus, benefits payable upon job termina-

Work Force

¹⁰ See Copeland and VanDerhei (2000). The Survey of Consumer Finances (SCF) is a triennial survey, conducted by the Federal Reserve Board, which collects comprehensive, nationally representative data on the wealth of American households. It collects data on households' total liabilities and assets, including pension wealth.

¹¹ See Quick (1999).

¹² This follows Gale, Papke, and VanDerhei (1999).

¹³ See Clark and McDermed (1990) and Gustman and Steinmeier (1992).

tion to younger workers are usually higher under DC plans than they are under traditional DB plans. This is one reason that DC plans are seen as being more “portable” from job to job. Another reason is that years of service under DB plans with age and service requirements are not usually transferable from employer to employer.

Business Environment

DC plans are thought to better match the new philosophies of relationships among compensation, employee performance, and profits (Campbell, 1996). For instance, increased competition, reorganizations, restructurings, and mergers have made businesses become leaner in order to survive in the global economy. The result has been less employer flexibility to meet unexpected costs, which has made DC plans more appealing because they offer more cost predictability (for example, employers do not assume investment risk under DC plans). These same business pressures have led employers to want benefit plan designs that align retirement benefits with employee performance¹⁴ and company profits (for example, profit-sharing plans using a discretionary contribution approach), and to expect employees to assume a larger role in helping their employers fund their retirement benefits (for example, cash or deferred compensation DC plans).

Regulatory Environment

The cost of complying with new and changing requirements has been higher for DB plans than for DC plans. For example, Husted (1996) estimated the cumulative costs of regulatory changes promulgated from 1981–1996 for employers offering DB versus 401(k) (DC) plans. He estimated that the cost of administering a DB plan in 1981 was approximately 140 percent higher than the cost of administering a 401(k) plan. However, by 1996, DB

administrative costs had grown to approximately 210 percent of the cost of administering a 401(k) plan. Husted found that these relative administrative cost increases disproportionately affected small plans.

The two primary reasons that relative DB plan administrative costs rose from 1981–1996 are the funding regulations and Pension Benefit Guaranty Corporation (PBGC) insurance premium requirements that Congress enacted during that period. Most DC plans are fully funded (by definition), while DB plans must meet complex ERISA regulations to determine their funding status. In addition, virtually all private employers that sponsor DB plans are required to pay premiums to the PBGC, which provides insurance upon plan termination to participants who are entitled to plan benefits. In contrast, because Congress does not require DC plan sponsors to insure DC plan benefits, employers sponsoring DC plans do not pay benefit insurance premiums.

Changes in Asset Holdings

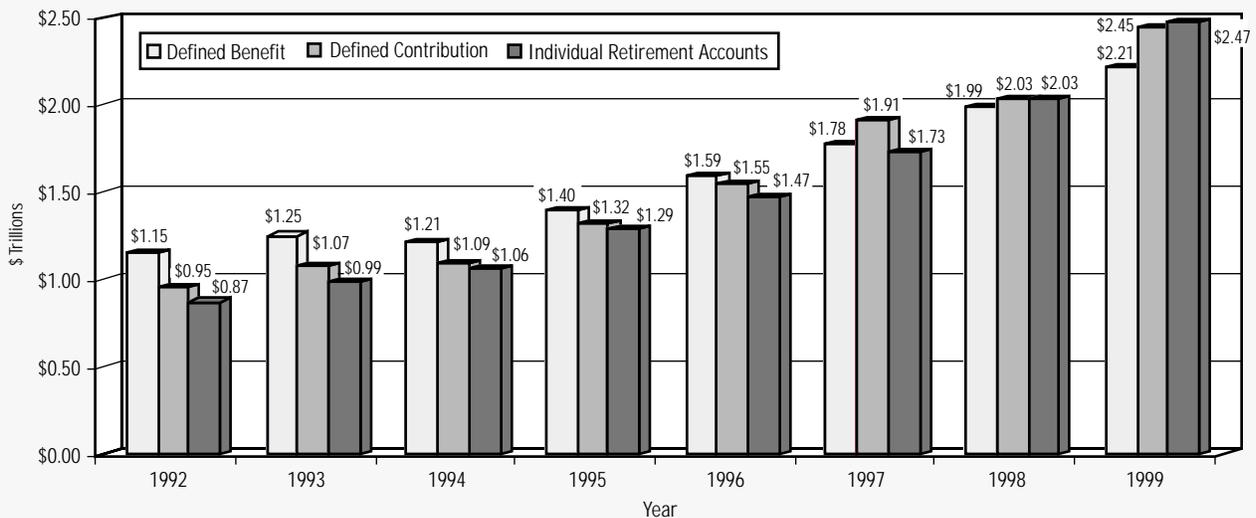
The significant shift in participation rates from DB to DC plans and the rise in the

number of households with DC plans only have been accompanied by an increase in DC plan assets. Private trustee DC plan assets first surpassed private trustee defined benefit plan assets in 1997 and continued to grow steadily relative to DB plan assets through 1999 (chart 3). Furthermore, assets held in IRAs, which are also individual account plans,¹⁵ surpassed both DC and DB trustee plan assets in 1999. That year, IRA assets equaled \$2.47 trillion, compared with \$2.45 trillion and \$2.21 trillion for trustee DC and DB plan assets, respectively.

¹⁵ Individual retirement accounts (IRAs) can be established by individual workers or can be offered as the funding vehicle under simplified employee pension plans.

¹⁴ See Ippolito (1997) for additional detail.

Chart 3
Private Trusted Pension Plan Assets Vs. Individual Retirement Account Assets, 1992-1999



Source: Employee Benefit Research Institute, *Pension Investment Report*, 2nd Quarter 2000 (Washington, DC: Employee Benefit Research Institute, December 2000); and Craig Copeland, "IRA Assets Continue To Grow," *EBRI Notes*, no. 1 (Employee Benefit Research Institute, January 2001): 1-8.

The significant shift in participation rates from DB to DC plans and the rise in the number of households with DC plans exclusively have also been accompanied by an increase in IRA assets. That is because when qualified DC plan participants terminate with the sponsoring employer, they may avoid current taxation on their DC plan assets by rolling them over into IRAs. In fact, a 1997 estimate determined that 22 percent of additions to IRAs in that year were attributable to rollovers, whereas only 2 percent were attributable to direct IRA contributions¹⁶ (the remaining 76 percent resulted from investment gains). Although individuals can purchase life annuities with their IRA assets (or choose annuities as their IRA investment selection), they may withdraw their IRA assets in essentially any manner they choose,¹⁷ including in the form of lump-sum or periodic distributions.

Rollovers

Before retirees need to make decisions about how to spend their IRA assets, they need to make decisions in order to accumulate those assets in the first place. Specifically, employees who leave a job must decide to roll over their assets into an IRA from a qualified plan or to leave their assets in their existing DC plan, as opposed to "cashing out" their benefits and spending them. In a study of Hewitt 401(k) data,¹⁸ 57 percent of participants who removed their assets from a previous employer's plan cashed out their assets, 6 percent rolled

them to another qualified plan, and 37 percent rolled them to an IRA.¹⁹ Participants who rolled over their DC plan assets typically rolled over larger amounts: The average account balance for those who rolled over their account balances to an IRA was \$68,107, compared with \$8,445 for those who cashed out. This finding suggests that perhaps participants with smaller account balances do not appreciate the considerable retirement income that can be amassed over time by preserving even small amounts of DC plan assets.

Modeling Retirement Income

The trends outlined above indicate that

future retirement income will depend less on "guaranteed" forms of benefits (such as DB plan annuities and Social Security) and more on DC plan benefits—which

¹⁶ See Sabelhaus (1999).

¹⁷ Subject to penalties for early withdrawal and minimum distribution requirements that apply beginning at age 70 1/2.

¹⁸ See McCarthy and McWhirter (2000).

¹⁹ Rather than rolling over or cashing out defined contribution plan assets, participants may leave their assets in their previous employer's plan. While the assets or balances remain in the plan, they are still accumulating investment gains (or losses). Participants who choose this option may withdraw those assets at a later date by taking periodic installments, a lump-sum cashout, or by rolling them over to another qualified plan or an IRA.

will be determined, in large part, by individual decisions (e.g., whether to contribute to the plan, how to invest, how to manage plan benefits, and whether to preserve plan benefits upon job termination). However, although the likely directions of these trends are known, little to date has been done to quantify the magnitude of these trends in terms of future retirement income.

A model for quantifying the relative levels of retirement income sources is outlined below. In addition, the results of the model are compared by gender for cohorts born between 1936 and 1964 in order to estimate the percentage of retirees' retirement wealth that will be derived from DB plans versus DC plans and IRAs over the next three decades. Lastly, the sensitivity of these estimates to key modeling assumptions is analyzed.

Model Description

The model used in this analysis is based on results from a four-year time series of administrative data from more than 10 million 401(k) participants and more than 30,000 plans, 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 (SCF, the Current Population Survey (CPS), and the Survey of Income and Program Participation (SIPP)²⁰) were used to model participation, wages, and initial account balance information.

The model attempts to estimate the balance of any defined contribution plan and/or IRA (whether funded through regular contributions or rollovers) of the individual at Social Security normal retirement age.²¹ In addition, it estimates the accrued benefits earned and assumed to be retained by defined benefit plan participants, and converts this amount to a present value at normal retirement age for comparison of relative magnitudes of those benefits that are typically thought of as "guaranteed" (usually by an implicit employer annuity) versus those that are typically perceived as a lump sum

by the employee (although the employee may have the option of converting the distributions to an annuity).²²

The notion of cash balance plans presents at least a conceptual difficulty for purposes of this distinction, since they are legally defined benefit plans but are often perceived by employees to be defined contribution plans in the way they accrue benefits. Since many of the cash balance benefits appear to be taken as lump sums, the projected "balances" from these plans are added to defined contribution plans for purposes of presenting the results in this report.

Estimating Current and Future Accrued Benefits and Account Balances

In general, the model in this analysis uses a combination of Form 5500 data from the Department of Labor and self-reported responses to public survey instruments to model coverage, participation and initial account balance information for all defined contribution participants,²³ 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 401(k) database,²⁴ and employee contribution behavior to 401(k) plans is provided by an expansion of a method based on both employee demographic information and plan matching provisions.

²⁰ *The Survey of Income and Program Participation (SIPP) is a longitudinal survey conducted by the U.S. Census Bureau to collect data on income sources and amounts, labor force participation, program eligibility and participation, and general demographic characteristics. Previously, households were followed for two and one-half years, but starting in 1996 households were followed for four years.*

²¹ *Future versions of the model will include a subroutine for early retirement behavior.*

²² *An alternative method of comparison would leave the defined benefit accruals as annual benefits and "annuitize" the defined contribution and IRA balances. However, this presents additional complications in modeling employee purchasing behavior.*

²³ *Holden and VanDerhei are currently analyzing similar activity exclusively within the 401(k) population by using the EBRI/ICI 401(k) database.*

²⁴ *See Holden and VanDerhei (2001) on the EBRI/ICI Participant-Directed Retirement Plan Data Collection Project.*

Future retirement income will depend less on “guaranteed” forms of benefits (such as DB plan annuities and Social Security) and more on DC plan benefits—which will be determined, in large part, by individual decisions.

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.

Self-reported results were used to initialize IRA accounts. Future IRA contributions were modeled from Survey of Income and Program Participation (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. A component was also included in the model to estimate withdrawals from IRAs.²⁵

Defined Benefit Plans—A stochastic job duration model was estimated and applied to each individual in the model to predict the number of jobs held and the age of each job change. Each time the individual starts a new job, the model simulates whether or not it will result in coverage in a defined benefit plan, a defined contribution plan, both or neither.²⁶ If coverage in a defined benefit plan is predicted, time series information from the Bureau of Labor Statistics (BLS) is used to predict whether it will be:

- A non-integrated (with Social Security) 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 (primary insurance amount) offset.²⁷

- A three-year final-average plan with a PIA offset.
- A cash balance plan; or
- A flat-benefit plan.

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 the model.²⁸

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 (IRC), it would appear that a significant percentage of defined benefit sponsors have retained PIA-offset plans. In order to estimate the offset provided under the plan formulae, the model computes the employee's Average Indexed Monthly Earnings, primary insurance amount, and covered compensation values for the birth cohort.

Defined Contribution Plans

Initial Account Balances—Previous studies²⁹ on the EBRI/ICI 401(k) database have analyzed the average account balances for 401(k) participants by age and tenure (see chart 4). The most recently published results show that the year-end 1999 average balance ranged from \$4,479 for participants in their 20s with less than

²⁵ This component was based on results reported in Sabelhaus (2000) which combined survey data on IRA balances with individual tax return data on IRA flows to study IRA accumulation and withdrawal patterns across cohorts.

²⁶ Thus the current version of the model ignores the possibility that an employer will adopt a new retirement plan—or change an existing plan—prior to the employee's job separation and/or retirement.

²⁷ For additional detail on integrated defined benefit plans, see Chapter 4 of Allen, Melone, Rosenbloom and VanDerhei (1997).

²⁸ BLS information was utilized to code the distribution of generosity parameters for flat benefit plans.

²⁹ Holden and VanDerhei (2001).

three years of tenure with their current employer to \$198,595 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, this 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. The model used in this report 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 similar to chart 4.

Contribution Behavior—Previous research on employee contribution behavior to 401(k) plans has often been limited by lack of adequate data. This is primarily due to the types of matching formulae utilized by sponsors. These formulae are often complicated due to the desire of sponsors to provide sufficient incentives to non-highly compensated employees to contribute in order to comply with technical nondiscrimination testing. This complexity makes it virtually impossible to appropriately analyze the employee's behavior if one is forced to observe either aggregate plan data or use information on the plan contribution formulae provided by the participant.

With the exception of studies based on administrative data, employee contribution behavior is typically assumed to be a function of employee demographic data and perhaps an employee's estimate of the employer-matching rate (Bassett et al., 1998) or a proxy based on Form 5500 data (Papke, 1995). However, as shown in Kusko et al. (1994), a significant percentage of the employee contribution behavior appears to be determined by plan-specific provisions. For example, in chart 5, the percentage of employees contributing up to either the IRC Sec. 402(g) limit, the maximum amount of compensation matched or the plan maximum is shown as a function of age for one of the plans studied by Yakoboski and VanDerhei (1996).³⁰ Chart 6 shows similar information as a function of salary. It would

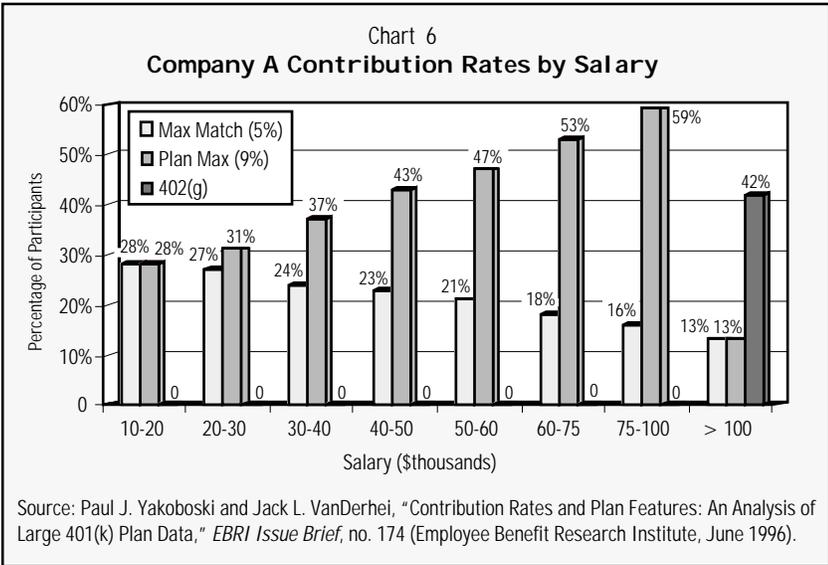
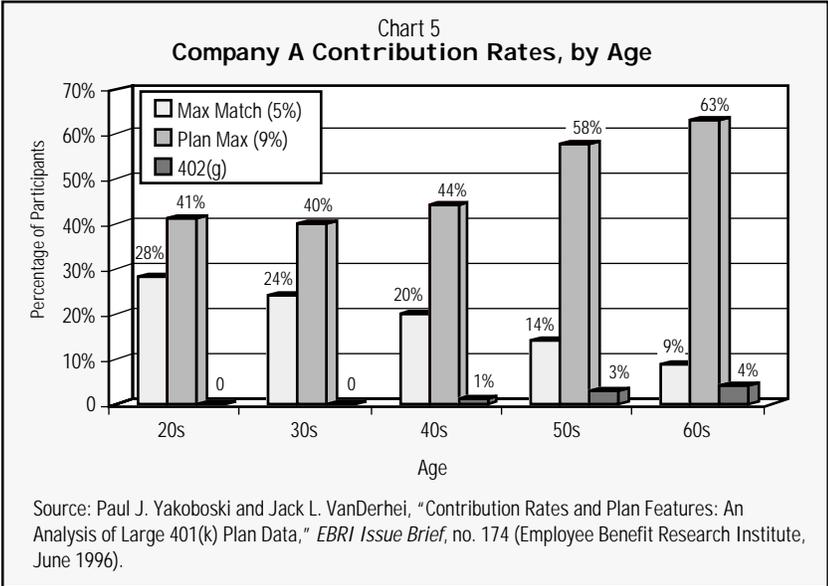
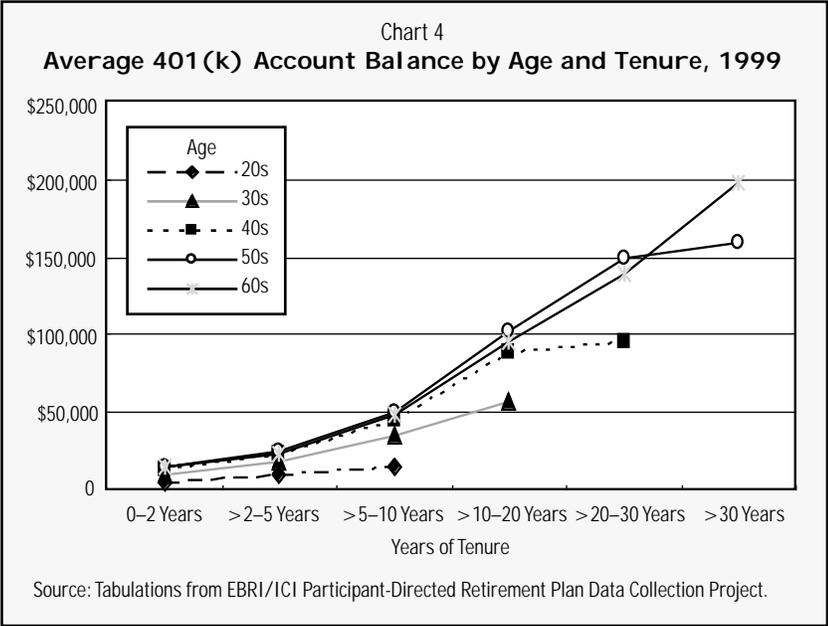
appear from this limited sample that well over 50 percent of the employee contributions occur at "corner points" that would not be identified in the data described above.³¹

In VanDerhei and Copeland (2001), preliminary findings are provided that introduce new methodology to expand the usefulness of modeling these data, as well as a better understanding of contribution behavior by 401(k) plan participants. A sequential response regression model was used to allow for the differing incentives faced by the employees at various levels of contributions. Based on findings from 137 distinct matching formulae, a behavioral model was estimated that is able to control for the tendency of employers to substitute between the amount they match per dollar of employee contribution and the maximum percentage of compensation they are willing to match. Employee contribution behavior is decomposed into a series of 1 percent of compensation intervals, which therefore permits modeling not only the marginal incentives to contribute at that interval but also the "option value" that making the contribution at that interval provides for the employee. Chart 7 illustrates the predicted employee contributions from the model as a function of employee demographics and the employer's matching formulae.

While the 401(k) plans used in the previous paper (VanDerhei and Copeland, 2001) provided the exact matching formulae adopted by the plan sponsor, the vast majority of the 30,000 plans in the EBRI/ICI Participant-Directed Retirement Plan Data Collection Project do not contain that information, and due to strict confidentiality standards no information on the plan sponsor's identity was included. However, the database

³⁰ 402(g) denotes the IRC section that limits employee deferrals to a specific amount per year. Unlike the other two variables, this value is constant across all plans for any particular year.

³¹ Clark, Goodfellow, Schieber and Warwick (2000) also use administrative data but only investigate the match rate, not the maximum amount of compensation matched and/or the maximum amount of compensation allowed by the plan.



does break out source of contributions (e.g., employee before-tax, employee after-tax, employer matching, qualified non-elective contributions (QNECs), etc.), and a series of computer algorithms has been developed to classify additional plans by the types of incentives provided to employees at various contribution levels (e.g., a 50 percent match for the first 6 percent of compensation). This information has been used to expand the previous sample and provides the predicted employee contributions for 401(k) plans in this paper.

Contribution behavior for defined contribution plans other than 401(k) plans is estimated from self-reported responses to public survey data.

Investment Returns—Although the model has been designed to generate investment rates of return on a stochastic basis, for purposes of this *Issue Brief* the results are obtained from running it in a deterministic mode.³²

Results

Panel A in table 1 provides the composition of estimated retirement wealth³³ for males at Social Security normal retirement age under the baseline assumptions, by birth cohort.

³² The model assumed a CPI growth rate of 3.50 percent, a real rate of return for stocks of 6.98 percent, and a real rate of return for bonds of 3.00 percent. In addition, 1 percent is subtracted from each of the stock and bond real rates of return to reflect administrative costs.

³³ Defined as the value of account balances from defined contribution plans, IRAs and cash balance plans and the present value of accruals from other defined benefit plans.

Table 1
Composition of Estimated Retirement Wealth for Males at Social Security Normal Retirement Age under Baseline Assumptions, by Birth Cohort

| Type of Plan | 1936 | 1938 | 1940 | 1942 | 1944 | 1946 | 1948 | 1950 | 1952 | 1954 | 1956 | 1958 | 1960 | 1962 | 1964 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Panel A: Baseline Assumptions | | | | | | | | | | | | | | | |
| Defined benefit | 39.0% | 38.5% | 38.4% | 38.2% | 37.3% | 36.2% | 34.1% | 32.7% | 32.7% | 32.8% | 31.3% | 30.3% | 28.6% | 27.0% | 26.4% |
| Defined contribution + cash balance | 33.2 | 32.3 | 32.3 | 32.8 | 33.3 | 35.1 | 37.1 | 36.5 | 35.6 | 34.8 | 33.9 | 33.5 | 34.2 | 33.6 | 33.7 |
| Individual retirement account | 27.8 | 29.1 | 29.2 | 29.0 | 29.4 | 28.7 | 28.9 | 30.8 | 31.6 | 32.4 | 34.8 | 36.2 | 37.2 | 39.3 | 39.9 |
| Panel B: Cash Balance Plans Double | | | | | | | | | | | | | | | |
| Defined benefit | 39.4 | 38.6 | 38.6 | 38.2 | 37.0 | 35.9 | 33.8 | 32.1 | 32.1 | 32.1 | 30.4 | 29.3 | 27.6 | 25.9 | 25.3 |
| Defined contribution + cash balance | 33.0 | 32.3 | 32.3 | 32.8 | 33.5 | 35.3 | 37.3 | 37.0 | 36.1 | 35.4 | 34.7 | 34.5 | 35.1 | 34.6 | 34.7 |
| Individual retirement account | 27.6 | 29.1 | 29.1 | 29.0 | 29.5 | 28.8 | 28.9 | 30.9 | 31.8 | 32.5 | 34.9 | 36.2 | 37.3 | 39.5 | 40.0 |
| Panel C: Assuming a Less Aggressive Long-Term Asset Allocation | | | | | | | | | | | | | | | |
| Defined benefit | 39.2 | 38.8 | 38.8 | 38.8 | 38.0 | 37.0 | 35.1 | 33.8 | 34.0 | 34.1 | 32.7 | 31.8 | 30.1 | 28.6 | 27.9 |
| Defined contribution + cash balance | 33.1 | 32.3 | 32.2 | 32.5 | 33.0 | 34.8 | 36.6 | 36.1 | 35.3 | 34.5 | 33.5 | 33.2 | 33.9 | 33.3 | 33.4 |
| Individual retirement account | 27.7 | 28.9 | 29.0 | 28.7 | 29.0 | 28.2 | 28.3 | 30.0 | 30.8 | 31.5 | 33.8 | 35.1 | 36.0 | 38.1 | 38.6 |
| Panel D: Assuming Terminated Vested Defined Benefit Participants Are Not Automatically Cashed Out | | | | | | | | | | | | | | | |
| Defined benefit | 41.0 | 40.5 | 40.3 | 40.0 | 39.0 | 37.8 | 35.7 | 34.3 | 34.3 | 34.3 | 32.9 | 31.9 | 30.0 | 28.5 | 27.7 |
| Defined contribution + cash balance | 32.1 | 31.3 | 31.4 | 31.8 | 32.4 | 34.2 | 36.1 | 35.7 | 34.8 | 34.0 | 33.2 | 32.8 | 33.5 | 33.0 | 33.1 |
| Individual retirement account | 26.9 | 28.2 | 28.3 | 28.2 | 28.6 | 28.0 | 28.1 | 30.0 | 30.9 | 31.6 | 34.0 | 35.3 | 36.4 | 38.5 | 39.2 |
| Panel E: Assuming All Defined Contribution Plan Account Balances That Are Not Retained in a Defined Contribution Plan on Job Termination Must be Rolled Over to an Individual Retirement Account (IRA) and Preretirement Withdrawals from an IRA Are Prohibited | | | | | | | | | | | | | | | |
| Defined benefit | 38 | 37 | 36 | 35 | 34 | 32 | 30 | 29 | 28 | 28 | 26 | 25 | 23 | 21 | 20 |
| Defined contribution + cash balance | 33 | 31 | 30 | 30 | 30 | 32 | 33 | 32 | 31 | 29 | 28 | 27 | 27 | 26 | 26 |
| Individual retirement account | 29 | 32 | 33 | 35 | 36 | 36 | 37 | 40 | 41 | 43 | 46 | 48 | 50 | 53 | 54 |

Source: Employee Benefit Research Institute, Retirement Income Projection Model.

Similar figures for females are provided in panel A of table 2. The same information is presented graphically in charts 8 (males) and 9 (females). It is readily apparent from these graphs that both genders have an appreciable drop in the percentage of private retirement income that is attributable to defined benefit plans (other than cash balance). Females start with a slightly higher defined benefit concentration than men (49.7 percent vs. 39.0 percent for the 1936 cohort), and the difference remains fairly constant over time (37.2 percent vs. 26.4 percent for the 1964 cohort).

The baseline results are based on several assumptions that may prove to be biased when additional information becomes available. Therefore, this report explores how sensitive the results are with respect to:

- Trends in cash balance plans.
- Long-term asset allocation for defined contribution plans.
- Cash-out behavior for defined benefit terminated vested participants.

Cash Balance Plans

The Bureau of Labor Statistics (U.S. Department of Labor, 1999) reports that 6 percent of full-time employees in medium and large private establishments had a “cash account” benefit formula.

Table 2
Composition of Estimated Retirement Wealth for Females at Social Security Normal Retirement Age Under Baseline Assumptions, by Birth Cohort

| Type of Plan | 1936 | 1938 | 1940 | 1942 | 1944 | 1946 | 1948 | 1950 | 1952 | 1954 | 1956 | 1958 | 1960 | 1962 | 1964 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Panel A: Baseline Assumptions | | | | | | | | | | | | | | | |
| Defined benefit | 49.7% | 48.9% | 47.1% | 45.7% | 44.7% | 44.6% | 43.2% | 42.7% | 42.7% | 41.1% | 40.5% | 39.3% | 39.9% | 37.9% | 37.2% |
| Defined contribution + cash balance | 32.5 | 32.0 | 32.6 | 34.0 | 34.9 | 34.3 | 34.1 | 33.6 | 33.3 | 33.8 | 32.9 | 32.1 | 32.0 | 32.6 | 31.9 |
| Individual retirement account | 17.8 | 19.1 | 20.3 | 20.3 | 20.4 | 21.1 | 22.7 | 23.7 | 24.0 | 25.1 | 26.6 | 28.7 | 28.1 | 29.4 | 30.9 |
| Panel B: Cash Balance Plans Double | | | | | | | | | | | | | | | |
| Defined benefit | 49.7 | 48.9 | 47.0 | 45.7 | 44.6 | 44.4 | 43.2 | 42.2 | 41.8 | 40.0 | 39.2 | 37.9 | 38.6 | 36.9 | 36.3 |
| Defined contribution + cash balance | 32.5 | 32.0 | 32.6 | 34.0 | 35.0 | 34.4 | 34.2 | 33.9 | 34.0 | 34.6 | 34.0 | 33.3 | 33.2 | 33.6 | 32.8 |
| Individual retirement account | 17.8 | 19.1 | 20.3 | 20.3 | 20.5 | 21.1 | 22.6 | 23.8 | 24.2 | 25.3 | 26.8 | 28.8 | 28.1 | 29.5 | 30.9 |
| Panel C: Assuming a Less Aggressive Long-Term Asset Allocation | | | | | | | | | | | | | | | |
| Defined benefit | 49.8 | 49.2 | 47.5 | 46.3 | 45.5 | 45.4 | 44.2 | 43.9 | 44.0 | 42.7 | 42.2 | 40.9 | 41.6 | 39.7 | 39.1 |
| Defined contribution + cash balance | 32.4 | 31.8 | 32.4 | 33.6 | 34.4 | 33.9 | 33.8 | 33.1 | 32.6 | 32.9 | 32.0 | 31.4 | 31.3 | 32.0 | 31.2 |
| Individual retirement account | 17.7 | 19.0 | 20.1 | 20.1 | 20.2 | 20.7 | 22.0 | 23.0 | 23.3 | 24.5 | 25.8 | 27.7 | 27.0 | 28.3 | 29.8 |
| Panel D: Assuming Terminated Vested Defined Benefit Participants Are Not Automatically Cashed Out | | | | | | | | | | | | | | | |
| Defined benefit | 53.2 | 52.2 | 50.1 | 48.5 | 47.6 | 47.3 | 45.9 | 45.2 | 45.1 | 43.4 | 42.8 | 41.5 | 41.8 | 39.7 | 39.0 |
| Defined contribution + cash balance | 30.3 | 29.9 | 30.8 | 32.2 | 33.1 | 32.6 | 32.6 | 32.1 | 31.9 | 32.5 | 31.7 | 30.9 | 31.0 | 31.8 | 31.0 |
| Individual retirement account | 16.5 | 17.8 | 19.1 | 19.3 | 19.4 | 20.1 | 21.6 | 22.7 | 23.0 | 24.1 | 25.5 | 27.6 | 27.1 | 28.6 | 30.0 |
| Panel E: Assuming All Defined Contribution Plan Account Balances That Are Not Retained in a Defined Contribution Plan on Job Termination Must be Rolled Over to an Individual Retirement Account (IRA) and Preretirement Withdrawals from an IRA Are Prohibited | | | | | | | | | | | | | | | |
| Defined benefit | 53.0 | 51.8 | 49.4 | 47.4 | 46.3 | 45.7 | 43.9 | 43.1 | 42.7 | 40.6 | 40.0 | 38.4 | 38.5 | 36.4 | 35.7 |
| Defined contribution + cash balance | 30.2 | 29.7 | 30.4 | 31.5 | 32.2 | 31.5 | 31.2 | 30.7 | 30.2 | 30.4 | 29.7 | 28.6 | 28.6 | 29.2 | 28.4 |
| Individual retirement account | 16.8 | 18.5 | 20.1 | 21.1 | 21.6 | 22.8 | 24.9 | 26.2 | 27.1 | 29.0 | 30.3 | 33.0 | 32.9 | 34.4 | 35.8 |

Source: Employee Benefit Research Institute, Retirement Income Projection Model.

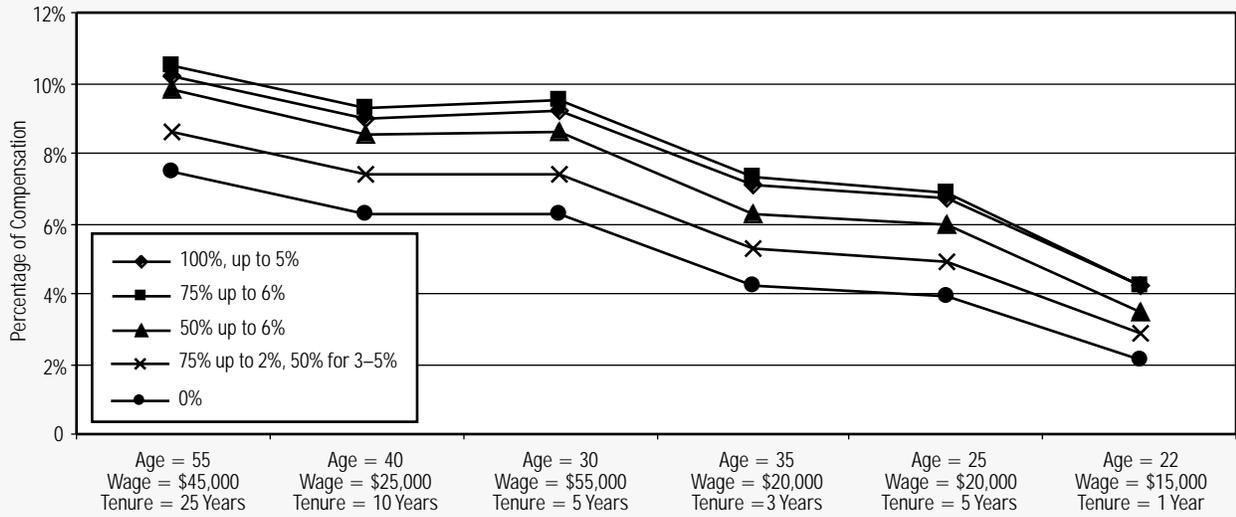
Since this was the most current number available, it was used in the baseline estimates. However, a significant amount of conversion activity has taken place since that time. Elliot and Moore (2000) report that 16 percent of the pension plans among Fortune 100 companies in 1998 were cash balance plans, and, that more generally, cash balance plans have increased from 5 percent to 12 percent of all defined benefit plans in just the previous two years.

Given these trends, it is reasonable to assume the percentage of defined benefit participants covered by a cash balance plan may have doubled between 1997 and 2000. In an attempt to model the potential impact of this change, the distribution of defined benefit plan types for jobs taken after the year 2000 was modified by taking a pro-rata reduction across all the final average categories to rebalance to 100 percent.³⁴

The results for panel B in tables 1 and 2 are generated with the same assumptions as panel A, with the exception of the new assumption for cash balance plans. There does not appear to

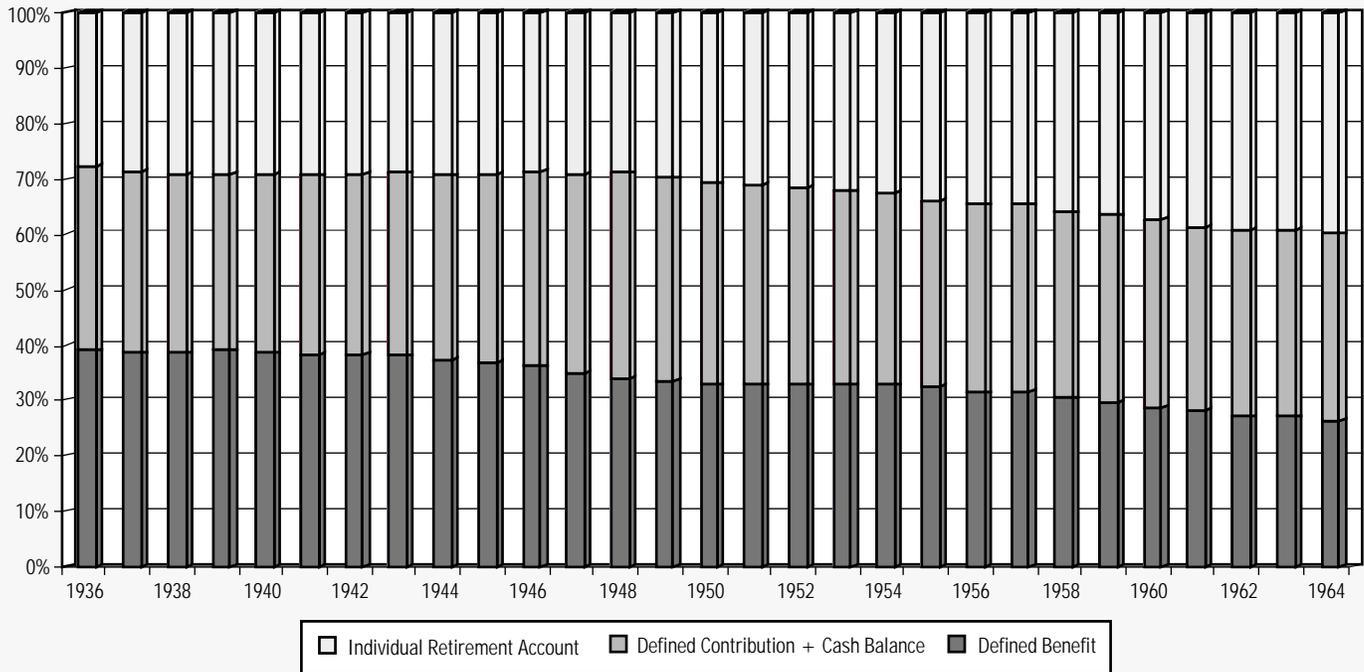
³⁴ This implicitly assumes that transition provisions allow everyone in a traditional defined benefit plan that is converted to cash balance to remain in the current plan until they change jobs. This assumption will be relaxed in a future version of the model.

Chart 7
Predicted 401(k) Contributions for Selected Persons and Plans



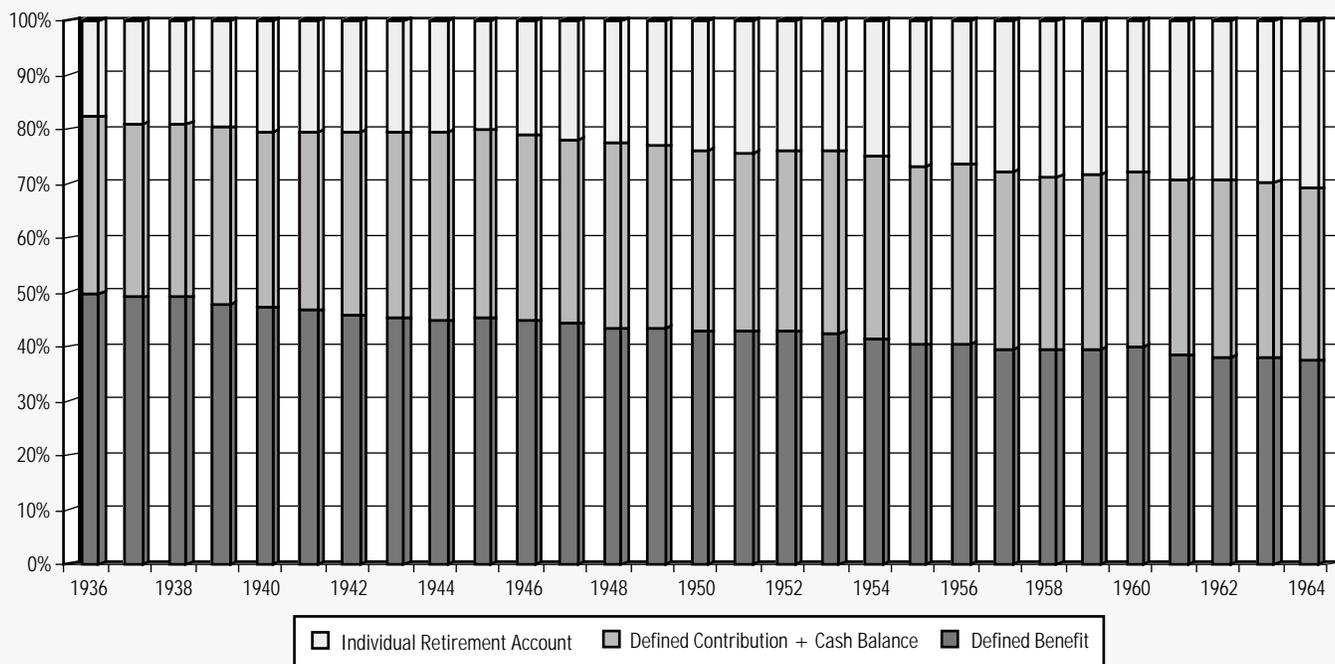
Source: Jack L. VanDerhei and Craig Copeland, "A Behavioral Model for Predicting Employee Contributions to 401(k) Plans: Preliminary Results," *North American Actuarial Journal*, Vol. 5, no. 1 (January 2001): 80-94.

Chart 8
Composition of Estimated Retirement Wealth for Males at Social Security Normal Retirement Age Under Baseline Assumptions, by Birth Cohort



Source: Employee Benefit Research Institute, Retirement Income Projection Model.

Chart 9
Composition of Estimated Retirement Wealth for Females at Social Security Normal Retirement Age Under Baseline Assumptions, by Birth Cohort



Source: Employee Benefit Research Institute, Retirement Income Projection Model.

be much impact in the short run, given the model's assumption with respect to transition provisions. However, for males in the 1964 birth cohort, the average proportion of retirement wealth estimated to be derived from (non-cash balance) defined benefit plans decreases from 26.4 percent to 25.3 percent—a 4.1 percentage decrease (table 3). The long-run results for females suggest a 2.6 percent decrease in the importance of pension wealth for defined benefit plans other than cash balance. As expected, most of the offsetting increase is found in the defined contribution and cash balance plan component: The 1964 birth cohort is estimated to experience a 2.9 percent increase in retirement wealth in these categories for both males and females. The impact on the IRA percentages is estimated to be de minimis for both genders.

Long-Term Asset Allocation for Defined Contribution Plans

To the extent that some defined contribution plan participants do not actively rebalance their asset allocations to reflect abnormally high recent experience in the equity markets, it appears that using the current asset allocation of equities by age for long-run asset allocation

may be artificially inflating the estimated equity percentages. Preliminary analysis of rebalancing was undertaken with the EBRI/ICI 401(k) data last year,³⁵ and while additional analysis remains to be completed, it appears that there may be more of a discrepancy between active rebalancers and passive investors among older employees.

For purposes of this sensitivity analysis, an ad hoc reduction in equity percentage was applied to reflect what is likely to be more of an equilibrium asset allocation by age. The equity reduction for purposes of this paper was arbitrarily assumed to increase from a 0 percent reduction for 20-year-olds to a 10 percent reduction for 65-year-olds.

The results of this sensitivity analysis are shown in panel C of tables 1 and 2. As expected, the decreased equity concentration results in a long-term decrease for both defined contribution plans and IRAs.³⁶ Overall, there was estimated to be a 0.8 percent decrease in the defined contribution plan percentage component for males in the 1964 birth cohort and a 2.1 percent decrease

³⁵ VanDerhei, Holden, and Quick (2000).

³⁶ IRAs are assumed to have the same asset allocation as defined contribution plans in the model.

Table 3
Percentage Change in Composition of Estimated Retirement Wealth at Social Security Normal Retirement Age for Various Scenarios Relative to the Baseline Assumptions: 1964 Birth Cohort, by Gender

| Type | Male | Female |
|---|-------|--------|
| Panel B: Cash Balance Plans Double | | |
| Defined benefit | -4.1% | -2.6% |
| Defined contribution + cash balance | 2.9 | 2.9 |
| Individual retirement account | 0.3 | 0.0 |
| Panel C: Assuming a Less Aggressive Long Term Asset Allocation | | |
| Defined benefit | 5.9 | 4.9 |
| Defined contribution + cash balance | -0.8 | -2.1 |
| Individual retirement account | -3.3 | -3.7 |
| Panel D: Assuming Terminated Vested Defined Benefit Participants are Not Automatically Cash Out | | |
| Defined benefit | 5.2 | 4.7 |
| Defined contribution + cash balance | -1.8 | -2.7 |
| Individual retirement account | -1.9 | -2.9 |
| Panel E: Assuming All Defined Contribution Plan Account Balances That are Not Retained in a Defined Contribution Plan on Job Termination Must be Rolled Over to an Individual Retirement Account (IRA) and Preretirement Withdrawals from an IRA are Prohibited | | |
| Defined benefit | -23.4 | -20.5 |
| Defined contribution + cash balance | -23.4 | -20.5 |
| Individual retirement account | 35.2 | 45.9 |

Source: Employee Benefit Research Institute, Retirement Income Projection Model.

for females. IRAs were estimated to decrease by 3.3 percent and 3.7 percent for males and females, respectively. Defined benefit plan benefits do not change under this new assumption; however, the relative importance of defined benefit plans for the 1964 birth cohort increases by 5.9 percent for males and 4.9 percent for females.

Terminated Vested Defined Benefit Plan Participants

In certain situations, defined benefit plan sponsors have the ability to automatically cash out former employees. When a worker separates from employment prior to normal retirement age, the present value of the accrued benefits is computed and compared with the statutory threshold for mandatory cashouts at the time. Under the baseline scenario in this model, it is assumed that employers will cash out these amounts whenever possible, and that the assets will not be retained in the retirement system. However, there does not appear to be a source of time series information on the employer's propensity to avail themselves of this option.³⁷ Therefore, this sensitivity analysis relaxes that assumption and assumes that departing employees are not cashed out and remain in terminated vested status until normal retirement age when they receive their deferred retirement benefits.

The results are shown in panel D of tables 1 and 2. As expected, this new assumption increases the importance of defined benefit plans relative to the baseline assumptions. For males born in 1964, there is

an estimated increase of 5.2 percent, while their female counterparts are estimated to have a 4.9 percent increase. Defined contribution plan and IRA benefits do not change under this new assumption; however, the relative importance of defined benefit plans for the 1964 birth cohort decreases by 1.8 percent and 1.9 percent, respectively, for males, while the decreases for females are estimated at 2.7 and 2.9 percent.

Simulating the Impact of a Prohibition of Preretirement Cashouts From Defined Contribution Plans and IRAs

The relative incidence of cashouts and rollovers among participants taking distributions from their previous employer's defined contribution plans has been documented extensively elsewhere.³⁸ However, there has been a lack of data with respect to the long-run behavior of individuals who—at least initially—leave their account balances with the previous employer when they change jobs. Therefore, we combine industry data with

³⁷ Hurd, Lillard, and Panis (1998) find that "among DB plan holders with a lump-sum distribution option, 48 percent started collecting benefits, 31 percent expected to draw benefits in the future, 4 percent took an LSD and rolled it over into an IRA, and only 16 percent cashed out their pension rights." However this information is limited to a relatively older population (the 1931–1941 birth cohort) and the authors confine their analysis to reports of plan dispositions for respondents who left their jobs between waves 1 and 2 of the HRS.

³⁸ See Yakoboski (1997) for an example.

SCF data³⁹ 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. These probabilities are used to estimate the baseline scenario in panel A of tables 1 and 2.

One way to demonstrate the first-order impact⁴⁰ of preretirement cashouts on eventual retirement income is to simulate the impact of a proposal that would force all defined contribution plan funds not either retained in the previous employer's plan or transferred to the new employer's plan at job termination to be rolled over to an IRA on a mandatory basis. However, this provision alone would not be sufficient to ensure that the funds remained in the retirement system if individuals retained the rights to withdraw from their IRAs without restriction. Therefore, we also assume that all pre-retirement access to IRAs would be prohibited.

The estimated results of such a modification to the current system are shown in panel E of tables 1 and 2. As expected, there is a sizable increase in the importance of IRAs at the expense of the other two types of plans. Given that (a) the likelihood of rollover to an IRA in the baseline scenario increases with account balance, and (b) males tend to have larger account balances than females, *cet. par.*, it is not surprising that the impact of this change would be larger on females. For females born in 1964, mandatory rollovers are estimated to increase the relative importance of IRAs by 45.9 percent, while the importance of both defined benefit plans and the combination of defined contribution and cash balance plans would decrease by 20.5 percent. Their male counterparts are estimated to experience an increase of 35.2 percent in the importance of IRAs, while the other two categories each decrease by 23.4 percent.

Poterba, Venti, and Wise (1999) estimated the impact of preretirement withdrawals on 401(k) asset accumulations and concluded that it reduces average 401(k) assets at age 65 by about 5 percent. Comparing the results from this scenario (for the combination of IRAs, defined contribution, and cash balance plans) with the baseline assumptions, we find a much larger impact

for the 1964 birth cohort: 41.6 percent for males and 40.0 percent for females. The differences between the model and the set of assumptions utilized in Poterba, Venti, and Wise and those used in this report are far too numerous to mention; however, it is important to keep in mind that their analysis was limited to the 401(k) market and that they did not include the impact of the ancillary restriction on preretirement withdrawals on IRAs.

Discussion

The results above show a clear increase in the income retirees will receive that will

have to be managed by the retiree. This makes the risk of longevity more central to retirees' expenditure decisions. Therefore, they will have to understand that life expectancies are merely averages, and that wide variation beyond the average is possible.

To illustrate, according to projections from the 2000 Social Security Trustees' Report, a 65-year-old male

³⁹ To calculate stay behinds from SCF, the total number of rollovers from pension plans plus the total number of previous pension plans with assets or rights left behind was determined. The percentage of stay behinds was then the number of previous pension plans with assets or rights left behind relative to the combined total described previously. Fidelity (2001) provides an analysis of their experience with respect to participant choices after termination. Based on 1999 job terminations, they found that the percentage of assets that remained in the plan until the end of the year varied from 33.7 percent for participants with account balances of less than \$10,000 to 68.7 percent for those with account balances in excess of \$200,000. However, as they point out, this may not be sufficient time to observe the long-term incidence, especially for those that terminate late in the year. Hurd, Lillard and Panis (1998) also investigate cashout behavior among defined contribution plan participants; however, it is subject to the same limitations mentioned in footnote 37 above.

⁴⁰ An estimate of the true impact of such a proposal would need to account for, *inter alia*, the potential impact that such a reform would have on: (1) the relative likelihood that employers would want to continue sponsoring such a plan and, if they did, how their contribution formulae may need to be restructured, and (2) how employees (especially those designated as nonhighly compensated employees under IRC Sec. 414(q)) would decrease their participation and/or contributions if they were not able to withdrawal the funds prior to retirement age.

in the year 2000 is expected to live another 16.4 years (to age 81), while a female is expected to live to about age 85, an additional 19.6 years of life. Yet, approximately 12 percent of the males and 8 percent of the females who reach 65 will die before they reach 70, while about 17.5 percent of the males and 31.4 percent of the females who reach 65 will live until they reach 90. Other important considerations are medical advances from research such as the Human Genome Project and the increase in health care needs that are associated with old age. Consequently, retirees will need to understand how much (or little) they can spend or to explore other avenues (such as the purchase of annuities) to reduce the risk of longevity.

How Much Can Individuals Spend?

Since many 65-year-old males will live longer than the projected average 16.4 years, an individual must make expenditure decisions based on a longer time horizon. Cooley, Hubbard, and Waltz (1998) estimated various payout (withdrawal of assets) percentages that would be sustainable for a different number of years. Across the three asset allocations examined, only a 3 percent withdrawal rate was found to have a high probability (80 percent) of not depleting one's assets before 30 years. The more aggressive investments in equities would support a 4 percent withdrawal rate for having a high probability for assets to last 30 years. Thus, what most people would consider to be rather low withdrawal rates would be necessary to protect an individual against outliving his or her assets.

Annuities

Even using the small withdrawal rates suggested above, the risk of outliving one's resources is not eliminated completely. The insurance vehicle for ensuring against outliving one's resources is a life annuity.⁴¹ This type of annuity pays regular payments for the length of one or more persons' lives.⁴² Currently, the market for life annuities other than Social Security and private pen-

sions is rather small.⁴³ The American Council of Life Insurers (2000) reported that 2.75 million individuals were covered by an individual immediate annuity policy in 1999. However, this is not too surprising considering the relatively high percentages of annuity payments retirees are presently receiving from private pensions (as shown in charts 8 and 9) and by Social Security.⁴⁴ Yet, there are other reasons why retirees do not purchase life annuities, which are central to any debate on the necessity for, or mandating of, retirees to purchase life annuities from their defined contribution plan and IRA account balances at retirement.

The reasons for not purchasing annuities range from rational financial choices to the lack of understanding the benefits of life annuities. First, the pricing of annuities discourages their purchase, as the price of annuities in the individual market typically diverges from the actuarially fair price. This occurs for two reasons. Insurance companies must cover their administrative and sales expenses in the underwriting and marketing of their annuity products, plus some level of profit in the premiums they charge. Typically, those who choose to purchase annuities live longer than those who do not. Thus, the insurer is faced with an "adverse selection" issue and must price the annuity to account for the longer longevity of those who purchase annuities.

The second reason why individuals do not purchase annuities is the desire for flexibility. The

⁴¹ This section closely follows Brown (2000).

⁴² There are also annuity-certain contracts that make payments for a fixed number of periods regardless of the survival of the insured. Thus, no insurance is offered against outliving one's resources.

⁴³ This is different from the tremendous growth in variable annuities in the past decade. However, variable annuities are deferred annuities. Under a deferred annuity, individual contract owners are in the process of accumulating assets, not receiving retirement income that is longevity-insured. Furthermore, assets in variable annuities are not required to be converted to a life annuity and evidence currently suggests that not many are being converted (Brown and Warshawsky 2000).

⁴⁴ Mitchell and Moore (1998) found that Social Security and private pensions make up approximately two-thirds of the wealth of households nearing retirement.

The main result of the model developed in this Issue Brief is that the expected increase in the need for income coming from sources that are not guaranteed for life. Consequently, retirees will be at a greater risk of outliving their resources.

decision to annuitize one's assets is virtually irrevocable; otherwise the insurer would face a serious adverse-selection situation, making it nearly impossible for the insurer to offer annuities. Consequently, annuity purchasers are faced with liquidity constraints in paying for large expenditures, particularly for those health-care related expenses not covered by Medicare. Also, ordinarily the annuity payments end when the annuity purchaser dies; thus, no bequest can be given. While one can annuitize only a portion of one's assets and leave the rest for bequests, this still may not be as attractive to many individuals as having access to all of their assets.⁴⁵

Thirdly, most annuities offer no protection against inflation, which discourages their purchase. Consequently, individuals could be faced with receiving a retirement payment that is constantly declining in real terms. If the assets were held instead of being annuitized, increases in nominal interest rates could mitigate some of the effects of inflation. While some annuity products have been developed around the U.S. government inflation-indexed Treasury Inflation Protected Securities, the resulting market has remained quite small (Brown 2000).

Another reason why individuals choose not to annuitize is the thought that they can invest in higher-return assets than what an annuity can provide. However, individuals can purchase annuities linked to equity returns that allow them to reap the benefits if higher returns occur, while still having the protection against outliving their resources. If an individual attempted to try to self-annuitize by using equity market diversification, even with a reasonable fraction of wealth reduction, Milevsky and Robinson (2000) found that between 17 percent and 32.5 percent of males age 65

(and between approximately 27 percent and 55 percent of females age 65), depending upon the equity allocation, would run out of resources before death.

Lastly, the lack of understanding about annuities' benefits appears to be a major reason for them not

being purchased. A study by the American Council on Life Insurers determined that consumer knowledge of annuities was low: Consumers always focused how they might die early (and lose their investment in the annuity), instead of how they might live longer than expected (and gain the post-retirement lifetime income that the annuity would provide). Consumers think that the odds of them dying are in insurance companies' favor, so they will lose. Thus, consumers miss the point that the purpose of annuities is to provide insurance against the risk of outliving one's resources.

The main result of the model developed in this *Issue Brief* is the expected increase in income coming from sources that are not guaranteed for life (i.e., defined *contribution* rather than defined *benefit* sources of income). Consequently, retirees will be at a greater risk of outliving their resources, and judging from the discussion above, people do not seem to be taking advantage of annuities' protection against this risk. Thus, a possible policy topic to reduce this risk is to mandate or encourage (give preference to) the annuitization of all defined contribution plan and IRA assets or a portion of those assets to achieve an income stream above some level such as the poverty level. However, there are benefits and costs to such a move.

The mandating of annuities would bring *all* risk classes into the market, and not just those who think they are going to live a long time. Thus, annuities could be priced using the overall average mortality characteristics, thereby bringing prices closer to their actuarially fair level. In fact, Mitchell et al. (1999) found that annuity payments could increase up to 10 percent if individuals were forced to annuitize their retirement

⁴⁵ There remains a debate on whether individuals do behave in a manner consistent with a bequest motive. For example, see Laitner and Juster (1986) for supportive evidence of behavior consistent with a bequest motive and Brown (1999) for evidence against.

assets. Furthermore, since annuities would provide a guaranteed payment, individuals would be protected from imperfect decisions on mortality when making expenditure choices. This would also potentially limit the costs to the public sector in the form of lower public assistance program expenditures, as many individuals would have a guaranteed level of income for life above the eligibility levels for these programs that they may not have had if they had not annuitized.

On the other hand, annuitization also has potential concerns. First, some individuals may be “over-annuitized,” meaning that they would be worse off from the annuitization. Retirees in poor health would be a particular class of individuals that likely would be hurt by forced annuitization; in this case, their bad health would lead to higher mortality rates and they would be paying for the average mortality rate. Thus, despite being already “worse-off” due to bad health, they would also lose the most from mandated annuitization. Secondly, redistribution would likely occur from poor to rich. If all risk classes were treated the same, then there would be a redistribution of income from those who die earlier (who are more likely to be poor) to those who live longer (who are more likely to be the wealthy). While this can be mitigated through annuity options (such as refund options) and potentially through tax and subsidy mechanisms by the federal government, the exact relationship between income and mortality is not known.

Conclusion

Most analysis and public discussion of retirement plans over the last 20 years

has focused upon the growth of defined contribution plans and the decline of defined benefit plans. Little analysis has been available of the long-term implications of this change on the composition and levels of future retirement income.

This original work by EBRI provides a clear

picture of the implications for the baby boom generation. Our model estimates that for today’s retirees with either defined benefit, defined contribution and/or IRAs, approximately 39.0 percent of pension wealth for males would be available from defined benefit plans and 49.7 percent for females; defined contribution and cash balance plans would provide 33.2 percent for men and 32.5 percent for women; while IRAs would provide 27.8 percent for men and 17.8 percent for women. For the youngest baby boom males (born in 1964) this report estimates that 26.4 percent of their pension wealth will be provided through defined benefit plans (a decline of 32.4 percent), while their female counterparts will see their defined benefit pension wealth fall to 37.2 percent, a decline of 25.0 percent. Defined contribution plans will provide 33.7 percent of the retirement wealth for men in this birth cohort, and 31.9 percent for women. IRAs will expand their role the most, reaching 39.9 percent for men and 30.9 percent for women.

The implications for retirees are major:

- Most of their non-Social Security retirement income will be subject to the retiree’s control regarding the rate of spending, rather than arriving like a regular paycheck for life.
- Rather than the assets that back up their income being managed by the sponsor of the pension plan, which would bear the risk of investment losses, the individual will have to self-manage the assets or select someone to do so.
- Rather than having the sponsor of the pension plan bear the risk of the retiree living to 100, the retiree will either need to purchase an annuity that transfers that risk to an insurance company or carefully manage his or her individual rate of spending to avoid outliving the assets.

Most Americans have not faced these challenges in the past, nor has the nation focused on financial education and financial literacy in a sustained and comprehensive way in the past. While there has been

increasing attention paid to these issues since passage of the SAVER Act in 1997, much remains to be done. This report suggests that, at a minimum, financial issues in retirement must become a higher education priority in the future. Most Americans have relied on Social Security to provide a basic monthly annuity for life, and the life of a spouse. Should the nation move to individual accounts in Social Security in the future, these same issues of asset management, rate of spending, and financial literacy may apply to that program as well. This report makes it clear that the individual responsibility model for retirement income will be tested in the decades ahead. It appears that a tag line from the Choose to Save[®] education program will become more relevant with each passing year: Save now or work forever.

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