

**Employees' Retirement Choices,
Perceptions and Understanding:
A Review of Selected Survey and Empirical
Behavioral Decision-Making Research**

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Summary

The evolution of workplace retirement benefits in America has greatly altered the roles of the employer and employee. A system in which paternalistic employers shoulder the burden and risks of funding retirement for long-tenured workers has largely given way to one in which employees are fully responsible for funding retirement themselves.

The increased individual involvement in planning and providing for retirement within the context of a workplace retirement plan has been fertile ground for behavioral economists and other researchers. Their work has provided a greater understanding of retirement-related decision making that often stands in stark contrast to the decisions predicted by traditional economists assuming fully rational agents. These researchers have also offered behaviorally based prescriptions with the goal of improving workers' retirement outcomes. The results of their selected work are discussed here.

While much can be gained from research outside the U.S. retirement domain, the review here is limited to U.S.-based retirement-specific work. Where it may otherwise not be obvious, the nature and context of the research is provided in an attempt to minimize inappropriate extrapolation of research results.

Research context and methodology are critical to appropriate interpretation of results. Correspondingly, we do not hypothesize about possible underlying psychological principles that may help to explain research results unless the original research author has done so. The body of research available has resulted in greater discussion of private-sector defined contribution retirement plans.

Many important questions like which type of plan is “better,” how retirement-ready workers are expected to be, or how pensions affect retirement timing and financial decisions in retirement are not addressed. A complete snapshot view of employees' retirement choices, perceptions and understanding is provided. Significant findings are reported below in the order in which they appear in the main text.

- Employees value, and may feel entitled to, retirement benefits.
- Experimental evidence suggests that the provision of retirement benefits plays a role in job choice, but perhaps not as strongly as Ippolito's sorting theory suggests.
- Although the concept of pension-pay trade-off may be less relevant in today's environment where (less generous) defined contribution plans are more prevalent, recent research favors a conclusion that trade-offs are unlikely and imperfect to the extent they do exist. Older research shows mixed results.
- Alarming, a significant portion of workers do not seem to understand their retirement benefits very well (even their plan type), and there has been little improvement over time. This lack of knowledge does not bode well for optimal retirement plan decision making nor for the interpretation of research based solely on survey results.

- Analyses of workers’ plan-type preferences (mostly in public-sector plans) show the importance of context. While employees tend to make passive choices, in one study, only a minority do. Suboptimal choices are impacted by inertia, framing, peer effects and market performance. Younger, higher-income and white employees show a greater preference for defined contribution plans.
- Less than 40 percent of all workers participate in any kind of workplace retirement plan. This is partially attributable to a lack of access; less than 50 percent of the American workforce has access to a plan. Older, married, more educated, higher-income and white employees are more likely to participate.
- Less than 20 percent of private-industry workers participate in a defined benefit plan; nearly 80 percent of public-sector employees do. Approximately 40 and 15 percent of private and public workers participate in a defined contribution plan, respectively.
- Conditional on 401(k) and other salary-deferral plan participation, the approximate median contribution rate is 5 percent.
- Age, income, tenure, education and home ownership are positively associated with participation in and contributions to a defined contribution plan.
- Decision-making context has a dramatic impact on participation and contribution decisions. For example, reframing or simplifying the enrollment process has improved participation rates by 10 to more than 40 percentage points in the first year of eligibility. Prohibiting inertia by *requiring* a participation decision (either positive or negative) has increased enrollment rates by nearly 30 percent.
- Other plan features specifically designed to thwart suboptimal decision-making tendencies can also be effective at increasing savings rates. One such feature that automatically increases savings rates periodically was responsible for nearly quadrupling average savings rates at one firm.
- Incentives are another way to potentially impact participation and contribution behavior. Within defined contribution plans, the incentive is often in the form of an employer “matching” contribution equal to some portion of an employee’s contribution, typically limited to a specified percentage of the employee’s salary. Researchers find positive participation effects from employer matching contributions. The effect on contribution rates is less clear. The match threshold is influential, but higher match rates are often associated with lower contribution rates.
- The ability to choose one’s retirement plan investments is associated with higher levels of plan participation, but the extent of choice also has an effect. Researchers have found that the total number of options and the number of equity options are associated with lower participation levels. The presence of company stock predicts higher participation levels, perhaps offering participants at least one investment they recognize.

- Researchers have demonstrated that social norms, anchors, past market performance and priming can also have an impact on savings rates.
- In aggregate, asset allocation of 401(k) accounts approximates that of the typical defined benefit plan: 60 percent invested in equities and 40 percent invested in fixed income.
- Generally, equity allocations are positively related to income and negatively related to age.
- Participants' investment choices are strongly influenced by the choice set offered and historical investment performance, often in irrational ways.
- Across all age groups, a nontrivial percentage of participants allocate more than 20 percent of their retirement accounts to company stock, causing these participants to be poorly diversified (and subject to unnecessary risk). Researchers suggest a number of factors explain this phenomenon: perceived implicit advice from the employer, a familiarity bias, mental accounting, performance chasing and financial illiteracy.
- Leakage in the form of preretirement withdrawals and unpaid loans can jeopardize workers' retirement security. A cash-out from one's first defined contribution plan can result in a 67 percent reduction in his retirement income.
- It is estimated that over 50 percent of lump-sum distributions by under age 60 participants are partially (41.4 percent) or wholly (13.4 percent) spent. Younger, nonwhite, unmarried, lower-income and less-educated participants are more likely to spend all or a part of their distributions. Smaller distributions are also more likely to be spent.
- Plan loans are taken by approximately 20 percent of participants who have access to them. Loans result in a relatively minor impact on retirement income, unless the loan is not repaid, which most often occurs when a participant terminates with an outstanding loan. In 80 percent of these cases, the participant fails to repay the loan.
- Workers' low level of financial literacy is undisputed. Positive effects of workplace financial education are reported, but most of the research analyzing actual behavioral change rather than self-reported surveys suggests the effects are statistically insignificant or small in absolute terms.
- Research that covers retiring participants' payout choices is limited, and wide variation in research results suggests contextual effects. Between 12 and 96 percent of retirees choose lump-sum distributions in the studies presented herein.
- Retirement payout choices appear to suffer from some of the same decision-making shortcomings observed during the accumulation phase. Of particular interest to researchers is the "annuity puzzle," the unexplained low levels of interest in annuities. Concluding that rational explanations fail to fully explain retirees' decisions, researchers

have turned to behavioral explanations, suggesting that loss aversion, an endowment effect, mental accounting and framing may negatively impact retirees' annuity purchase behavior.

Early Retirement Benefits and the Trend to Defined Contribution Plans¹

Employer-provided retirement benefits have a long history in the United States. The Employee Benefit Research Institute (EBRI) documents The New York City Teachers Retirement Plan, introduced in 1869, as the first public-sector retirement-income plan (1998). The American Express Company commenced one of the first private-sector plans in 1875 (Greenough & King, 1976). Both of these plans were defined benefit plans, but the American Express plan differed significantly from today's traditional defined benefit plans. Specifically, the general manager had to approve an employee's retirement, and benefits were paid only to disabled, elderly workers. The benefit for an eligible plan member was set at 50 percent of average earnings over the last 10 years of work, with a cap of \$500 (Latimer, 1932).

While some of the first workplace plans may have provided defined benefits funded by the employer, there is also early evidence of workers being responsible for funding their own retirement, as evidenced by a carriage shop's 1880 posting of employee rules:

Working hours shall be from 7 a.m. to 9 p.m. every day except the Sabbath. ... After an employee has been with this firm for five years he shall receive an added payment of five cents per day, provided the firm has prospered in a manner to make it possible. ... It is the bounden duty of each employee to put away at least 10 percent of his monthly wages for his declining years so he will not become a burden upon his betters. (Milkovich & Newman, 2002)

Still, in contrast to many other industrializing nations where individuals were provided protective benefits by the government, many of America's employers began to shoulder the welfare of their employees by providing health and retirement benefits, among others.

Shaped by economic, regulatory, cultural and demographic forces, the nature and form of employment-based retirement benefits in America have evolved since their inception.² Most notably, private employers have increasingly moved away from providing retirement benefits that promise a steady stream of income in retirement (a defined benefit plan) to offering employees defined contribution plans such as profit sharing, 401(k) and money purchase plans, or a combination of both.^{3,4,5} From 1975 through 2009, the number of private-sector defined

¹ Here, and throughout this paper, "retirement benefits" refers to *voluntary* retirement benefits and does not include Social Security.

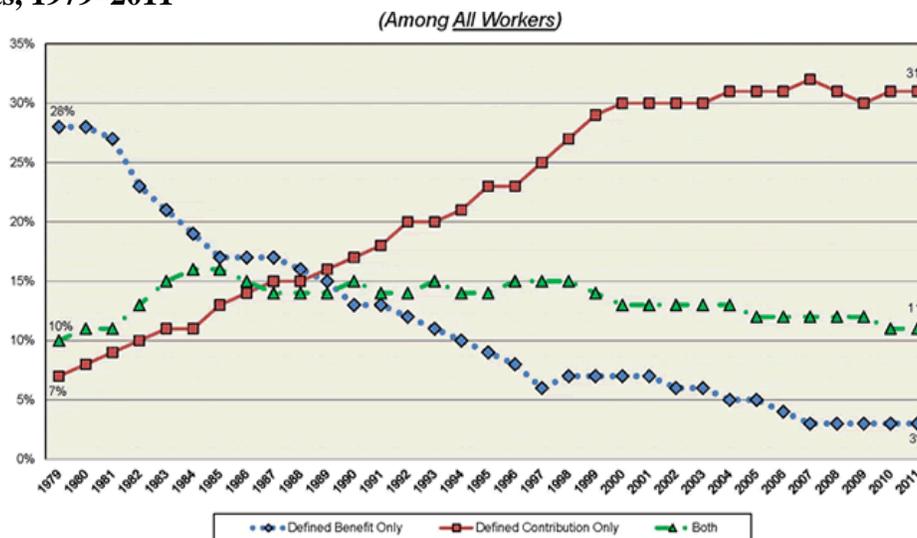
² For overviews of the evolution of workplace retirement benefits, see EBRI Databook on Employee Benefits, Chapter 1 and Appendix E, and EBRI Facts, U.S. Retirement Income System, December, 1998.

³ For a description of the different types of retirement plans, see <http://www.dol.gov/dol/topic/retirement/typesofplans.htm> (U.S. Department of Labor, 2013).

⁴ These same trends are not replicated in the public plan domain. Bovbjerg (2008) finds that as of 2007, virtually every state offered a defined benefit plan as its primary benefit. Only two states and the District of Columbia offered a defined contribution plan as their primary plans. In addition, 2012 National Compensation Survey statistics show that 83 percent of state and local

benefit plans declined by more than half—from approximately 103,000 to 47,000 plans while the number of defined contribution plans more than tripled from approximately 208,000 plans to nearly 660,000 plans. During this same period, the percentage of active private-sector employees (with a retirement plan available to them) eligible to participate in defined benefit plans declined from 71 percent to 20 percent (U.S. Department of Labor, 2011). EBRI (2013) estimates an 89 percent (55 percentage point) decline—from 62 percent in 1975 to 7 percent in 2011—in the number of employees participating in a defined benefit plan offered as the exclusive retirement benefit plan.⁶ Figure 1 below shows the participation trend by plan type.

Figure 1. Retirement plan trends: participation by plan type, private-sector, active-worker participants, 1979–2011



Employee Benefit Research Institute (2013)

Original source: U.S. Department of Labor Form 5500 Summaries 1979–98, Pension Benefit Guaranty Corp. Current Population Survey 1999–2011, EBRI estimates 1999–2010.

Employees’ Perceptions of Employer-Provided Retirement Benefits

An important empirical question is the extent to which employees value retirement benefits. According to three recent surveys, employees do appear to qualitatively appreciate the retirement benefits offered by their employers. While the surveys below seek preferences of private-sector employees, Fredericksen and Soden (1998) found similar preferences for both private- and public-sector employees.⁷

In the Principal Financial Well-Being Index survey conducted in the fourth quarter of 2011, 69 percent of respondents rated their defined contribution retirement plan benefit as one of the more

government employees have access to a defined benefit plan and 31 percent have access to a defined contribution plan (U.S. Department of Labor, 2012).

⁵ See chapter 7 in *Pension Plans and Employee Performance* (Ippolito, 1997) and chapter 8 in *The Choice of Pension Plans in a Changing Regulatory Environment* (Clark & McDermed, 1990) for discussions of potential explanations for the shifts.

⁶ Also U.S. Department of Labor, Form 5500 Filings, Pension Benefit Guaranty Corporation, Bureau of the Census, and Current Population Survey, all as cited by EBRI (2011).

⁷ The research sample was restricted to employees in El Paso, Texas.

important benefits provided by their employers (Principal Financial Group, 2011).⁸ The second-place ranking to health care has been consistent but declining (from 75 percent of employees in 2006) over the last five years. Defined benefit pension plans were ranked as an important benefit by 48 percent of respondents, a percentage that was also lower than in prior years when the percentage ranged from 57 to 51 percent.⁹ Interestingly, the top “wished for” benefit was a defined benefit plan, which was selected by nearly 25 percent of respondents.

The 2011 Employee Job Satisfaction and Engagement (Society for Human Resource Management (SHRM)) showed similar results: Defined contribution plans and defined benefit plans ranked third and fourth, respectively, as the most important benefits offered by respondents’ employers.¹⁰ (Health care benefits and paid time off were ranked higher.) The survey results also showed that African-American employees (as compared to Caucasian employees) and baby boomers (as compared to Gen Xers) placed greater importance on retirement benefits. In addition, defined benefit plans were found to be more important to large company workers. (This is likely because defined benefit plans are more prevalent in larger companies.)

Finally, 66 percent of respondents to a 2010¹¹ telephone survey jointly conducted by EBRI and the Financial Services Roundtable (FSR) assigned a top rating to retirement savings accounts for their importance in providing financial protection. Importance ratings were higher among older and higher-income workers—rising to 80 percent in some segments. The highest importance rating was also assigned to pensions by 55 percent of respondents (EBRI & FSR, 2010).

Despite being viewed as valued benefits, some research suggests that employees view benefits as entitlements, or part and parcel of their employment, regardless of their or the company’s performance (Williams, 1993; Hart & Carraher, 1995; Sinclair, Hannigan & Tetrick, 1995). Weathington and Tetrick (2000) further explore this concept to separately determine the degree to which workers believe employees are entitled to *each type of benefit*.¹² They indeed find a sense of entitlement that extends to retirement plan benefits. Nearly 77 percent of subjects rated their agreement with the statement that a workplace retirement plan is an entitlement a 5 or better on a scale from 1 to 7 (strongly agree).^{13,14}

⁸ The online survey was conducted in October 2011 within the United States by Harris Interactive. Respondents—1,121 employees and 533 retirees—were selected for Harris’ online panel. The data have been weighted to reflect the composition of the entire population of retirees and adult employees working for small to mid-sized U.S. businesses. “Because the sample is based on those who agreed to be invited to participate in the Harris Interactive online research panel, no estimates of theoretical sampling error can be calculated” (Principal Financial Group, 2011).

⁹ Note that these percentages represent the percentages of total respondents who assigned an 8, 9 or 10 importance rating to the benefit on a 1- to 10-point scale.

¹⁰ The survey is from a randomly selected sample from a third-party Internet panel based on the American Community Study. A response rate of 83 percent yielded 600 participants who were employed full or part time. The survey was conducted in 2011.

¹¹ The survey was conducted in September 2010 by the Opinion Research Corporation. A sample of 1,007 adults age 18 and older, living in private households in the continental United States were interviewed.

¹² Subjects included 216 employed undergraduate students attending a large southern university. Ages ranged from 19 to 73; 72.7 percent were women. A majority worked on a full-time basis (61.1 percent). Approximately 5 percent worked both a full- and a part-time job.

¹³ Of the benefits tested, retirement plan benefits were associated with the lowest sense of entitlement, behind medical insurance, paid holidays, paid vacation, paid sick leave and family leave.

¹⁴ The researchers offer no explanation for entitlement perceptions but find that the higher degree of entitlement perceptions, the more closely positive the association between benefit satisfaction and affective commitment and organizational commitment.

Retirement Benefits and Job Choice

A pat explanation for the provision of employer benefits is “to attract and retain quality employees.” Ippolito (1997) extends this with his notion of sorting, which suggests employers use pensions to sort prospective employees, implying that pensions matter in job choice. Underlying this concept is the assumption that prospective workers who are attracted to pensions have qualities associated with good performance. His sorting theory not only suggests that pensions can be used to sort workers generally, but that the *type of pension offered* can sort workers. Ippolito posits that high discounters (workers with high discount rates) will not be attracted to jobs with defined benefit pension plans, but will more likely prefer jobs with defined contribution plans. Ippolito cites Curme and Even (1995) who show a connection between spending propensities, credit constraints and defined benefit plan coverage as empirical evidence of his theory.

Although there is some evidence that supports Ippolito’s sorting theory (see section on participation decisions), it is not found in early survey work in this area. Surveys tended to only address benefits overall (not specific types of benefits) as a basis for job selection and found that benefits were unimportant. This may have been a result of the nature of the research as well as the subject pool as initial studies involved surveying graduate students. Against opportunity for advancement, pay, location, responsibilities and prestige, benefits were ranked last (Huseman, Hatfield, & Driver, 1975; Huseman, Hatfield & Robinson, 1978). However, Barber and Roehling (1993) find that subjects gave most attention to location, salary and benefits in their reviews of job opportunities for the purpose of hypothetically deciding to interview and devoted even more attention to benefits when they were generous.

More recently, Tetrick, Weathington, Da Silva, and Hutcheson (2010) studied the impact of several aspects of a total compensation package (e.g., salary, vacation time, health insurance cost and type of retirement plan) on hypothetical job preferences, albeit with an unrepresentative subject pool.¹⁵ Subjects were provided 32 job descriptions that varied starting salary, vacation, cost of health insurance and type of retirement plan (if any). The conditions included four variations of retirement plan offering: none, a 401(k), a defined benefit and a “company stock” plan. As one would expect, subjects were more likely to apply for and accept jobs that are higher paying, offer more vacation, and where the employees’ share of health insurance costs are lower. They were also more likely to apply and accept the job if a retirement plan were offered, but it made no difference what type of retirement plan it was.

Tested predictors of the importance of the various compensation factors included self-reported age, marital status, previous benefit history, risk aversion, achievement orientation, attitudes toward earnings and consideration of future consequences. Only retirement-related results are presented here, and the comparison group for all is “no retirement plan.”

- Married subjects were more likely to value a defined benefit plan.

¹⁵ Sample is 76 university students, most (69) who were undergraduate students. Ages ranged from 18 to 50, with a mean age of 25. Approximately 62 percent of subjects were women. Six students were unemployed, 24 worked full time, 39 worked on a part-time basis, and two held both a full- and a part-time job. Average prior year earnings ranged from \$15,000 to \$19,999.

- Benefit history was positively related to the preference for defined benefit and company-stock-funded plans.
- Subjects with a greater propensity for risk preferred 401(k) and company-stock-funded plans.
- Achievement orientation positively correlated with the relative importance of a company-stock-funded plan.
- Attitudes toward earnings pointed to a greater preference for defined benefit and 401(k) plans.¹⁶
- The extent to which future consequences are considered was predictive of a preference for a 401(k) plan.

In commenting on the surprise finding of no age-related preferences, they note this may relate to the fact that the oldest member of the subject pool was 50.¹⁷

The Pension-Pay Trade-Off

Next we turn attention to empirical evidence of employees' trade-off between current and deferred compensation (retirement benefits). In other words, how much current pay are employees willing to give up in exchange for future retirement income? Labor economists have theorized that in a competitive labor market, compensation among similar workers will be equalized.¹⁸ Similar workers in similar jobs will receive similar compensation, albeit in different forms due to heterogeneous preferences for cash compensation and benefits, therefore predicting relatively straightforward, dollar-for-dollar trade-offs between benefits and pay (Brown 1980). Stated differently, rational workers only forgo current pay to the extent that they are equivalently compensated with other benefits. Compensation practices are also often driven by this logic as managers work from a total compensation package, assuming rational employees accepting equal trade-offs between pay and fringe benefits.

However, empirical evidence *proving* this rational theory is scant—in some cases owing to the difficulty of obtaining complete and reliable data that include all relevant variables (Smith & Ehrenberg, 1983; Gustman & Mitchell, 1990). In fact, many early researchers in this area specifically mention limitations of their research, and interested readers are encouraged to review specific sources for additional details. Given researchers' concern with data reliability and completeness, it should come as no surprise that the results of early research are mixed, as evidenced in Table 1 below, which reports older work included in Gunderson, Hyatt and Pesando (1992).

¹⁶ Attitudes toward earnings were based on responses to nine questions using a five-point Likert-type response scale to measure the value placed on earning money.

¹⁷ They also refer to Miceli and Lane (1991), who suggest that the preference for protective benefits “may be best predicted by the joint effect of age and family responsibilities.” As retirement plans seek to “protect” income, they may be considered within the category of protective benefits.

¹⁸ This concept was introduced by Adam Smith ([1776] 1937) who posited “The whole of the advantages and disadvantages of the different employments of labor and stock must, in the same neighborhood, be either perfectly equal or continually tending toward equality.”

Much of the pension-pay trade-off research is dated, and some researchers believe the question of whether a pension-pay trade-off exists is less relevant in today’s environment of (generally less generous) 401(k) plans. In fact, more recent research favors a conclusion that a trade-off does not exist. Only Gerakos (2010) finds an imperfect trade-off of 48 cents of pay for every pension benefit dollar.¹⁹ Cadman and Vincent (2011) infer that (nonqualified) defined benefit pension compensation is *in addition to* and not a substitution for other forms of compensation. In hypothetical experimental research, Tetrick et al. (2010) find an additional \$10,000 per year does not offset the perceived “value” of an additional three weeks of vacation, having to pay the entire cost of one’s health insurance (at the company’s rates) or assuming full responsibility of funding one’s retirement. Weathington (2008) further explores the relationship between income and willingness to trade retirement benefits for cash and finds no relationship.

Table 1. Studies of wage-pension benefit trade-offs

Study	Data	Pension Variables	Results
<i>Ehrenberg (1980)</i>	Two data sets on municipal police, firefighters, and sanitation workers in the years 1973-75	Ratio of pension benefits to earnings at time of retirement; employee’s contributions; measures of likely underfunding; other characteristics of pension plans	Some evidence that increased employee contributions and underfunding lead to higher wages; limited evidence of wage-pension benefit trade-off (police in one data set); mixed results for other characteristics
<i>Schiller and Weiss (1980)</i>	1969 pension file linked with Social Security earnings for men	Ratio of pension cost to wages; other pension plan characteristics	Trade-off for 3 of 5 age groups, but significant only for 45-54 age; mixed results for other characteristics
<i>Smith (1981)</i>	Government employees in 86 cities in Pennsylvania in 1976	Pension benefit accrual and measure of pension underfunding	Significant trade-offs, usually insignificant
<i>Smith and Ehrenberg (1983)</i>	193 firms with wage and pension differences across jobs of different Hay point job evaluations	Differences in pension value across jobs in different Hay Scores	No significant trade-offs
<i>Bulow and Landsman (1985)</i>	1982 data on 993 faculty at Stanford	Probability of signing up for pension plan	Weak trade-off, usually insignificant
<i>Clark and McDermed (1986)</i>	1971/73/75 Retirement History Survey, men	Working past age of normal retirement and hence experiencing negative pension accruals	Trade-off in the sense that a significant compensating wage premium is associated with expected pension loss from delayed retirement
<i>Mitchell and Pozzebon (1986)</i>	1,696 employees, 666 with pension plans, from 1983 Survey of Consumer Finance	Coverage by pension plan; pension contributions; and other pension plan characteristics	No trade-off; more often, a wrong-signed relationship

¹⁹ The researcher’s sample included 442 chief executive officers of S&P 500 companies. Defined contribution plan benefits have been excluded from his estimates of pension benefits.

Study	Data	Pension Variables	Results
<i>Gustman and Steinmeier (1987)</i>	558 full-time private sector men from 1983 Survey of Consumer Finance	Coverage by pension plan	Significant positive relationship
<i>Moore (1987)</i>	4,500 employees from 5 firms	Pension cost to employer	Significant negative trade-off under 2SLS to account for the fact that pensions are a positive function of wages in earnings-based plans; significant positive relationship under OLS
<i>Dorsey (1989)</i>	1,973 full-time private sector employees from 1983 Survey of Consumer Finance	Coverage by pension plan, simultaneously determined	Significant positive relationship in both OLS and 2SLS, the latter to account for the possibility that pension coverage is a function of wages
<i>Montgomery, Shaw, and Benedict (1990)</i>	529 employees with defined benefit pension plans, from 1983 Survey of Consumer Finance	Pension benefit accrual as % of wages	Significant trade-off, but it becomes insignificant when 2SLS is used to account for simultaneity
<i>Even and Macpherson (1990)</i>	6,317 employees from 1983 Survey of Consumer Finance	Coverage by pension plan	Significant positive relationship
<i>Gunderson (1992)</i>	98 matches pension plans and collective agreements, Ontario	Actuarial calculation of employer's expected pension cost, and; pension plan characteristics affecting that cost	Significant trade-off, especially for flat benefit rate, but not for early and postponed retirement provisions; trade-off only when pension variable specified as replacement rates, not amounts

Note. From "Wage-pension trade-offs in collective agreements," by Gunderson, Morley, D. Hyatt, and J.E. Pesando, 1992, *Industrial and Labor Relations Review*, p. 148. ©1992 Cornell University. Reprinted with permission.

How Well Do Employees Understand Their Retirement Benefits?

There are at least three reasons why employees' understanding of their retirement benefits is important. As Gustman, Mitchell and Steinmeier (1994) note, for pensions to have the desired effects on employee behavior, workers must understand them, including "the risks they face, and value the insurance the pension provides." Second, to the extent that large groups of employees lack a basic understanding of their retirement benefits, it is naive at the outset to assume them rational agents able to optimally plan for retirement. Third, many of the datasets used in retirement-related research rely, at least in part, on accurate respondents.

Unfortunately, *significant* empirical evidence suggests that retirement benefits are quite poorly understood, even among workers who are nearing retirement and dependent upon them. Additionally, little improvement has occurred over the 30 years since Mitchell (1988) and

Gustman and Steinmeier (1989) began analyzing 1983 Survey of Consumer Finances (SCF) data by comparing respondent answers to information collected from employers, as shown in Table 2.

Table 2. Summary of pension knowledge research

Author and Data	Key Findings
<p><i>Gustman and Steinmeier (1989)</i></p> <p>1983 SCF data</p>	<p>Conditional on employer reporting of plan type, 63 percent of employees covered by a defined benefit plan correctly said so.</p> <p>For those covered by defined contribution plans, the corresponding percentage was 37 percent.</p>
<p><i>Mitchell (1988)</i></p> <p>1983 SCF data</p>	<p>Unionized, higher-income, longer tenured and more educated respondents tend to be better informed.</p>
<p><i>Starr and Sunden (1999)</i>²⁰</p> <p>1989 SCF data</p>	<p>Over three quarters of respondents could correctly identify their plan type.</p> <p>Employees covered by a defined contribution plan (DC workers) were more likely to know their plan type.²¹</p> <p>Fewer DC workers knew whether they themselves contributed than knew whether their employer contributed.²²</p> <p>Less than a third of DC workers knew whether their plan had any withdrawal provisions, but 60 percent of them correctly knew their plans' loan provisions.</p> <p>Of those covered by a defined benefit plan, 75 percent knew the basic contribution provisions of the plan and 80 percent knew their vesting status.</p>
<p><i>Gustman and Steinmeier (2004)</i></p> <p>1992 Health and Retirement Study (HRS) data matched with Social Security earnings records as well as employer retirement plan descriptions</p>	<p>Although 77 percent of respondents correctly identify that they are in a defined benefit-type plan, widespread misinformation exists.</p> <p>Those who are most dependent on pensions are better</p>

²⁰ Starr and Sunden were employed by the Federal Reserve Board of Governors. The Federal Reserve Board conducts the Survey of Consumer Finances.

²¹ Starr and Sunden (1999) admit that in their study, the assumptions employed in matching 1989 SCF data to employer records give the respondent the benefit of the doubt, which may cause some upward bias in respondent accuracy.

²² One might expect that as defined contribution plans gained in popularity, individuals would become more accurate in their responses. However, Dushi and Honig (2008) find that 2004 Health and Retirement Study (HRS) respondents were no more accurate in correctly reporting whether they contribute to a defined contribution plan than the original 1992 cohort was. These authors note that both cohorts had a tendency to overstate their contributions. Over 20 percent of both cohorts reported they contributed to a defined contribution plan but did not according to their W-2 reports.

	<p>informed; 93 percent of those whose pension wealth represents 60 percent or more of their total wealth can correctly identify their plan type.</p> <p>Women are 7 percent less likely to correctly identify their plan type, as are older respondents. However, women are more likely to say they don't know and older individuals are less likely to do so.</p> <p>More than 40 percent of respondents do not know what their pension is worth.</p>
<p><i>Gustman, Steinmeier and Tabatabai (2010)</i></p> <p>1983 Survey of Consumer Finances, 1992 through 2004 Health and Retirement Studies, employer and consulting firm data</p>	<p>A significant portion (over one-third) of workers do not know the type of retirement plan in which they participate.</p> <p>The lack of plan knowledge has persisted over time (see Table 3) and extends to workers approaching retirement.</p>
<p><i>Dushi and Iams (2010)</i></p> <p>Comparison of 1998 and 2006 Survey of Census Bureau's Survey of Income and Program Participation (SIPP) data to W-2 wage reports</p>	<p>While 40 percent of 1998 and 39 percent of 2006 respondents said they contributed to a defined contribution retirement plan, 46 percent actually did so.</p> <p>The gap between actual (49 percent) and reported (37 percent) participation was even wider in the public sector.</p>
<p><i>Clark, Morrill and Allen (2012)</i></p> <p>Survey of 1,500 workers nearing retirement from three large companies (average age of 56.5)</p>	<p>Fifty-six percent did not know their expected pension income as a percentage of their salary.</p> <p>Only 36 percent knew the earliest age they could receive their pension.</p> <p>Only 16.2 percent knew the reduction if retirement benefits were taken at an early age.</p>

Table 3. Summary of respondent and firm reports over time²³

	1983	1992	2004
1. DB only: employer data	88	48	25
2. DC only: employer data	8	21	26
3. Both: employer data	3	31	49
4. DK	16	2	3
5. Frequency of DB only	Understated by 18 percentage points in respondent report, after	Understated by 1 percentage point in respondent report, after	Overstated by 16 percentage points in respondent report, after

²³ Lines 1 through 3 show the frequency of plan type reported in employer data. Line 4 represents the fraction of employees who do not know their plan type.

	1983	1992	2004
	excluding DKs	excluding DKs	excluding DKs
6. Frequency of DC only	Overstated by .4 percentage points in respondent report, after excluding DKs	Overstated by 3 percentage points in respondent data, after excluding DKs	Overstated by 7 percentage points in respondent data, after excluding DKs
7. Frequency of both	Overstated by 17 percentage points in respondent report, after excluding DKs	Understated by 2 percentage points in respondent data, after excluding DKs	Understated by 23 percentage points in respondent data, after excluding DKs
8. Share on diagonal: employer and respondent agree	60 percentage points on diagonal (despite high DK)	49 percentage points on diagonal	45 percentage points on diagonal
9. Conditional on firm reporting DB only, respondent reporting DC only	4	15	20
10. Conditional on firm reporting DB only, respondent reporting both	17	27	27
11. Conditional on firm reporting DC only, respondent reporting DB only	29	26	14
12. Conditional on firm reporting DC only, respondent reporting both only	10	18	14
13. Conditional on firm reporting both, respondent reporting DB only	35	45	48
14. Conditional on firm reporting both, respondent reporting DC only	10	18	19

Note. From *Pensions in the Health and Retirement Study*, by A.L. Gustman, T.L. Steinmeier, & N. Tabatabai, 2010, Cambridge, MA: Harvard University Press. Reprinted with permission.

Much of the research reported above was driven by researchers' desire to better understand (and improve) the reliability of the large data sets available for study. What they find about individuals' knowledge level of their own retirement benefits is telling. Many workers don't know the type of plan they're in or whether they are contributing to it. This offers an important backdrop for the exploration of workers' retirement decision-making journeys covered herein.

Employee Plan-Type Preferences

There are few opportunities to empirically analyze workers' preferences for one type of retirement plan over another. Once hired, a relatively small percentage of employees have the opportunity to choose between a defined benefit plan and a defined contribution plan. When they

do, it most often occurs within the public sector, as is evidenced by the extent of available research reviewed here. All except one of the papers examine employee plan-type preferences within the public sector. Specifically, most focus on faculty from state-funded university systems where it is more common for members to be given the option of choosing their pension plan upon hiring.²⁴

In this section, we report on five academic studies of employees' actual decision-making.²⁵ Two of the studies analyze choices of newly hired employees, and three others focus on the decisions of employees who have been given a one-time opportunity to switch from their existing defined benefit plan. As can be seen from Table 4 below, Brown and Weisbenner (2007) and Clark, Ghent and McDermid (2006) study the decisions of new employees, whereas Benartzi and Thaler (2007), Yang (2005) and Papke (2004) study the decisions of participants given the opportunity to switch from a traditional defined benefit plan to a defined contribution plan. Major findings are highlighted below.

- The mixed results of these studies suggest the importance of context in decision-making outcomes. For example, we see significant evidence of passive choices in Brown and Weisbenner (2007), Benartzi and Thaler (2007), Yang (2005) and Papke (2004), but in Clark et al. (2006) over 80 percent actively choose their plan type.
- Authors suggest that a nontrivial portion of employees make suboptimal choices regardless of whether the choice was actively or passively made (Brown & Weisbenner, 2007; Benartzi & Thaler, 2007; Yang, 2005). Brown and Weisbenner (2007) find that higher-income, more educated employees actively choose to participate in a defined contribution plan even though the authors' analysis showed the portable defined benefit plan to be a superior option. Benartzi and Thaler (2007) find that lower-tenured employees passively accept their continued participation in the defined benefit plan offered, even though the likelihood of breaking even (as compared to participating in the newly offered defined contribution plan) is 13 percent.
- Benartzi and Thaler (2007) partially attribute suboptimal choices to inertia, citing that while only 10 percent expected to be defaulted into the defined benefit plan (based on advanced survey results), 63 percent of employees actually were.
- Brown and Weisbenner (2007) and Yang (2005) suggest that the way information was framed impacted employee choices.
- Peer effects are also implicated as contributors to suboptimal choices (Brown & Weisbenner, 2007; Clark et al., 2006).

²⁴ According to a 2007 American Association of University Professors survey, 97 percent of the public colleges and universities responding offer faculty the option to choose their pension plan, whereas just 3 percent of private schools do (Conley, 2007).

²⁵ In a 2009 report by consultant Mark Olleman on the decisions by new hires in seven public systems, he finds that between 39 and 90 percent are defaulted into defined benefit plans. Between 13 and 43 percent actively choose their defined benefit option, and between 3 and 26 percent actively choose their defined contribution option (Olleman, 2009). (This is intentionally excluded from Table 3 above.)

- Employees' choices are also thought to be influenced by favorable recent market performance, which is associated with a greater preference for defined contribution plans (Brown & Weisbenner, 2007; Benartzi & Thaler, 2007), but this does not appear to be the case in Clark et al. (2006).
- Analyzing choices by various demographic variables, researchers show that high earners tend to prefer defined contribution plans, women are more likely than men to take action (Brown & Weisbenner, 2007; Yang, 2005; Papke, 2004), older employees are more likely to choose defined benefit plans (Brown & Weisbenner, 2007; Clark et al., 2006; Yang, 2005), and whites are more likely to choose defined contribution plans (Clark et al., 2006; Yang, 2005).

Survey work related to plan-type preferences is also included in Table 3 and briefly summarized below.

Table 4. Summary of plan choice research

Author and Study	Default Option	Key Findings
Studies Using Actual Behavioral Data		
<p><i>Brown and Weisbenner (2007)</i></p> <p>This study covers decisions of 45,000 state university employees, including campus administrators, university police, etc., hired between 1999 and 2004. Data are extracted from the State University Retirement System (SURS) of Illinois.</p> <p>Within six months of employment, employees have a one-time, irrevocable choice between a traditional DB plan, a portable DB plan or an entirely self-managed DC plan.</p> <p>Subjects are not covered by Social Security.</p>	<p>Defined benefit plan</p>	<p>56 percent were defaulted into the traditional DB plan</p> <p>18.9 percent chose the portable DB plan</p> <p>15.3 percent chose the DC plan</p> <p>10 percent actively chose the traditional DB plan</p>
<p><i>Benartzi and Thaler (2007)</i></p> <p>Researchers study the behaviors of (undisclosed) public-sector employees who, in the latter half of 2002, are given the opportunity to select either a new defined contribution plan (with a vesting period of one year) or a hybrid plan as an alternative to remaining in the defined benefit plan, which had a six-year vesting schedule. Results presented at right are as of early February 2003.</p>	<p>Defined benefit plan</p>	<p>63 percent defaulted into the DB plan</p> <p>7 percent of employees with less than two years of tenure switched to the DC plan</p>
<p><i>Clark et al. (2006)</i></p> <p>This study examines retirement plan choices of 7,035 new tenure-track employees hired between 1983 and 2001 into the University of North Carolina school system, across 15 campuses.</p>	<p>Defined benefit plan</p>	<p>83.8 percent chose the DC plan and 16.2 percent chose the DB plan</p> <p>Authors do not indicate portion that made active versus passive decision</p>

Author and Study	Default Option	Key Findings
<p>Within 30 days after being hired or 30 days after becoming an instructor, employees must choose between a defined benefit and a defined contribution plan, and employees who do not make an active choice are automatically enrolled in the DB plan. Employees who enrolled in a DC plan could switch to another DC plan, but the DB or DC choice was irrevocable.</p> <p>Employees are covered by Social Security.</p>		<p>Older, female and nonwhites were more likely to choose the DB plan</p>
<p>Yang (2005)</p> <p>This paper analyzes the choices made by 3,535 employees at a nonprofit firm who were given the one-time opportunity (between March and June 2000) to switch from their current DB plan into a new DC plan.</p>	<p>No switch to DC (remain in DB)</p>	<p>Half of employees switched to DC</p> <p>The other half remained in DB, but 6 percent made an active choice (to remain in the plan)</p> <p>More likely to choose DC: female, white, higher-income, nonunionized, familiar with previous DC plan</p>
<p>Papke (2004)</p> <p>Papke analyzes the choice to remain in a DB plan or transfer vested balance to DC plan made by 13,170 Michigan state correctional workers when a one-time, irrevocable offer between Jan. 2, 1998, through April 30, 1998, to transfer vested DB balance to a DC plan was made.</p> <p>In 1997, Michigan closed its DB pension plan to new state employees. Employees hired in and after 1997 were defaulted into DC plan.</p> <p>Employees are covered by Social Security.</p>	<p>No transfer to DC (remain in DB)</p>	<p>Only 1.6 percent of eligible employees made the switch from DB to DC</p>
<p>Studies Using Survey Data</p>		
<p>DeArmond and Goldhaber (2010)</p> <p>During spring 2006, 3,080 full-time Washington state teachers responded to a survey to assess their plan knowledge and to find out whether they would hypothetically prefer an additional 10 percent of salary in a DB or DC plan:</p> <ul style="list-style-type: none"> • 68 percent of respondents reported being in a hybrid plan • 27 percent reported being in a traditional DB plan • 4 percent were unsure <p>Teachers hired after 1996 have been automatically enrolled in a hybrid DB/DC plan.</p>	<p>Not applicable</p>	<p>49 percent prefer DC</p> <p>26 percent prefer DB</p> <p>26 percent unsure</p>

Author and Study	Default Option	Key Findings
<p>Respondents are covered by Social Security.</p>		
<p><i>Mathew Greenwald & Associates Inc. (2004)</i></p> <p>Reported results are based on mail surveys received in early 2003 from 790 workers primarily between the ages of 25 and 74.</p>	<p>Not applicable</p>	<p>Sixty-two percent of working DC plan participants prefer DC plans; only 19 percent of this group prefers DB plans</p> <p>Fifty-one percent of workers in defined benefit plans prefer this plan type; 30 percent of this group prefers defined contribution plans. The author notes that this finding is strongly influenced by government employees.</p>
<p><i>Dulebohn, Murray and Sun (2000)</i></p> <p>This research is based on a field survey of 2,410 employees who participate in the state-sponsored retirement (defined benefit) system, from 60 different employers, to identify determinants of plan choice as well as employee attitudes and preferences for various plan features.</p>	<p>Not applicable</p>	<p>41 percent preferred the hypothetical DB plan</p> <p>44 percent preferred the hypothetical hybrid plan</p> <p>16 percent preferred the hypothetical DC plan</p>
<p><i>Clark, Harper and Pitts (1997)</i></p> <p>Study is based on 1995 survey data (from 580 North Carolina State faculty hired between 1971 and 1994) designed to learn more about employees' plan choice decision making, the determinants of their choices and plan knowledge.</p>	<p>Not applicable</p>	<p>29 percent didn't give much thought to their plan selection</p> <p>30 percent of respondents said they hadn't consulted anyone when making their decision</p> <p>Over 40 percent didn't realize the DB/DC choice was irrevocable</p>

Brown and Weisbenner (2007) note that a growing portion of the population is defaulted into the defined benefit plan (from 42 percent in 1999 to 60 percent in 2004). Further, younger, lower-wage males with lower job attachment are more likely to accept the default. Unfortunately, it is difficult to know whether these individuals actively decided to do nothing because they knew they would be defaulted into their preferred plan type (the defined benefit plan). The authors find that higher earners who are more educated are more likely to actively choose the defined contribution even though the authors' analysis suggests the defined contribution plan is suboptimal to the portable defined benefit plan option. They suggest employees' choices were influenced by the way the plan options were framed in the informational materials provided to employees.²⁶ They also find evidence of the influence of peers and recent market performance.

²⁶ The authors also offer that employees may have been concerned about the political risk associated with state's pension underfunding, they may be overconfident about future market returns and their ability to manage their assets, or they may simply place a high value on being able to manage their own investments (Brown & Weisbenner, 2007).

More specifically, an employee choosing a plan type in 2003 (after a significant market decline) was 11 percentage points less likely to choose the self-managed defined contribution plan than was a new employee in 1999. Finally, higher earners who are older, married and female working in community colleges are more likely to actively choose the traditional defined benefit plan (Brown & Weisbenner, 2007).

Benartzi and Thaler's (2007) analyses showed that under most scenarios, the defined benefit plan was a suboptimal choice for younger, lower-tenured employees. In fact, they estimate the likelihood of breaking even (the defined benefit plan benefit equals the defined contribution plan benefit) at just 13 percent. The plan actuary estimated that a 31-year-old with one year of tenure has a 10 percent chance of continuing his career (to age 62) with the same employer. However, they find that just 7 percent of employees with less than two years of tenure switched to the defined contribution plan. Further, less than half the participants who planned to switch to the defined contribution plan actually did.

There are two striking findings in the work of Clark et al. (2006). First is the decline in the preference for the defined benefit plan and second is the dramatic difference in the preferences of white and blacks. The authors note that in 1983, the first year studied, 18.2 percent of whites and 60.6 percent of blacks selected the defined benefit plan, whereas in 2001, the comparable percentages are 9.3 and 32.8. Their regression model estimates that gender, race, age, rank and classification have significance in predicting plan type preferences of new hires. Women, blacks, those who are older, those who are not full or tenured professors, and those who do not have doctorates are more likely to choose the defined benefit plan. The authors suggest that choices of newly hired blacks may be influenced by peer effects.

The work by Yang (2005) and Papke (2004) studies the decisions by employees who are given the one-time opportunity to switch or transfer vested defined benefits to a defined contribution plan. The employees in Yang's nonprofit firm were much more likely to switch. Each employee was provided with projected annual benefits in retirement under each plan, assuming varying levels of tenure. The authors find that people in situations where it was relatively easy for the defined contribution benefit to "catch up" to the defined benefit were more likely to switch. Interestingly, they also find that if an employee's projected benefit at age 65 from the defined contribution plan exceeded that from the defined benefit plan, he was less likely to switch, causing the author to believe that perhaps employees did not pay much attention to projected benefits. In addition, Yang finds the following attributes are associated with a switch to the defined contribution plan: higher earnings, younger, female, lower tenured, white and nonunion.

Papke (2004) focuses on the impact of vesting and tenure in her study, noting that age and salary are perhaps of lesser importance in the decision to switch from the defined benefit plan to the defined contribution plan. She finds that the biggest demand for the defined contribution plan comes from workers eligible to retire in their 50s and suggests that having a balance to transfer to the defined contribution plan is positively correlated with a switch.

The remaining research presented in Table 3 above is based on survey work. When asked about their preferences, DeArmond and Goldhaber (2010) find that more teachers preferred an additional 10 percent of salary contributed to a defined contribution plan instead of a defined

benefit plan. Lesser-experienced employees as well as those who reported participating in a hybrid plan or not knowing their plan type were more likely to report this preference. The authors note that the market's favorable performance in the spring of 2006 may have been a factor in respondents' preferences. However, as would be expected, low discounters preferred the additional contribution to a defined benefit plan. With respect to the respondent group's plan knowledge, a high percentage of them in the traditional defined benefit plans could correctly describe their plan, but less than half of those in the hybrid plan could.

Similar to Benartzi and Thaler (1999), who found that 58 percent of faculty spent less than an hour deciding how much to contribute to their retirement plan and how to invest their contributions, Clark, Harper and Pitts (1997) found that 29 percent of respondents "did not give much consideration to the choice of my primary retirement plan" and only 22 percent said that they put a great deal of thought into their decision. In addition, nearly 30 percent of respondents didn't consult with anyone when selecting a plan. They also found that more than 40 percent were unaware their decision was irrevocable.

In summary, we see that a significant portion of individuals don't put much thought into their retirement plan choice and simply accept the default, not realizing the choice is irrevocable. Passive as well as active choices frequently appear to be suboptimal, and behaviorists attribute these suboptimal choices to anomalies that reappear throughout employees' retirement planning cycle.

Retirement Decisions During the Working Years

Nearly 70 percent of all employees work for entities that provide retirement benefits, a statistic that masks wide variation between the percentage of private-industry employees who have access (65 percent) and the percentage of state and local government workers who do (89 percent) (U.S. Department of Labor, 2012).²⁷ Over the last 30 years, and in particular since subsection IRS 401(k) of the Internal Revenue Code became effective, defined contribution retirement plan benefits have become much more prevalent, and are available to 55 percent of civilian workers (59 percent in private industry and 31 percent in state and local governments) as of March 2012. Over the same period, defined benefit plans have become less common, particularly in private industry, and are now only accessible to 29 percent of workers (19 percent in private industry and 83 percent in state and local governments) (U.S. Department of Labor 2012). By comparison, in 1975, 70.8 percent of private-industry active workers were covered by defined benefit plans (U.S. Department of Labor, Employee Benefit Security Administration, 2013).

The retirement planning decisions employees face within these two types of retirement benefit programs are vastly different, particularly during the working years, or what is often referred to as the accumulation phase. Employees covered by defined benefit plans make relatively few decisions and shoulder little responsibility for funding their retirements. The employer is (generally) fully responsible and bears all risk of funding and investing assets of the plan from

²⁷ A number of other disparities are noted. For example, access varies by firm size, as well as the position, union membership, employment status (full or part time) and income level of the employee (U.S. Department of Labor, 2012).

which retirement benefits will be paid. The primary risks employees face in this environment include the risk of future benefit reductions (either through plan design changes or employer insolvency) and involuntary separation prior to normal retirement age.

Within the majority of defined contribution plans, employees and employers have markedly different roles. Employees are fully responsible for funding their retirement years and bear all related risks. Employers, often with assistance from advisers and consultants, are “choice architects”²⁸ responsible for developing plan decision-making contexts that so significantly impact employees’ retirement outcomes, as more fully discussed below. Employers decide the action required for employees to participate in the plan. They select the investment choice set from which employees may pick their retirement funds. They determine what steps are required for employees to develop and manage well-diversified portfolios. And, they decide whether employees will have preretirement access to their retirement assets via loans and/or hardship withdrawals. Finally, employers determine what payout options are available. Employees’ retirement choices are executed within these employer-defined constraints, and the increased prevalence of defined contribution plans as the sole workplace retirement benefit increases the need for optimal decision-making.

In this section, the potential decisions employees face within employer-sponsored retirement plans are discussed. These include participation, contribution, investment and withdrawal choices, virtually all of which are relevant for many types of retirement plans—most notably salary-deferral-type plans such as 401(k) and 403(b) plans. Differences between plan-type contexts are noted. Observed behaviors and, where available, individual characteristics of decision-makers are covered. Behavioral anomalies are highlighted, as are explanations posited by researchers.

The Participation Decision

Across the board, the U.S. Department of Labor reports that approximately 54 percent of civilian workers participate in workplace retirement benefit programs, for an overall blended “take-up rate” of 79 percent. Take-up rates in private industry and state and local government are 75 and 95 percent, respectively (U.S. Department of Labor, 2012).

Other data show lower rates of access and participation (Copeland, 2012; Purcell, 2009a).²⁹ For example, Copeland (2012) analyzes March 2011 Current Population Survey (CPS) data and reports statistics for three main groups of employees: all workers, which includes unincorporated, self-employed individuals; “wage and salary” workers between the ages of 21 and 64; and “full-time, full-year” employees of the same age.³⁰ Table 5 below reports these findings.

²⁸ A “choice architect,” as defined by Thaler and Sunstein (2008), is one with “the responsibility for organizing the context in which people make decisions.” They further note the parallels between a traditional architect and a choice architect to make the point that a neutral design does not exist.

²⁹ For a discussion of pension coverage using different data sets, see “Estimating Pension Coverage Using Different Data Sets” by G. Sanzenbacher (2006).

³⁰ CPS data comprise survey results from a representative sample of 97,000 households, collected annually by the Census Bureau. Each March, two questions related to workplace retirement benefits are included in survey. Both Copeland (2012, pp. 7

Table 5. Various work forces working for an employer that sponsored a retirement plan and the percentage of workers participating in a plan, 2011

	All Workers	Wage and Salary Workers Ages 21–64	Private Sector Wage and Salary Workers Ages 21–64	Public Sector Wage and Salary Workers Ages 21–64	Full-Time, Full-Year Wage and Salary Workers Ages 21–64
(millions)					
Worker Category Total	153.7	128.6	108.3	20.4	91.0
Works for an employer sponsoring a plan	75.2	69.3	52.8	16.5	55.4
Participating in a plan	61.0	57.4	42.5	14.9	48.8
(percentage)					
Worker Category Total	100.0	100.0	100.0	100.0	100.0
Works for an employer sponsoring a plan	48.9	53.9	48.8	81.1	60.8
Participating in a plan	39.7	44.6	39.2	73.2	53.7

Source: Employee Benefit Research Institute estimates from the 2012 March Current Population Survey

Note. From, “Employment-Based Retirement Plan Participation: Geographic Differences and Trends, 2011,” by C. Copeland, 2012, EBRI Issue Brief 378. Employee Benefit Research Institute.

In contrast to U.S. Department of Labor data that include information about plan type as well as other employer-level information, the CPS data do not include this information but instead provide more information about the individuals surveyed, enabling researchers to identify differences in coverage among various demographic segments (Copeland, 2012). In his analysis of the March 2012 data, Copeland finds that older, married or divorced, white, more educated (schooled), male, full-time workers in better health with higher incomes and employer-sponsored health insurance are more likely to participate in an employer-sponsored retirement plan. In the population of all workers, men are more likely to participate, but full-time women who worked a full year were more likely to participate than their male counterparts.

and 8) and Purcell (2009a, pp. 13-15) address the difference between U.S. Department of Labor data (which are from employer survey responses) and CPS data. For trend information, see pp. 27-29 of Copeland (2012).

Participation rates vary by plan type as indicated in Table 6 below, potentially attributable to the opposing manner in which employees come to be participants in plans. Historically, a significant difference between the decision-making contexts of defined benefit and defined contribution plans related to the action required to participate. Generally, this difference persists, but to a lesser extent than it did in the past when eligible workers automatically became participants in an entity-sponsored defined benefit plan and only became participants in a defined contribution plan if they had actively enrolled in the plan. Now, over 40 percent of companies automatically enroll participants in defined contribution plans (Plan Sponsor Council of America [PSCA], 2011), a context change discussed below that has important implications for defined contribution plan take-up rates.

Table 6. Plan participation (take-up) rates by employment sector and type of plan

	Defined Benefit	Defined Contribution	Total
All Civilians	26% (91%)	37% (68%)	54% (79%)
Private Industry	17% (89%)	41% (70%)	48% (75%)
State and Local Government	78 % (94%)	15% (48%)	84%(95%)

U.S. Department of Labor (2012)

Note: Participation percentages represent percentage of workforce indicated participating in plan type and not percentage of eligible employees.

Note: From “National Compensation Survey,” 2012. United States Department of Labor.

In the private sector, eligible workers generally still become automatic participants in company-sponsored defined benefit plans, but in the public sector, some states offer alternatives to a primary defined benefit plan, and employees may *choose* their preferred plan.³¹ See “Plan Type Preferences” for a discussion of selected research on employee choices in this context.

Within private-industry defined contribution plans, a significant, but declining, portion of participants must take affirmative action to participate as noted above.³² Participation must often be effected via the web or an automated phone line, but some firms permit the use of representative-assisted enrollment or paper forms. Within the public sector, defined contribution plans tend to be supplemental plans due to the high prevalence of defined benefit plans (Wiatrowski, 2009).³³ Participation is typically voluntary and similar to their private-industry counterparts, workers must sign up to participate. However, in plans with employer contributions, participation, including employee contribution, may be required as a condition of employment.

³¹ These states include Colorado, Florida, Indiana, Montana, North Dakota, Ohio, South Carolina, Utah and Washington (Snell, 2012).

³² Participation is automatic (i.e., no employee action is required) in some types of defined contribution plans such as money-purchase plans, profit-sharing plans and certain stock plans. In addition, no affirmative action is required to participate in some savings and thrift plans such as automatic enrollment 401(k) plans. Approximately 19 percent of private-industry workers participating in defined contribution plans (which in this case do not include 401(k) and other salary-deferral plans, which are classified as savings and thrift plans in U.S. Department of Labor data) are participants in money-purchase plans, which are fully funded by employer contributions (U.S. Department of Labor, 2010). Twenty-one percent of private-industry workers in savings and thrift plans are in plans with an automatic enrollment feature (U.S. Department of Labor, 2010).

³³ Wiatrowski (2009) notes that only 5 percent of public-sector employees participate exclusively in a defined contribution plan.

The decline in the provision of retirement benefits that provide lifelong monthly income to private-industry employees intensifies the importance of planning for retirement-income needs. For many, participating in an employer's defined contribution retirement plan is the most convenient way to begin making those preparations, and researchers are keen to assess who is doing so, and what influences their decision-making. In the remainder of this section, the individual characteristics of who participates in workplace retirement plans are reported. After discussion of the extent to which employees are contributing to workplace retirement programs, plan features, social norms and other behavioral factors that impact the retirement plan participation and contribution decisions are covered.

In their efforts to identify the individual characteristics of who is choosing to participate in private-industry defined contribution plans, researchers have analyzed a variety of data sources including CPS data (Andrews, 1992; Bassett, Fleming, & Rodrigues, 1998; Even & Macpherson, 2005), Health and Retirement Study (HRS) data (Papke, 2003a and 2003b), SCF data (Munnell, Sunden, & Taylor, 2001/2002; Munnell et al., 2009), Survey of Income Program Participation (SIPP) data (Smith, Johnson, & Muller, 2004), plan-specific records (Clark & Schieber, 1998; Kusko, Poterba, & Wilcox, 1998; Agnew, 2006a; Huberman, Iyengar & Jiang, 2007) and other, smaller-scale survey results (Bernheim & Garrett, 2003).

Where these demographic variables have been observed and measured, the researchers have found positive associations between age, income and tenure, and the probability of participating. Kusko, Poterba and Wilcox (1998) find age is more important at lower-income levels, and Smith, Johnson and Muller (2004) find that increases with earnings disappear at higher-income levels and that increases with age occur up to about age 55.

Other positively related factors include education and home ownership (Andrews, 1992; Bassett, Fleming & Rodrigues, 1998; Papke, 2003a; Smith, Johnson & Muller, 2004), although Munnell, Sunden & Taylor (2001/2002) and Bernheim & Garrett (2003) find no significant effect from education. Gender effects are not clear. When gender effects are found, women are 4 (Agnew 2006a) to 6.5 (Huberman, Iyengar & Jiang, 2007) percent more likely than men to participate.³⁴ However, some researchers find no significant relationship between gender and participation (Bernheim & Garrett, 2003; Smith, Johnson & Muller, 2004).

While Munnell, Sunden and Taylor (2001/2002) find a positive relationship between net worth and participation, Papke (2003a) finds no significant relationship between the two. Having a short time horizon (Munnell, Sunden & Taylor, 2001/2002) and being married (Bassett, Fleming & Rodrigues, 1998; Smith, Johnson & Muller, 2004) are each negatively related to participation likelihood. However, in Munnell et al.'s analysis of 2007 SCF data, they find no significant relationship between having a short time horizon (defined as a planning horizon of four years or less) and participation (2009). The authors attribute this change to the increase in automatic enrollment, where more people without a preference for saving become plan participants.

Using longitudinal data, Smith, Johnson and Muller (2004) analyzed the effects of various life changes on plan participation. They find no impact of a change in marital status. Participation rates declined with the number of children under the age of 18, but the probability of

³⁴ Papke (2003a) finds that single females are 5 percent more likely to participate than married males.

participating increased in the year of or the year following the birth of a child. Work-limiting health problems had no impact on one's participation, but spousal health problems corresponded with an increase in the probability of participation. No earnings for a year reduced the probability of participating (potentially due to eligibility requirements). Participation likelihood increased when a spouse changed or returned to work.

Two of the aforementioned studies show that the decision to participate in a 401(k) plan may be a signal of whether the worker considers the employment relationship to be short term. Even and MacPherson (2005) find that for workers with less than three years of tenure, the probability of a job change is 14 percentage points higher for workers who choose not to participate in the 401(k) plan.³⁵ Kusko, Poterba and Wilcox (1998) report similar results. In their research, they find an average first-year participation rate of 50 percent among new hires, but among those who left, the participation rate was a mere 6.5 percent.

The Contribution Decision

The retirement plan contribution decision is most relevant to defined contribution plans, and more specifically salary-deferral plans. Although some defined benefit plans *require* employee contributions (typically public-sector plans), the percentage of one's salary that must be contributed is typically specified.³⁶ This is not the case with most defined contribution plans, particularly in private industry. To participate in salary-deferral plans, the most popular type of defined contribution plan that includes both 401(k) and 403(b) plans, employees must decide *how much* of their paycheck to divert to the plan. It is not an easy decision, especially when one considers all of the inputs that a fully rational decision would require.

Based on SIPP data collected in early 2012, conditional on participation, the average contribution to salary-deferral plans was 6.7 percent, which represents a decline from the 7.4 percent reported in 2009 (Copeland, 2013).³⁷ Approximately 53 percent of respondents contributed 5 percent or less, and nearly 25 percent of respondents contributed between 5 and 10 percent. The remaining 22 percent contributed 10 percent or more (Copeland, 2013).

Similar to the individual characteristics positively associated with plan participation, researchers have generally found that higher contribution rates are associated with increases in age, income and tenure.³⁸ For example, Holden and VanDerhei (2001), who analyze contribution behavior of 1.7 million 401(k) plan participants drawn from the EBRI/Investment Company Institute (ICI) Participant-Directed Retirement Plan Data Collection Project, estimate that contribution rates increase by .06 percentage point for each additional year of age for participants in their mid-40s or younger. For older participants, the increase is estimated at .07 percentage point per additional

³⁵ This compares to an overall probability of job change for workers with less than three years of tenure of 27 percent (Even & Macpherson, 2005).

³⁶ Based on U.S. Department of Labor data, 83 percent of public-sector workers participating in defined benefit plans are required to contribute, on average, 6.6 percent (2012).

³⁷ This finding, based on self-reported data, compares to 7.0 percent and 7.3 percent in 2007, which is based on 2012 Vanguard recordkeeping data for over 1,600 plans and 3 million participants.

³⁸ For example, see Andrews (1992); Xiao (1997); Clark and Schieber (1998); Kusko, Poterba and Wilcox (1998); Holden and VanDerhei (2001); Papke (2003a); K. Smith, Johnson and Muller (2004); and Huberman, Iyengar and Jiang (2007).

year (Holden & VanDerhei, 2001). Smith, Johnson and Muller (2004) estimate that the increases begin after about age 33, and, using 1995 SCF data, Xiao (1997) estimates that the increases occur until about age 45 or 46 before falling. However, Munnell, Sunden and Taylor (2001/2002) estimate there is no significant influence from age.

Holden and VanDerhei (2001) and others also report that higher salaries and increased tenure are associated with higher levels of contributions up to a point. With respect to income levels, it is likely that regulatory and plan limits curtail additional tax-deferred contributions.³⁹ The positive effects of tenure appear to fall after about 18 years on the job (Holden & VanDerhei, 2001).

Certain research has also suggested some gender effects on contribution levels. Huberman, Iyengar and Jiang (2007), Papke (2003a) and VanDerhei and Copeland (2001) find that women contribute more than men, but others find no difference between the two. Munnell, Sunden and Taylor (2001/2002) also find a significant effect associated with having a short planning horizon. They suggest that a planning horizon of less than five years predicts a contribution rate that is 1.2 percentage points lower. The effect of planning horizon in Munnell et al.'s (2009) analysis of SCF 2007 data is minimal and insignificant.

Factors Affecting Participation and Contribution Levels

A review of relevant literature reveals several factors that affect employees' retirement plan decision-making, often in surprising ways, evidencing employees' irrational decision-making tendencies. The steps an employee must take to start contributing to a retirement matter, as do other plan features such as the existence of saving-rate-increase programs, employer matching contributions and loan provisions. Research results also indicate that the nature of the investment menu offered to employees has an effect on participation likelihood. In this section, the role of these plan features as well as social norms and other decision-making heuristics and biases are discussed.

Enrollment-Related Features

Automatic Enrollment

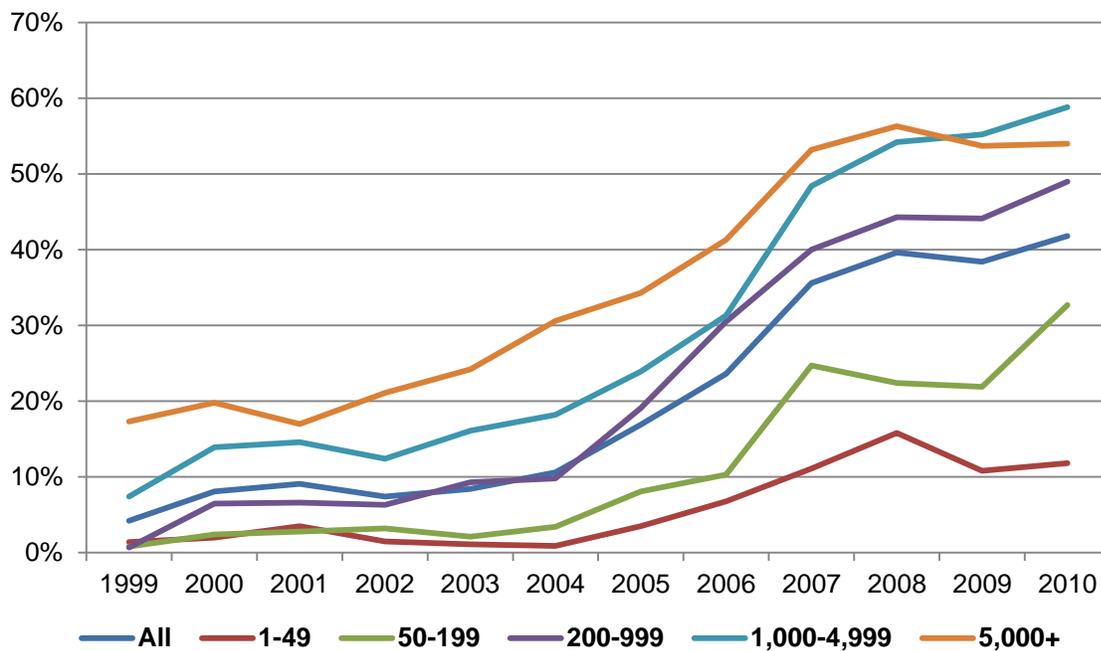
Over the last 30 years, sponsors of defined contribution retirement plans have increasingly "reframed" the participation decision from requiring action to join the plan to requiring action to avoid it.⁴⁰ Plans that require action to avoid joining are automatic enrollment plans. Since no action is required for participant enrollment into the plan, employers must select an initial contribution rate and make an investment choice that will be used for all automatically enrolled participants. These are referred to as default choices. Employees are free to make different choices, but if they do not, they will become plan participants, contributing at the default rate and investing in the default investment selected by the plan sponsor.

³⁹ Further, Holden and VanDerhei (2001) note a nonlinear relationship between income and contribution rates, reporting greater influence from salary increases at higher levels of earnings.

⁴⁰ That automatic enrollment is a reframing of the enrollment decision is set forth by Madrian and Shea (2001a) and Mitchell and Utkus (2004).

The percentage of defined contribution plans with an automatic enrollment feature has dramatically increased over last decade, and as of 2010, about 42 percent of 401(k) plans offer an automatic enrollment feature (PSCA, 2011). (See Figure 2 below.) U.S. Department of Labor National Compensation Survey (2010) data show that approximately 20 percent of private-industry participants in savings and thrift plans have access to an automatic enrollment feature.

Figure 2. Percentage of 401(k) plans with automatic enrollment by plan size (number of participants), 1999–2010

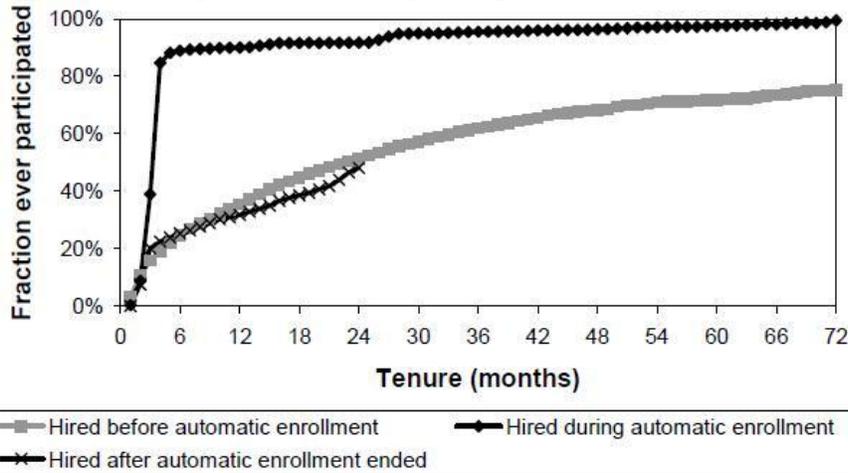


Source: Profit Sharing/401(k) Council of America, Annual Survey of Profit Sharing and 401(k) Plans, Chicago: Profit Sharing/401(k) Council of America, 2000-2011.

The reframing of the participation decision has been unarguably successful in increasing plan participation rates, even at higher default contribution rates. In the figures below, results from automatic enrollment implementations at four companies studied by Choi, Laibson, Madrian and Metrick (2006) are presented. The details of each company’s enrollment process changes are provided below each figure showing average participation rates by tenure for relevant cohorts.

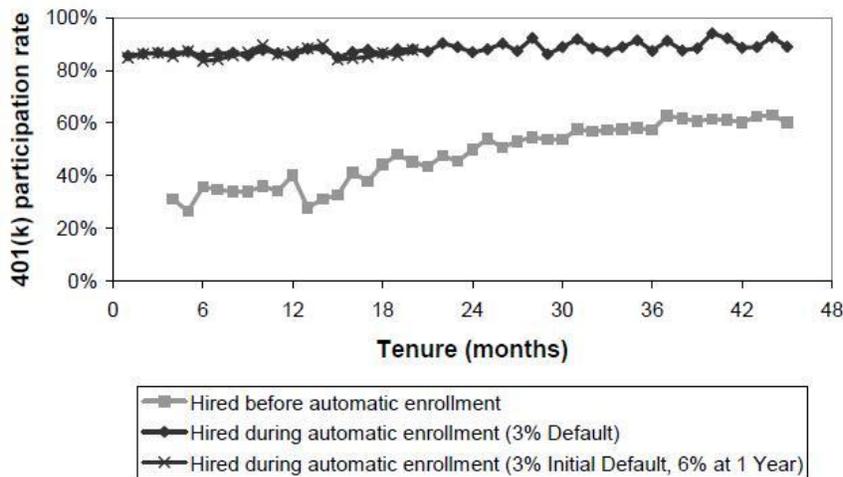
The positive effect of automatic enrollment on participation rates is obvious from these figures. After six months of tenure, participation rates are 50 to 67 percentage points higher under automatic enrollment (Choi et al., 2006). Since the probability of participation increases with tenure when automatic enrollment is not used, the participation rate differential declines over time and at 36 months is 20 to 34 percentage points (Choi et al., 2006). In an environment of increased mobility, these differences in participation rates could easily result in sizable gaps between retirement assets generated under automatic enrollment and the level of assets accumulated under a traditional enrollment model.

Figure 3. Company B: 401(k) participation by tenure



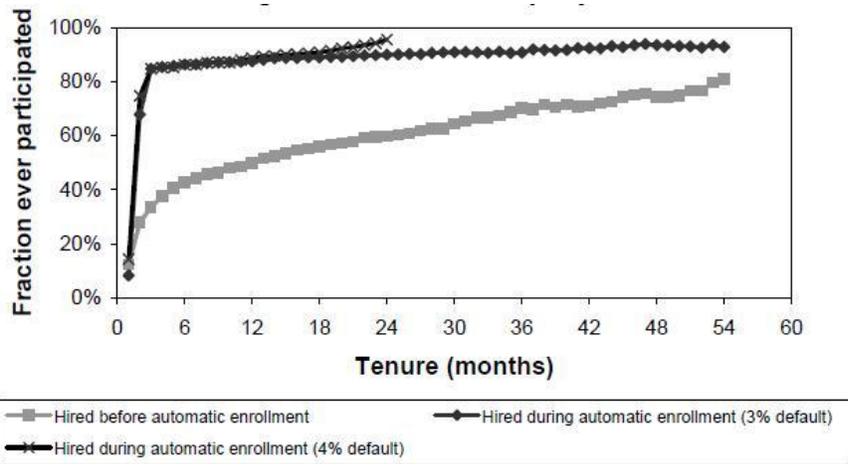
Automatic enrollment (2 percent contribution rate and a stable value fund as the default investment) was implemented at the beginning of 1997 for new employees only and subsequently dropped four years later.

Figure 4. Company C: 401(k) participation by tenure



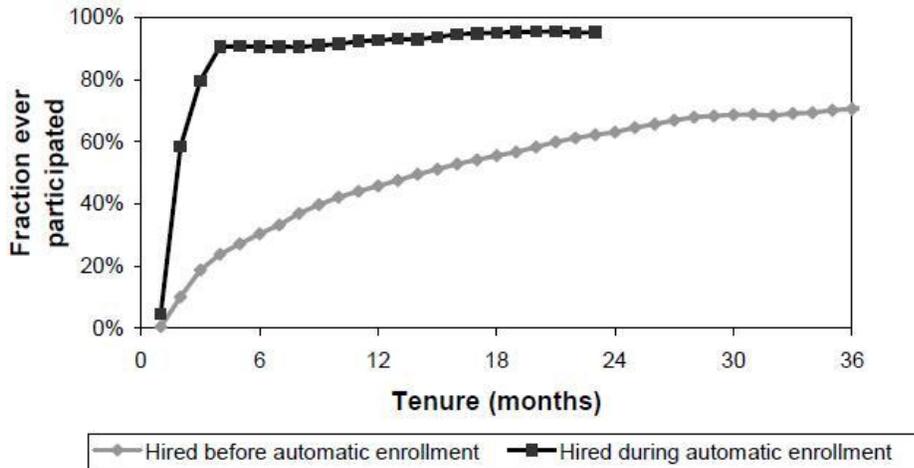
Automatic enrollment (3 percent contribution rate and a money market fund as the default investment) was implemented in April 1998 for new employees only. Three years later, the default investment was prospectively changed to a lifestyle fund. At the same time, contribution rates of participants with one year of tenure who remained at the initial default rate of 3 percent were prospectively increased to 6 percent. Therefore, beginning in May 2001, employees still contributing 3 percent after a year of tenure automatically began contributing 6 percent.

Figure 5. Company D: 401(k) participation by tenure for employees age 40+ at hire



Automatic enrollment (3 percent contribution rate and a stable value fund as the default investment) was implemented at the beginning of 1998 for new employees and, subsequently, automatically enrolled eligible nonparticipants. Three years later, the default contribution rate was increased to 4 percent.

Figure 6. Company H: 401(k) participation by tenure



Automatic enrollment (6 percent contribution rate and a balanced fund as the default investment) was implemented at the beginning of 2001 for new employees only.

Note. Figures 3 through 6 are from "Saving for Retirement on the Path of Least Resistance," by J.J. Choi, D. Laibson, B.C. Madrian, & A. Metrick. In Ed McCaffrey and Joel Slemrod, eds., *Behavioral Public Finance: Toward a New Agenda*. New York, NY: Russell Sage Foundation, 2006: 304-351. © 2006 Russell Sage Foundation. Reprinted with permission.

Automatic enrollment's positive impact on plan participation comes at the expense of lower contribution rates partially as a result of the very behavioral tendency that enables its success— inertia.⁴¹ The researchers find that while automatically enrolled participants have been nudged in a presumably better direction (toward plan participation), many of them are proceeding with lower contribution rates than if they had actively chosen to participate on their own (Madrian & Shea, 2001a). In the 3 percent automatic enrollment they studied at one large company, Madrian and Shea (2001a) note raw and regression-adjusted reductions in average contribution rates of 2.9 and 2.2 percentage points, respectively, that appear across virtually all demographic

⁴¹ Note that the selection of higher default rates could possibly help overcome this situation.

segments. A Vanguard analysis of employees hired between January 1, 2004, and September 30, 2006, in 527 voluntary and 48 automatic enrollment plans showed similar results. Conditional on plan participation, the average contribution rate of employees hired under voluntary enrollment was 6.1 percent, compared to an average of 4.2 percent for automatically enrolled participants (Nessmith, Utkus & Young, 2007). See Table 7 below.

Table 7. Voluntary versus automatic enrollment for new hires

	<i>Hired under voluntary enrollment</i>	<i>Hired under automatic enrollment</i>
Eligible employees	319,002	18,544
Participation rate	45%	86%
Contribution Rates		
Employee average	2.8%	3.6%
Employee median	0.0%	2.6%
<i>Participant</i> average	6.1%	4.2%
<i>Participant</i> median	5.0%	2.9%

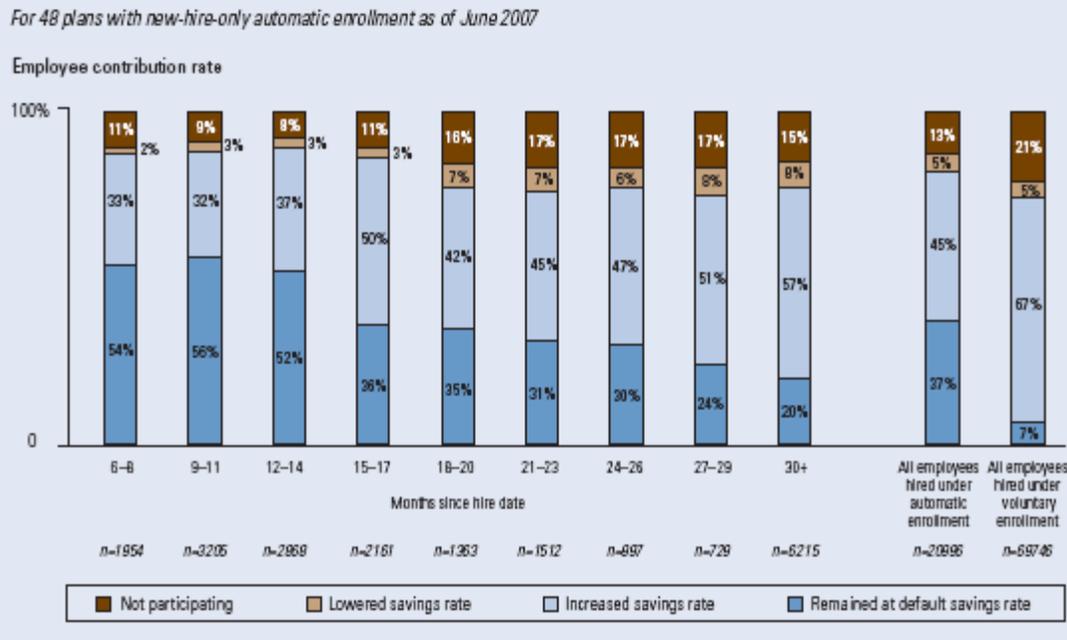
Note: For employees hired between Jan. 1, 2004, and Sep. 30, 2006, as of Dec. 31, 2006

Note. From “Measuring the Effectiveness of Automatic Enrollment,” by W.E. Nessmith, S.P. Utkus, and J.A. Young, 2007, Vanguard Center for Retirement Research.

In addition, the tendency to passively accept the default contribution rates persists over long periods of time for a significant percentage of the automatically enrolled population. Even after three years, between 29 and 48 percent of automatically enrolled participants remain at the default rate and wholly invested in the default fund (Choi et al., 2006).⁴² Income appears as the strongest predictor of moving away from the defaults (Choi, Laibson, Madrian, & Metrick, 2004a). These persistency levels are higher than those found by Nessmith, Utkus and Young (2007), however, as shown in Figure 7 below.

⁴² In a discussion with one of the study’s authors, he relayed that the persistence of the default rate and default investment were about the same.

Figure 7. Automatic enrollment over time



Note. From “Measuring the Effectiveness of Automatic Enrollment,” by W.E. Nessmith, S.P. Utkus, and J.A. Young, 2007, Vanguard Center for Retirement Research.

Nevertheless, the projected benefits of automatic enrollment are significant. Using data from 225 large plan sponsors, VanDerhei (2010) models projected accumulations for various income segments and estimates that automatic enrollment may increase age-65 accumulations from .08 times final earnings to 4.96 or 5.33 times final earnings (depending on contribution rate change assumptions at job change) for the lowest-income quartile worker age 25 to 29, assuming automatic enrollment provisions similar to those used by large plan sponsors in their data set. VanDerhei (2010) projects benefits for those in the highest income quartile as well.

Simplified Enrollment

In a traditional enrollment environment without nudges, employees select from what is often a very wide range of allowable contribution rates and investment options. Although regulatory requirements (and participant liquidity needs) may constrain the upper limit of the permissible range of contribution rates, at first blush the range may appear as wide as zero to 100 percent of compensation. And the menu of investment options in plans has grown over the years; the average number available now stands at 18, a 50 percent increase since 1999 (PSCA, 2011).

Under “simplified enrollment,” employees are offered a preselected contribution rate and investment choice. Researchers have found that this type of enrollment process can result in a 10 to 20 percentage-point increase over participation rates in traditional enrollment model plans (Beshears, Choi, Laibson, & Madrian, 2013). Similar to automatic enrollment, the researchers see participation and default rate persistency. After four years, 90 percent of simplified enrollees are still in the plan (even seasoned employee enrollees), and between 37 and 63 percent remain at the initial default rate (Beshears et al., 2013).

Required Active Decision-Making

Under what researchers call the “required active decision-making” enrollment process, employees must make (and communicate) a decision about plan participation (even if the decision is to forgo enrollment) within a limited, specified, but loosely enforced, time frame. In other words, inertia is thwarted. Researchers implementing this enrollment method found that enrollment rates were 28 percent higher than they were under a traditional model. Further, they note that requiring active participation decisions may be optimal for procrastination-prone workforces with a wide range of optimal savings rates (Carroll, Choi, Laibson, Madrian, & Metrick, 2005).

It is illogical that so many more would decide to save (and exactly the same amount as the default rate) for retirement simply because of these differences in the enrollment process. Researchers posit that automatic enrollment, quick enrollment and required active decisions are effective because they address (if not capitalize on) decision-making tendencies that can, and often do, hinder economically ideal retirement preparation. While two of these tendencies (loss aversion and self-control problems) are discussed in “Automatic Deferral Increase Programs,” here we describe others that are at play: status quo bias, procrastination and framing effects.

In a series of experiments, Samuelson and Zeckhauser (1988) discover an attachment to the status quo (i.e., “status quo bias”) that is particularly strong in cases where there are no strong preferences and when the choice set is large. Certainly, the choice set of most salary-deferral-type plans is huge, and it is easy to imagine that many would have no particular preferences. A status quo bias may stem from procrastination caused by the costs (search or transactional) associated with moving away from the status quo and it may also be caused by the self-control problem discussed below. Researchers (Madrian & Shea, 2001a) suggest procrastination indeed may help explain some of the difference between participation rates in standard, automatic and quick enrollment plans. In the automatic and quick enrollment environments, the participation decision is reduced to a binary one. There is no longer the requirement to think about how much to save or which funds to select.

Automatic enrollment is often referred to as a “reframing” of the participation decision from one that requires action to join to one that requires action to not join (Madrian & Shea, 2001a; Mitchell & Utkus, 2004). The way options are presented shouldn’t affect choices, but there are numerous examples across many domains illustrating that it does. The classic example in behavioral economics demonstrates the effect of framing options in terms of gains or losses. Tversky and Kahneman (1981) show that when a riskless and a risky option are described in loss terms, preferences are reversed from when the options are described in terms of their gains.

While the status quo bias and procrastination may explain the persistency of automatic enrollment default choices, researchers suggest other forces may also be affecting the continued acceptance of plan defaults. McKenzie, Liersh and Finkelstein (2006) suggest employees perceive the default choices (including the default choice of enrollment) as implicit advice. In their lab experiment, they find that when subjects were told they would be automatically enrolled in the company’s retirement plan, they were more likely (than those who weren’t automatically

enrolled) to believe the human resources staff think employees should enroll (80 versus 11 percent).

Madrian and Shea (2001a) further offer that once they have been “endowed” with plan participation, automatically enrolled participants may value their participation much more than they would value discontinuing it. Thaler coined this anomaly stemming from the concept of loss aversion the “endowment effect” (Thaler, 1980).

Automatic Deferral Increase Programs

Automatic deferral increase programs, conceived by Benartzi and Thaler (2004) and coined “SMarT” for “Save More Tomorrow” are another plan design feature that beneficially exploits human (as opposed to fully rational) decision-making tendencies to improve retirement savings rates over time. As it was conceived, employees precommit to increasing savings rates in the future when they receive pay raises.⁴³

In first implementation of the Save More Tomorrow program, 78 percent signed up for the service, and 80 percent continued with it through the fourth pay raise. The average savings rates for SMarT participants increased from 3.5 to 13.6 percent over the 40-month period covered (Benartzi & Thaler, 2004).⁴⁴

Benartzi and Thaler (2004) designed the program with behavioral anomalies in mind. In addition to simplifying the savings decision and taking advantage of procrastination and inertia, both of which have been discussed above, SMarT addresses problems of self-control and loss aversion. It also addresses what is known as “money illusion” by offering employees a way to commit to having better self-control when a pay raise is given, thereby relieving a perceived loss even if the raise is an illusion because it is below what would be necessary to keep pace with inflation (Benartzi & Thaler, 2004).

Referring to McIntosh (1969), Thaler and Shefrin (1981) rationalize their use of a two-self model in their economic theory of self-control, noting that the idea of self-control is paradoxical without it. They suggest a farsighted planning-self and a shortsighted doer-self. The farsighted planning-self would like to save more for a comfortable retirement but the shortsighted doer-self would much rather spend more today. Put differently, individuals are said to have time-inconsistent preferences related to higher levels of impatience in the short term than in the longer term.⁴⁵ SMarT provides a way for the shortsighted doer-self and the farsighted planning-self to exist in harmony. One can spend today and yet at the same time commit to save more in the future.

Because saving generally requires a reduction in current consumption, a sense of loss may be experienced, and behaviorists have discovered that the pain of a loss is about two to two and a

⁴³ Due to administrative limitations, the savings-rate increases are often not synchronized with pay raises.

⁴⁴ An adviser who met individually with most eligible employees conducted the first implementation and this personalized attention may have had an effect. The results of two other implementations, one of which was conducted entirely via mail, had lower participation rates.

⁴⁵ The term “hyperbolic discounting” is also used to describe time-inconsistent preferences, or present-based biases. For additional information, see Frederick, Loewenstein and O’Donoghue (2002).

half times the pleasure of a gain (Tversky & Kahneman, 1992; Kahneman, Knetsch, & Thaler, 1990). Because savings-rate increases occur when a pay raise is received, SMarT participants avoid a sense of loss. And finally, SMarT takes advantage of the “money illusion” in the event that a raise is nominal rather than real. (“Money illusion” occurs because people tend to think in nominal rather than real terms [Fisher, 1928.]

Employer Matching Contributions

Approximately 89 percent of private-sector 401(k) plans with more than 100 participants offer employer matching contributions (Soto & Butrica, 2009). Since employer matching contributions provide additional economic incentive for employees to contribute to the plan, the widely accepted rationale for the provision of matching contributions is their ability to encourage employee participation and motivate higher contribution levels. But do they? Although most researchers have found that the existence of an employer matching contribution increases plan participation, the effect on employee contribution rates is more ambiguous, as shown in Table 8 below. At least some of the varying results are believed to stem from incomplete data sets.⁴⁶

Table 8. Research on employer matching contributions

Study and Data Description	Effect on Participation	Effect on Employee Contributions
Studies Using Actual Behavioral Data		
<i>Kusko, Poterba and Wilcox (1998)</i> Plan records from 1988 through 1991 for 12,000 employees from one manufacturing firm	Minimal, except that when match rate increased from 63 percent to 150 percent, 63 percent of prior nonparticipants joined	Minimally positive
<i>Clark and Schieber (1998)</i> 1994 participant and plan data from 19 firms (all plans offered employer matching contributions)	Positive effect from higher match rates	Positive effect from higher match rates (model estimated 50 to 75 percent match raises contribution level by .8 percentage point, compared to 25 percent match, and 100 percent match raises contribution levels by 2 percentage points higher than 25 percent match)
<i>VanDerhei and Copeland (2001)</i> Demographic and contribution behavior for over 160,000 participants between the ages of 21 and 64, with \$10,000 in earnings and a contribution in 1998	Positive	Negative for match rate and total potential match Match threshold a significant factor

⁴⁶ For a brief overview, see Engelhardt and Kumar (2003).

Study and Data Description	Effect on Participation	Effect on Employee Contributions
<i>Holden and VanDerhei (2001)</i> Demographic and contribution behavior from 1999 for approximately 1 million participants	Not evaluated	Minimally negative effect from increased match rate Positive effect from increased match threshold
<i>Choi, Laibson, Madrian and Metrick (2002)</i> Participant and plan data from 1998 to 2000 for two plans (one with approximately 10,000 employees and the other with 40,000)	Positive (versus no match) No effect from increase in match threshold	Positive related to threshold Positive related to increase from zero to 25 percent match
<i>Mitchell, Utkus and Yang (2007)</i> Participant and plan data from 2001 for approximately 500 plans covering nearly 750,000 participants	Minimally positive (estimate that an additional 10 percent would participate in presence of match as compared to no match), particularly for nonhighly compensated employees See Table 9 below.	Positive As match rates increase (particularly on the first 3 percent of pay), effect becomes negative See Table 9 below.
<i>Huberman, Iyengar and Jiang (2007)</i> Participant and plan data from 650 plans covering nearly 800,000 eligible employees	Positive, strongest effect on lower-income participants	Positive Middle-income participants contribute less when the match is generous
Studies Using Survey and Other Data		
<i>Andrews (1992)</i> May 1988 CPS data	Positive	Higher match rates are negatively related to contribution levels
<i>Bassett, Fleming and Rodrigues (1998)</i> 1993 CPS data	Estimated participation increase of 10 percentage points in presence of matches <i>Higher</i> matches do not relate to higher participation	No effect
<i>Munnell, Sunden and Taylor</i>		

Study and Data Description	Effect on Participation	Effect on Employee Contributions
<i>(2001/2002)</i> 1998 SCF data	Not evaluated	Positive, presence of match increases predicted contribution rate by .7 percentage point Larger matches have a negative impact
<i>Papke (1995)</i> 1986 and 1987 Form 5500 data	Positive (estimated 17.4 percentage point increase in participation from an increase in match rate from zero to 100 percent)	Positive up to 80 percent, but beyond that, negative effect (lower employee contributions than in plans without matches)
<i>Papke and Poterba (1995)</i> 1986 and 1990 survey data from 43 firms	Positive Positive impact from higher matches (estimated 26 percentage point increase in participation from an increase in match rate from zero to 100 percent)	Weak positive relationship
<i>Even and Macpherson (2005)</i> 1993 pension supplement to CPS data	Positive under multiple models	Not evaluated
<i>Engelhardt and Kumar (2007)</i> 1992 HRS data linked to Social Security and Internal Revenue Service earnings records for 1,042 subjects	Positive A 25 percent match is estimated to increase participation by 5 percentage points	Positive, but inelastic
<i>Xiao 1997</i> 1995 Survey of Consumer Finances		Positive to a point (when match reached \$7,076 in one model and 22 percent in another model) and then negative
<i>U.S. General Accounting Office 1997</i> 1992 SCF data and 1992 Form 5500 research data base	Positive, estimate that matching increases participation by 20 percentage points	Estimate that matches increase contribution levels 10 to 24 percent, depending on match rate

Study and Data Description	Effect on Participation	Effect on Employee Contributions
		Based on regressions, no positive relationship between match rates and predicted contribution rates appears Threshold levels not evaluated
<i>Munnell et al. 2009</i> 2007 SCF data	Positive	Positive for matches up to 50 percent, then negative Threshold levels not evaluated
<i>Dworak-Fisher 2010</i> 2002 and 2003 U.S. Department of Labor microdata exclusively including plans with an employer match (6 percent of plans were automatic enrollment plans)	Little to no effect on participation of lower-income segment Small positive but significant effect on middle-income segment	Not evaluated

Table 9. Forecasted value of non-highly compensated employee participation and saving rates based on match design, with all other independent variables estimated at means

Panel A: Forecasted Participation Rates

Base participation rate (no match, no loan): 63%
Base participation rate (no match, with loan): 64%

Match Rates

Match tier	\$0.25 on the dollar	\$0.50 on the dollar	\$1.00 on the dollar
3%	69%	71%	76%
4%	69%	72%	77%
5%	70%	73%	78%
6%	71%	73%	78%

Panel B: Forecasted Contribution Rates

Base savings rate (no match, no loan): 6.1%
Base savings rate (no match, with loan): 6.7%

Match Rates

Match tier	\$0.25 on the dollar	\$0.50 on the dollar	\$1.00 on the dollar
3%	6.6%	6.5%	6.3%
4%	6.6%	6.5%	6.3%
5%	6.6%	6.5%	6.3%
6%	6.6%	6.5%	6.3%

Mitchell, Utkus and Yang (2007)

Note. From “Turning workers into savers? Incentives, liquidity, and choice in 401(k) plan design,” by O.S. Mitchell, S.P. Utkus, & T. Yang, 2007, *National Tax Journal*, (60), pp. 469-89.

Choi et al. (2002) are able to overcome some of these data limitations in their study of two large companies with changes in employer matching contributions. One company instituted a match and the other increased the match threshold (the upper limit on the percentage of compensation to be matched). In addition to noting an increase in participation when a match was instituted and an increase in contribution rates when the threshold was increased, they found that the match threshold has strong influence on contribution rates. Participant contribution rates “cluster” around the match threshold.⁴⁷ (See “Anchoring” below for further discussion.)

The growing popularity of automatic enrollment gives rise to a new look at the role of employer matching contributions within plans with this feature. Beshears, Choi, Laibson and Madrian (2007) explore this by analyzing participant behavior in one automatic enrollment plan where the matching contribution was dropped. They find that participation rates after six months of tenure were 5 to 6 percentage points lower and that average contribution rates declined by .65 percent of pay. In addition, they aggregate data from a number of automatic enrollment plans with varying matching contributions to estimate that a 1 percentage point reduction in the maximum match available predicts a 1.8 to 3.8 percentage-point reduction in participation levels at six months of eligibility. They conclude that a modestly positive relationship between match generosity and automatic enrollment plan participation rates exists.

Despite evidence that employer matching contributions positively affect participation and contribution rates, we also know that a significant percentage of employees fail to take full advantage of employer matching contributions.⁴⁸ However, we do not have *conclusive* evidence that employees react irrationally to them. While it may seem that employees should take full advantage of the match, liquidity constraints may simply prohibit this. However, in one study, Choi, Laibson and Madrian (2011) find contribution choices that would be difficult to rationalize. In their study, between 20 and 60 percent of match-eligible participants over the age of 59 1/2 (virtually all of who were fully vested) fail to maximize the benefit available from their employer matching contributions.^{49,50} The researchers surveyed a sample of these individuals in an attempt to identify potential explanations for subthreshold contribution rates and conclude that procrastination and low levels of financial knowledge appear to at least partly explain participant contribution decisions.

Investment-Related Features

The ability to select one’s own investments as well as the number and type of investments from which participants choose can also have an impact on participation and contribution rates. PSCA (2011) reports that nearly 98 percent of respondent plans offer participants the ability to choose

⁴⁷ Clustering around match thresholds is observed by others as well. See Benartzi and Thaler (2007), Engelhardt and Kumar (2007), Madrian and Shea (2001a), and Kusko, Poterba and Wilcox (1998).

⁴⁸ For example, Mitchell, Utkus and Yang (2007) estimate that the average workforce misses out on about half of the available company match. Further, Engelhardt and Kumar (2007) estimate that those who contribute leave 1 percent of pay on the table.

⁴⁹ Participants over the age of 59 1/2 are of particular interest because they can theoretically withdraw the employer-matching contributions shortly after they are deposited without penalty. The authors note that for the most part, the participants in their sample were fully vested and conclude vesting is not an issue.

⁵⁰ Lower-income participants were less likely to take full advantage of the match, as were men and singles.

their own investments for their contributions and over 92 percent allow participants to invest employer contributions made on their behalf. Papke (2003b) suggests that self-direction of plan investments is one of the most important determinants of (higher) participation and contribution rates.⁵¹ This is confirmed by Z. Li (2012), who finds that individuals with investment choice in their defined contribution plans contribute over 3 percentage points more than those without choice.⁵² This is disputed by Dworak-Fisher (2010) who finds that “Providing workers with a choice of how to invest their own contributions has a small but significant, negative association with participation.” Dworak-Fisher finds no effect on participation from the ability to direct the investment of employer contributions.

Iyengar, Huberman and Jiang (2004) and Mitchell, Utkus and Yang (2007) find that offering too much choice can have negative consequences. Iyengar, Huberman and Jiang (2004) estimate that the probability of participation drops by 1.5 to 2 percent for every 10 funds added to the plan’s investment menu. Mitchell, Utkus and Yang (2007) refine this line of research and offer that participation of nonhighly compensated employees peaks at 30 investment options and falls thereafter. Also, they find that the number of funds available is positively related to the percentage of highly compensated employees saving the maximum allowable amount.

The composition of the investment options offered to employees also matters. An increase in the proportion of stock funds reduces participation likelihood among nonhighly compensated employees, but the presence of company stock as an option increases the probability of participating in the plan, particularly for lower-income employees (Mitchell, Utkus & Yang, 2007; Huberman, Iyengar & Jiang, 2007). More specifically, Mitchell, Utkus and Yang (2007) estimate that a 10 percent increase in the number of equity options reduces plan participation for this group by 1.62 percentage points. In Huberman, Iyengar and Jiang’s (2007) participation estimation model, the presence of company stock increases participation by 2.4 percent, and the authors suggest a familiarity bias, as discussed below.

“Choice overload” is used to describe Iyengar and Lepper’s (2000) hypothesis that while choice may at first seem appealing, large choice sets may be demotivating. Having more alternatives available to suit one’s preferences would, under many circumstances, be welfare enhancing. However, Iyengar and Lepper (2000) show there are circumstances where choice overload may cause many people to decide to make no choice at all, similar to the effect of large investment menus on plan participation. Rather than sort through a daunting list of investment options, some will decide to defer a decision, and inertia may keep delayers from ever becoming joiners.

Loan Provisions

It is reasonable to expect that the ability to borrow from one’s 401(k) account might encourage higher plan participation and contribution levels since such access could relieve concerns about the loss of liquidity associated with contributing to the plan. Most research does in fact estimate a positive relationship between a loan provision and contribution rates. The estimated impact of a

⁵¹ Interestingly, Benartzi and Thaler (2002) find that 80 percent of participants who expressed the desire to construct their own plan investments actually preferred another investment portfolio constructed by a managed account service. This is even more interesting because the portfolios were not identified; they were simply specified by a letter.

⁵² Z. Li’s work is based on the 1992 HRS wave, and men and lower-income participants are more likely to be affected (2012).

loan provision on contribution rates ranges from an increase of about 10 percent among nonhighly compensated employees (Mitchell, Utkus & Yang, 2007), or .6 percentage point (Holden & VanDerhei, 2001) to 3 percentage points (Munnell, Sunden & Taylor, 2001/2002; U.S. General Accounting Office [GAO] 1997). Munnell et al. (2009) find a positive effect of about 1 to 1.5 percentage points. K. Smith, Johnson and Muller (2004) find no effect on observed contribution rates but do estimate a higher likelihood of participation when workers can borrow from the plan. GAO (1997) estimates that a loan provision increases plan participation by 6 percentage points. Xiao (1997) and Dworak-Fisher (2010) find no or an insignificant effect from the ability to borrow, and Mitchell, Utkus and Yang (2007) find no effect on participation likelihood among nonhighly compensated employees.

Other Retirement Benefits

It is difficult to draw an overall conclusion about the effect of the presence of other retirement benefits on 401(k) participation and contribution rates. Earlier work found that the presence of another retirement benefit program lowered participation probability by 11 to 14 percent (Andrews, 1992; Bassett, Fleming & Rodrigues, 1998; Munnell, Sunden & Taylor, 2001/2002). Papke (1995) and Mitchell, Utkus and Yang (2007) also find that the availability of other plans reduces the likelihood of participating in the 401(k) plan. Dworak-Fisher (2010) finds a negative participation effect associated with the employer's cost of a defined benefit plan but a positive effect on participation from the presence of another defined contribution plan. Other researchers who have found positive participation effects from the existence of other plans include: Papke and Poterba (1995), Even and Macpherson (2005), GAO (1997), Papke (2003a) and Munnell et al. (2009). Even and Macpherson (2005) suggests that maybe the participation in another plan is a proxy for a "strong taste for saving." Munnell et al. (2009) offer that the positive relationship between 401(k) and defined benefit plan participation may partially be explained by the existence of frozen defined benefit plans. Finally, research shows that the presence of other retirement-plan benefits has either a neutral or positive effect on plan contribution rates.⁵³

Social Norms

Social norms can wield significant power over a wide range of behaviors and choices, including retirement plan participation and contribution. For example, Duflo and Saez (2002) study individual data from a large university and find evidence participation and vendor choice may be influenced by the choices of peers. They further conduct a randomized experiment and find that the attendance rate of individuals in the same department as recipients of an incentive to attend a benefits fair was three times that of the attendance rate of individuals in other departments who did not receive an incentive to attend, suggesting some intradepartmental "spillover effects." They also find greater variation in interdepartmental enrollment rates than they find between treatment and control groups within departments (Duflo & Saez, 2003).

Bailey, Nofsinger and O'Neill (2004) conduct a lab experiment with college students and find a strong main effect for what the researchers call descriptive norms (telling people what similar

⁵³ Munnell, Sunden and Taylor (2001/2002); Munnell et al. (2009); and Xiao (1997) find no effect. Papke and Poterba (1995); GAO (1997); Papke (2003a); Mitchell, Utkus and Yang (2007); and Huberman, Iyengar and Jiang (2007) find that participants with access to another plan contribute more than participants for whom the 401(k) plan is the sole retirement plan.

others typically do) and injunctive norms (telling people what experts say they ought to do). On the other hand, other researchers have found no evidence of peer effects from providing employees who had opted out of an automatic enrollment plan information about the savings decisions of their peers (Beshears, Choi, Laibson, Madrian, & Milkman, 2011). In fact, the effect of providing this information to a group of unionized employees was a larger gap between their average contribution rate and the published rate of their peers.

Other Observed Heuristics and Biases Affecting Saving Decisions

Thus far, the influence of various plan design features and selected social norms on participation and contribution choices have been covered. Decision-making biases and behavioral tendencies have also been discussed along the way, when their mention facilitated an understanding of observed behaviors. Behaviorists have identified other decision-making biases that may also influence participation and contribution; these are briefly discussed below.

Anchoring

Anchoring refers to the tendency to make small adjustments from a reference point, even though large adjustments are more appropriate (Tversky & Kahneman, 1974). Research has shown that even irrelevant reference points can have significant influence over choices (Ariely, Loewenstein & Prelec, 2003).

Determining one's optimal savings rate is a complex task requiring several economic assumptions and is likely beyond the ability of even those workers interested enough to try. It is therefore unsurprising that a large percentage of participants search for or find a savings-rate "anchor" or reference point—whether it be the employer match threshold, the automatic enrollment contribution rate or some other percentage that signals a contribution rate. In addition to saving at the default rate (as discussed above), participants often select a contribution rate based on the maximum employer match (the match threshold), a multiple of five (which Hewitt [2002] calls the "round number" heuristic) or a prior (outdated) plan maximum.⁵⁴ These tendencies are observed in Choi et al. (2006) where the distribution of specific participant contribution rates of one company is presented. The most popular rates observed are the match threshold, 5 percent, 10 percent and 15 percent.

"Naive Reinforcement Learning"

Investing experience also has an effect on employees' savings rates. Choi, Laibson, Madrian and Metrick (2009) specifically find that one standard deviation increase in return for the year is associated with a .13 percentage-point increase in savings rate and that an increase in return volatility (again, by one standard deviation) predicts a .16 percentage-point reduction in contribution rate at the end of the year, and a reduction of just over twice that much at the end of

⁵⁴ Benartzi and Thaler (2007) study participant contribution behavior in one plan that increased the permissible maximum contribution from 16 to 100 percent after the Economic Growth and Tax Relief Reconciliation Act of 2001. They find the percentage of (new) employees deferring 16 percent declined by 75 percent. They suggest employees who may have anchored to the 16 percent plan maximum switched to the "round number" heuristic, deciding to save 10 or 15 percent.

the following year. The researchers call this the “naive reinforcement-learning heuristic” and define it as an illogical emphasis on personal experience as a basis for decisions.

Priming

As previously discussed, a lack of self-control is implicated as one potential reason for low savings rates. Evidence suggests promising interventions to address these self-control problems. In one experiment, Nenkov, Inman and Hulland (2008) use priming (exposure to a deliberate stimulus with the intention of having an effect on experimental subject’s response to another stimulus) to increase subjects’ consideration (the researchers use the term elaboration) of potential outcomes prior to making a decision about contributing to a 401(k) plan. Subjects were randomly assigned to a priming condition in which they were asked to consider the positive and negative potential outcomes of contributing or not contributing to the 401(k) plan. They find that individuals who are inclined to think about future outcomes prior to making a decision contribute more than those who are not so inclined. More importantly, subjects who did not exhibit the natural tendency to think about the future but who were in the priming condition contributed nearly 60 percent more than their nonprimed counterparts.

In another experiment, researchers used virtual reality technology to present subjects with aged visual images of themselves and found that subjects in this condition allocated more than twice the amount to a retirement fund than subjects who were only exposed to current visual images (Hershfield, Goldstein, Sharpe, Fox, Yeykelis, Carstensen, Bailenson, 2011). It seems that thinking about an older self helps individuals overcome a tendency to overweight the desires of the current self.

Retirement Plan Investment Decisions

Within most defined contribution plans, participants are fully responsible for determining an appropriate asset allocation and selecting specific investments. They fully shoulder the risk and enjoy (or suffer) the consequences of their selections. Although investment advisory services may be available to assist participants, these services tend to be underutilized in most plans.⁵⁵ Within defined benefit plans, asset allocation and investment selection are responsibilities of retirement plan sponsors, who often retain experts to guide them through these decisions.

Giving participants full responsibility for managing all of their retirement plan investments has become more commonplace over the last 30 years. Papke (2003b) reports that in 1985, while 90 percent of participants in defined contribution plans directed the investment of their own contributions, less than half did so for employer contributions made on their behalf. More recent data from PSCA (2011) shows that now, 98 percent of respondent plans permit participant direction of their own contributions and 92 percent permit investment direction of company contributions.

⁵⁵ In the plan studied by Agnew (2006b), she finds that although 15 percent enrolled in the advice service offered, only 3 percent used the service more than once during the time period analyzed.

In this section about workers' investment choices, current asset allocation statistics, predictors of investment choices and observed anomalies, including participant investment in employer stock, are reported.

According to VanDerhei, Holden, Alonso and Bass (2012), at the end of 2011, approximately 61 percent of 401(k) plan assets were invested in equities: 39 percent in equity funds, 8 percent in company stock and the remainder through investments in balanced funds. In addition, approximately 12 percent was held in bond funds, 11 percent in guaranteed interest contracts and stable value funds, 4 percent in money funds and 20 percent in balanced funds. VanDerhei et al. (2012) report that asset allocation varies by age, the investment option choice set and salary. (See Table 10 below.)

Table 10. Average asset allocation of 401(k) accounts, by participant age, salary and investment options (percentage of account balances,^a 2011)

	Equity Funds	Target-Date Funds ^b	Nontarget-Date Balance Funds	Bonds Funds	Money Funds	GICs ^c /Stable-Value Funds	Company Stock
Plans Without Company Stock, and GICs^c and/or Other Stable-Value Funds							
<u>Age Group:</u>							
20s	35.8%	38.7%	7.4%	9.5%	3.5%		
30s	48.1%	24.0%	6.3%	12.1%	4.4%		
40s	51.0%	17.9%	6.2%	14.2%	5.2%		
50s	44.9%	16.9%	6.7%	18.6%	7.0%		
60s	38.5%	15.4%	6.6%	23.8%	9.4%		
<u>Salary:</u>							
\$20,000–\$40,000	40.4%	26.4%	7.1%	13.6%	6.3%		
>\$40,000–\$60,000	42.5%	22.2%	7.8%	15.4%	7.1%		
>\$60,000–\$80,000	45.5%	20.0%	7.4%	15.2%	6.4%		
>\$80,000–\$100,000	47.8%	18.4%	6.4%	16.1%	5.9%		
>\$100,000	49.2%	14.9%	6.6%	17.3%	5.6%		
All	45.6%	18.0%	6.5%	17.8%	6.7%		
Plans With GICs^c and/or Other Stable-Value Funds							
<u>Age Group:</u>							
20s	35.1%	27.9%	14.2%	8.1%	1.4%	7.4%	
30s	44.8%	20.0%	10.1%	7.9%	1.9%	9.4%	
40s	47.5%	14.5%	8.6%	8.5%	2.2%	12.4%	
50s	40.2%	12.8%	8.6%	10.4%	2.6%	19.2%	
60s	32.7%	11.4%	8.2%	11.5%	3.3%	27.4%	
<u>Salary:</u>							
\$20,000–\$40,000	31.7%	18.1%	12.6%	9.6%	2.1%	20.1%	
>\$40,000–\$60,000	34.8%	13.5%	14.2%	9.3%	2.4%	18.9%	
>\$60,000–\$80,000	38.7%	10.6%	13.8%	9.6%	2.5%	17.9%	
>\$80,000–\$100,000	42.3%	9.4%	11.7%	10.4%	2.4%	17.0%	

	Equity Funds	Target-Date Funds ^b	Nontarget-Date Balance Funds	Bonds Funds	Money Funds	GICs ^c /Stable-Value Funds	Company Stock
>\$100,000	44.6%	9.0%	10.3%	11.6%	2.3%	15.7%	
All	41.1%	14.0%	8.9%	9.9%	2.6%	18.4%	
Plans With Company Stock							
<u>Age Group:</u>							
20s	27.3%	41.7%	5.2%	6.7%	2.9%		12.0%
30s	38.4%	22.6%	4.4%	9.5%	4.4%		15.4%
40s	38.5%	17.2%	4.0%	11.0%	5.5%		18.9%
50s	30.3%	14.2%	4.6%	14.7%	8.9%		21.5%
60s	25.0%	12.6%	3.9%	18.4%	14.7%		20.5%
<u>Salary:</u>							
\$20,000–\$40,000	25.7%	17.7%	3.9%	12.8%	15.6%		19.4%
>\$40,000–\$60,000	32.9%	12.8%	2.8%	12.8%	11.3%		22.5%
>\$60,000–\$80,000	31.3%	14.4%	4.4%	13.7%	8.4%		21.7%
>\$80,000–\$100,000	33.9%	11.1%	5.5%	13.0%	7.5%		21.8%
>\$100,000	33.7%	10.9%	4.8%	15.8%	5.8%		21.7%
All	32.4%	16.1%	4.2%	13.6%	8.7%		19.7%
Plans With Company Stock, GICs^c and/or Other Stable-Value Funds							
<u>Age Group:</u>							
20s	30.4%	20.8%	15.8%	4.9%	1.4%	7.1%	16.0%
30s	41.5%	12.3%	9.7%	6.5%	1.7%	8.7%	15.4%
40s	42.5%	8.1%	7.9%	7.0%	1.8%	12.0%	16.3%
50s	34.3%	6.6%	7.4%	8.5%	2.2%	19.8%	16.7%
60s	27.7%	6.1%	7.1%	8.7%	2.4%	30.0%	14.4%
<u>Salary:</u>							
\$20,000–\$40,000	29.9%	8.0%	11.2%	6.2%	1.5%	20.2%	20.9%
>\$40,000–\$60,000	32.0%	7.0%	11.4%	7.1%	1.9%	20.1%	18.4%
>\$60,000–\$80,000	33.1%	7.0%	10.0%	7.1%	1.8%	20.8%	17.5%
>\$80,000–\$100,000	36.2%	6.1%	10.2%	7.9%	1.7%	18.4%	16.3%
>\$100,000	39.6%	6.2%	8.0%	8.0%	1.4%	17.6%	13.9%
All	35.7%	7.6%	7.8%	7.9%	2.0%	19.0%	16.0%

Original source: Tabulations from EBRI/Investment Company Institute (ICI) Participant-Directed Retirement Plan Data Collection Project

^a Minor investment options are not shown; therefore, row percentages will not add to 100 percent. Percentages are dollar-weighted averages.

^b A target-date fund typically rebalances its portfolio to become less focused on growth and more focused on income as it approaches and passes the target date of the fund, which is usually included in the fund's name.

^c GICs are guaranteed investment contracts.

^d Salary information is available for a subset of participants in the EBRI/ICI database.

Note: “Funds” include mutual funds, bank collective trusts, life insurance separate accounts and any pooled investment product primarily invested in the security indicated.

Note. From “401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2011,” by J. VanDerhei, S. Holden, L. Alonso, & S. Bass, 2012, EBRI Issue Brief 380. Employee Benefit Research Institute.

While aggregate statistics are interesting, particularly when compared to the fairly common 60/40 allocation often observed in defined benefit plans, we are more interested in the underlying individual decisions that make up the aggregate statistics. As can be seen in Table 11 below, wide variation in asset allocation is observed.

Table 11. Asset allocation distribution of 401(k) participant account balances to equities,^a by age, percentage of participants,^b 2011

Age Group	Percentage of Account Balances Invested in Equities					
	Zero	1–20%	>20–40%	>40–60%	>60–80%	>80–100%
20s	9.4%	1.5%	2.3%	5.3%	19.6%	61.9%
30s	8.8%	2.8%	3.7%	7.7%	20.4%	56.6%
40s	9.4%	4.0%	4.8%	9.2%	31.3%	41.3%
50s	11.4%	6.2%	7.0%	20.2%	30.5%	24.7%
60s	16.2%	8.3%	13.3%	25.1%	16.5%	20.6%
All	10.8%	4.5%	6.0%	12.8%	25.4%	40.6%

Original source: Tabulations from EBRI/ICI Participant-Directed Retirement Plan Data Collection Project

^a Equities include equity funds, company stock and the equity portion of balanced funds. “Funds” include mutual funds, bank collective trusts, life insurance separate accounts and any pooled investment product primarily invested in the security indicated.

^b Participants include the 23.4 million 401(k) plan participants in the year-end 2010 EBRI/ICI 401(k) database.

Note: Row percentages may not add to 100 percent because of rounding.

Note. From “401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2011,” by J. VanDerhei, S. Holden, L. Alonso, & S. Bass, 2012, EBRI Issue Brief 380. Employee Benefit Research Institute.

The asset allocations of longer-tenured employees are most likely a result of participants’ initial investment selections as altered by cumulative performance over time. In other words, they may not necessarily reflect recent, active asset allocation decisions.⁵⁶ Therefore, additional insight can be gained by reviewing the asset allocation of recently hired employees. VanDerhei et al.’s (2012) analysis shows that recently hired participants were much more likely to hold balanced funds and in particular target-date funds, funds that offer a mix of investments in various asset classes that become more conservative with the passage of time. Sixty-eight percent of recently hired participants held balanced fund investments in 2011, compared to just 29 percent of recent hires in 1998 (VanDerhei et al., 2012). About three quarters of these new balanced fund investors held target-date funds, and over three-quarters of target-date fund investors held more than 90 percent of their account balance in these funds, perhaps owing to the increased use of target-date funds as investment default in automatic enrollment plans. VanDerhei et al. (2012) find that target-date fund usage varied with the investment menu available to the participant and age

⁵⁶ As discussed below, a small percentage of participants make investment changes.

(younger participants are more likely to use these funds and to a greater extent than older participants).⁵⁷

The individual characteristics associated with asset allocation decisions have been the subject of a number of research studies that include analyses of behavioral data (Bajtelsmit & VanDerhei, 1997; Goodfellow & Schieber, 1997; Agnew, Balduzzi & Sunden, 2003)⁵⁸ as well as survey data (Sunden & Surette, 1998; Bajtelsmit & Bernasek, 2001; Dulebohn, 2002; Bieker, 2008).⁵⁹ Generally, these studies find that allocations to risky assets are positively related to income and negatively related to age.⁶⁰ Results related to tenure are mixed. While Agnew, Balduzzi and Sunden (2003) find that tenure is positively related to equity allocation, Bajtelsmit and VanDerhei (1997) look at the effect of tenure on fixed-income allocations and report a positive relationship up to a point, after which declines are observed.

Although Dulebohn (2002) finds no gender effects in his survey work, generally, studies report findings that suggest women are more risk averse than men (judging by their allocations to equities), but certain researchers are reluctant to make that conclusion since some data sets are missing potentially important variables such as marital status (Bajtelsmit & VanDerhei, 1997; Agnew, Balduzzi & Sunden, 2003; Goodfellow & Schieber, 1997; Bieker, 2008).⁶¹ Regression model estimates in Sunden and Surette (1998) show the importance of considering marital status in addition to gender. Their models estimate that single women and married men are less likely (than single men) to choose “mostly stocks.” They further estimate that the choices of married men and married women do not differ significantly, but that married women are more likely than single women to choose “mostly bonds.”

Bieker (2008) finds further that college attendees and individuals with longer planning horizons are more likely to hold equities and that the likelihood of holding stock decreases with wealth. No effects from race, marital status for men, ownership of risky assets outside the plan, home ownership or employer size are found.

Effects of the Investment Option Menu on Participant Choice

As further evidence of the impact of decision-making context, in this section, we report research results demonstrating that participant investment choices are strongly influenced by the choice set offered in the plan. More specific observations are highlighted below.

⁵⁷ In addition, Mitchell, Mottola, Utkus and Yamaguchi (2009) show that among participants who are defaulted into target-date funds and those in plans that previously offered static allocation funds, women and participants with lower account balances are more likely to be target-fund investors. This work also analyzes the use of target-date funds as exclusive versus nonexclusive holdings. (Target-date funds were designed to be used as an exclusive investment since they offer participants a preselected mix of funds in various asset classes that becomes more conservative with the passage of time.)

⁵⁸ Bajtelsmit and VanDerhei (1997) study a sample of 20,000 active management employees from one employer. The data are from 1993. Goodfellow and Schieber (1997) analyze data for 36,000 participants in 24 plans, and Agnew, Balduzzi and Sunden (2003) study data for 7,000 participants in one plan from April 1994 to August 1998.

⁵⁹ Sunden and Surette (1998) analyze 1992 and 1995 SCF survey data; Bajtelsmit and Bernasek (2001) use 1994 HRS data for their work that analyzes allocations of total wealth as opposed to plan wealth. Dulebohn (2002) collects survey data from 795 college and university employees in a Midwestern state. Bieker (2008) uses 1998 SCF survey data.

⁶⁰ However, Bieker (2008) finds a positive relationship between age and equity allocation.

⁶¹ See also Yilmazer and Lyons (2010), who explore the effects of family decision making on portfolio choice. They find portfolio choices of married men appear unaffected by characteristics of their wives, but portfolio choices of wives are affected by their relative control and spousal age difference.

- Mixed evidence that participants evenly allocate their assets among those available when the choice set is small is observed (Benartzi & Thaler, 2001; Agnew, 2002; Tang, Mitchell, Mottola & Utkus, 2010; Huberman & Jiang, 2006).
- Closely related, asset allocation is correlated with the proportion of equity and fixed-income funds (Brown, Liang, & Weisbenner, 2007; Benartzi & Thaler, 2001).
- Individuals allocate evenly to three or four funds, regardless of the number available (Huberman & Jiang, 2006).
- Large choice sets can be overwhelming, with some researchers suggesting that high-knowledge participants are more confused by large choice sets than low-knowledge participants (Agnew & Szykman, 2005) and others suggesting the opposite (Kida, Moreno & Smith, 2010).
- Larger choice sets are associated with higher allocations to stable value and fixed income investments (Iyengar & Kamenica, 2010), but there is evidence that subjective knowledge levels may play a role (Morrin, Broniarczyk, Inman & Broussard, 2008; Kida, Moreno & Smith, 2010).

In experimental research with UCLA employees, Benartzi and Thaler (2001) observed a strong behavioral tendency to split investment choices evenly over the number of choices offered, allowing subjects' asset allocation to be easily influenced by the composition of the investment option line-up. The researchers call this the "1/n" heuristic. In one two-condition experiment, employees in the first condition were asked to choose from four fixed-income and one equity option (a menu similar to the actual choices offered to UCLA employees). Employees in the second condition chose from a menu of four equity options and one fixed-income option (a menu designed to be similar to the choices offered to TWA pilots). In the first condition, the average allocation to equities was 43 percent compared to 68 percent in the four-equity condition. The authors supplement their experimental findings with an analysis of actual plan allocations using a large database of plans and also with a time-series analysis of one plan's asset allocation during a period of investment option changes. Results of both of these supplemental analyses confirmed their experimental results.

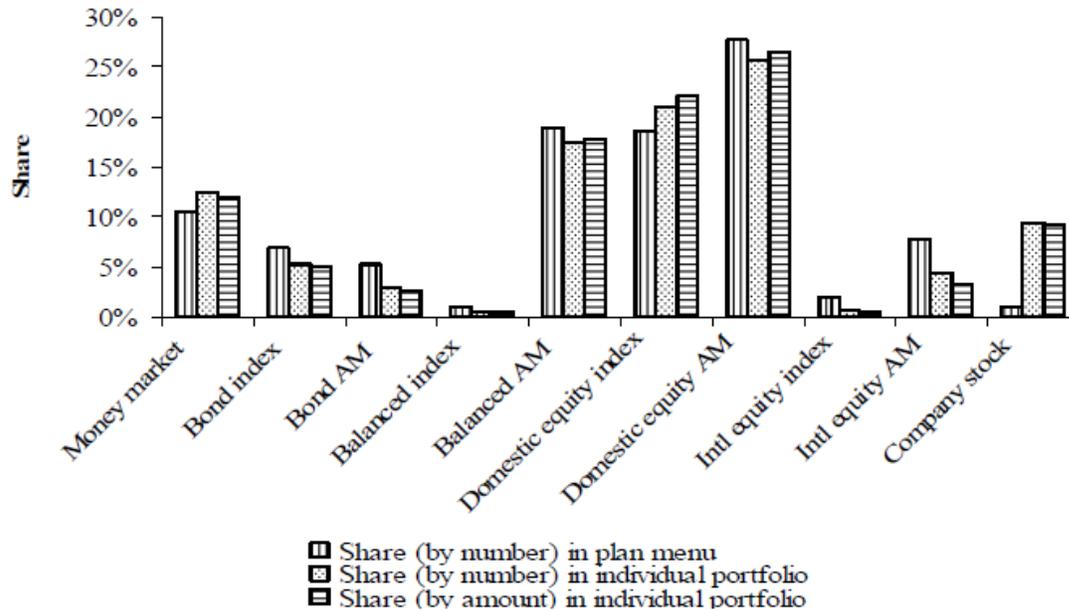
Brown et al. (2007) study 11-K data for nearly 900 firms during the period from 1991 through 2000. Similar to Benartzi and Thaler (2001), they find strong menu effects. Specifically, their work estimates that increasing the portion of equity options from one-third to one-half predicts an increase in contribution allocations to equities by approximately 7.5 percentage points.

In contrast to Benartzi and Thaler (2001) and Brown et al. (2007), who analyze experimental survey responses and aggregate plan data, Tang et al. (2010) and Agnew (2002) analyze individual-level data and also report menu effects. (See Figure 8 below.) Agnew (2002) studies 1998 individual-level contribution allocation data for one plan that offered four investment choices: a guaranteed income fund, an equity-income fund, an S&P 500 index fund and company stock. Agnew (2002) finds that less than 4 percent follow the "1/n" heuristic and less than 5 percent follow the modified "1/n" heuristic (the modified "1/n" heuristics explains even allocations to all other options, excluding a company-stock offering).⁶² Further, her regression

⁶² Benartzi and Thaler (2001) identify this behavior and suggest that employees view company stock as a separate asset. Company stock is separately discussed below.

model finds income and tenure are negatively related to the tendency to follow the modified “1/n” heuristic.

Figure 8. Allocation of individual participant portfolios in 401(k) plans



Source: Authors’ computations. Note: N = 1,003 plans and 986,614 participants.

AM references actively managed.

Note. From “The efficiency of sponsor and participant portfolio choices in 401(k) plans,” by N. Tang, O.S. Mitchell, G.R. Mottola, & S.P. Utkus, 2010, *Journal of Public Economics*, 94, 1073–1085. ©2010 by Elsevier B.V. Reprinted with permission.

Huberman and Jiang (2006) offer an alternative view of participants’ investment decision-making.⁶³ First, they find that despite the number of options offered to them, participants actually invest in a relatively small number of funds—between three and four. Further, participants tend to allocate their contributions evenly among their chosen funds. Finally, contrary to the other researchers previously mentioned, they do not find strong menu effects. In other words, participants’ asset allocations are only slightly affected by the portion of equity options in plans’ investment menus.

Even though the low number of funds used by participants would suggest little demand for large investment menus, the menus have grown by about 50 percent since 1999 when an average of 12 options was offered (PSCA, 2011). Now, an average of 18 options is offered to participants (PSCA, 2011). Based on their research using a data set of nearly 600,000 participant accounts in 638 plans, Iyengar and Kamenica (2010) find that more funds are associated with higher levels of money market and bond fund holdings (and lower levels of equity holdings).⁶⁴ More

⁶³ The data set analyzed by Huberman and Jiang (2006) includes nearly 500,000 participant accounts in about 600 plans recordkept by one recordkeeper. The number of options offered within these plans ranged from four to 59.

⁶⁴ The data set only includes participants who had made an active investment choice.

specifically, they estimate that for every additional 10 funds, equity allocations decline by 3.28 percentage points and bond fund allocations increase by 1.98 percentage points. Further, the authors find that an increase of 10 funds increases the likelihood participants will allocate nothing to equities by 2.87 percentage points. (Just under 11 percent of participants in the data set allocate nothing to equities.) While the authors offer rational explanations for the observed behavior, data limitations prevent the authors from precisely identifying *why* participants choose simple, easy-to-understand options from large choice sets.

In experimental research, Agnew and Szykman (2005) find that increased choice sets affect individuals differently, according to their financial knowledge. Individuals with a higher degree of financial knowledge appear to be more overwhelmed by large choice sets than lower-knowledge subjects who show a high level of overload even when choice sets are smaller. In other words, for individuals with lower levels of financial literacy, there is no difference in their degree of overload no matter how large the choice set.⁶⁵ The researchers find an increase in the number of similar options offered is associated with an increase in default selection, which may be caused by a high degree of overload.

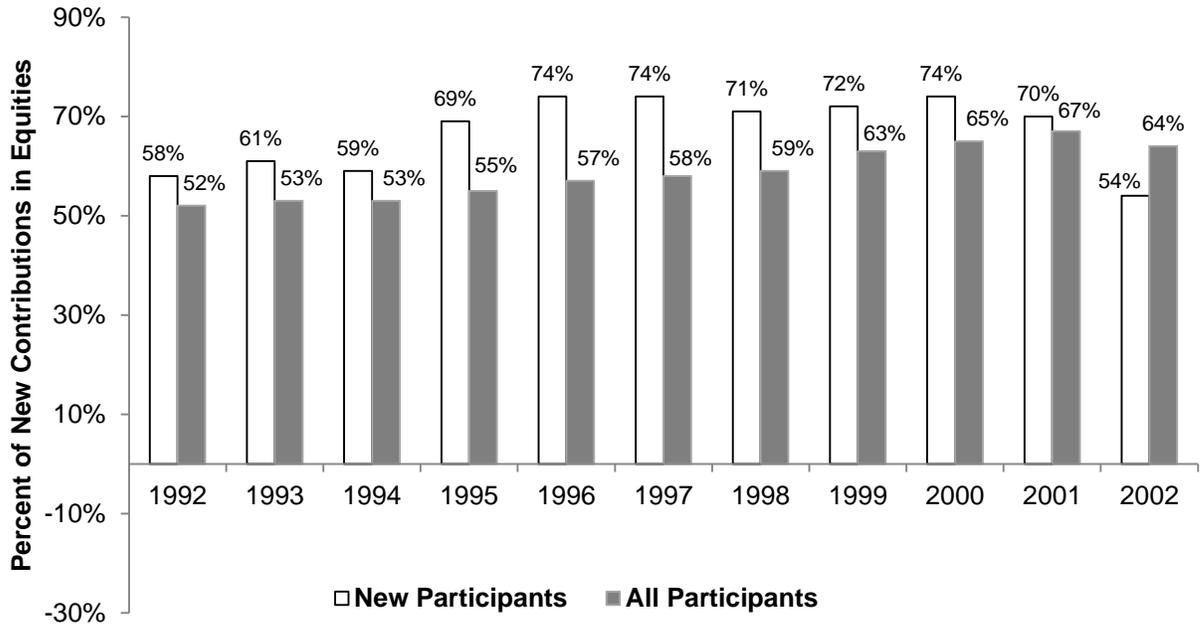
Morrin et al. (2008) report results of an experiment designed to test whether the asset allocation effects of choice set size differed between low- and high-knowledge individuals. Subjects with lower levels of subjective knowledge significantly allocated more to equities (60.2 versus 28.7 percent) when the choice set was large (21-fund choice set versus three-fund choice set).

Effects of Investment Performance on Investment Choice

Ample research sets forth evidence of performance chasing as an investment selection approach, but much of it is outside the retirement plan domain. However, Benartzi and Thaler (2007) offer two examples of real-world evidence of performance chasing. Figure 9 below separately shows the equity allocations of all and new participants calculated from recordkeeping data from one vendor. The first observation that can be made is the significant difference in the allocations of the two groups, an observation also noted above in the more recent data from VanDerhei et al. (2012). As discussed below, once participants make their selections, a significant percentage of them never make any changes. The second is the way in which new participants responded to market performance when making their investment choices.

⁶⁵ This is in contrast to Kida, Moreno and Smith (2010), who find that experienced investors are not negatively impacted by larger choice sets and may in fact be less likely to choose when the choice set is limited.

Figure 9, Panel A. The equity allocation of new versus all plan participants

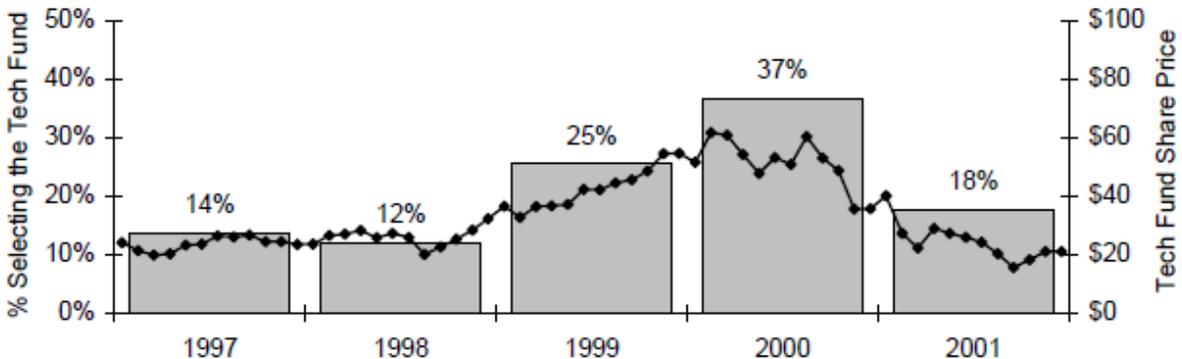


Panel A displays the percentage of new contributions allocated to equities by new versus all plan participants. “New” participants are those entering the plan in a given year. The chart was constructed from data provided by Vanguard.

Note. Figure 9, panels A. and B. are from “Heuristics and Biases in Retirement Savings Behavior,” by S. Benartzi and R. Thaler, 2007, *Journal of Economic Perspectives*, 21(3), 81–104. ©2007 Benartzi and Thaler. Modified with permission.

Similar decision making is noted in Figure 9, Panel B; only here participant allocation to a technology fund is shown. Participant allocation to the fund appears to move in lockstep with the fund’s share price.

Figure 9, Panel B. Percentage of new participants selecting the technology fund



Panel B reports the allocations of new participants at a large plan that offers a technology fund. The left axis displays the percentage of new participants allocating some of their contributions to the technology, and the right axis shows the fund's share price. Data were provided by Hewitt Associates.

Even when the returns of different funds are incomparable because they cover different time periods, individuals will tend to choose the fund with the highest since-inception return. In an experiment conducted by Choi, Laibson and Madrian (2010), the researchers create a scenario where a failure to minimize fund fees is difficult to rationalize. In this experiment, each subject selected investments for her hypothetical \$10,000 lump sum from a menu of four S&P 500 index funds (whose *only* difference was cost).⁶⁶ In the control condition, where subjects received fund prospectuses, almost no one allocated their "money" to minimize fees. Even in the various treatment conditions, where fees were made quite salient, 90 percent of staff and college student subjects and 81 percent of MBA subjects failed to minimize fees. The researchers note that subjects had a strong tendency to select the funds with the highest return since inception, which is interesting since the funds each had different inception dates (and therefore, the returns since inception covered different time periods).

Status Quo Bias and Default Acceptance

Once participants make their initial investment selections, a large portion never make any adjustments throughout the course of their working careers despite the effects of uneven market performance and likely changes in risk tolerance and investment menu. Samuelson and Zeckhauser (1988) were among the first to document the status quo bias in retirement plan investment choice. The authors refer to a 1986 TIAA-CREF study reporting that less than 30 percent had ever made a change to their investment choices. Twenty percent reported making exactly one change and 8 percent reported making more than one change.

Similarly, Ameriks and Zeldes (2004) report that over the course of the 10-year period ended in 1996, 44 percent of participants made absolutely no change to either the allocation of their current contributions or their accumulated contributions. Table 12 reports their findings.

⁶⁶ In an effort to elicit closer-to-true decision-making, the researchers rewarded subjects based on performance of their selected portfolio over a specified time period extending beyond the experimental session.

Table 12. Changes in quarterly asset and flow allocations, 1987–96, sample of participants with flows in all 40 quarters (n=4, 782)

Asset Allocation Changes	Flow Allocation Changes						Total
	Count	0	1	2	3–5	6–10	
0	44.3%	15.3%	6.6%	5.3%	1.1%	0.2%	72.8%
1	1.9%	4.2%	3.2%	3.5%	0.8%	0.1%	13.7%
2	0.5%	0.8%	1.1%	1.9%	0.7%	0.0%	5.0%
3–5	0.4%	0.6%	0.6%	2.4%	1.0%	0.1%	5.1%
6–10	0.1%	0.2%	0.3%	0.4%	0.7%	0.2%	1.9%
11+	0.0%	0.1%	0.2%	0.4%	0.4%	0.3%	1.5%
Total	47.1%	21.2%	12.0%	14.1%	4.7%	0.9%	100.0%

“Assets allocation changes” are the number of quarters in which assets are transferred from any deferred annuity investment account to another via an “accumulation transfer” transaction, or in which assets are transferred from a TPA to a deferred annuity account. “Flow allocation changes” also reflect changes in the allocation of contributions to *any* of the investment accounts.

Note. From “How Do Household Portfolio Shares Vary With Age?” by J. Ameriks & S.P. Zeldes, 2004, Working Paper. Reprinted with permission.

Other researchers report low levels of activity in retirement plan accounts as well. Agnew, Balduzzi and Sunden (2003) find that 87 percent of participants in the plan they studied made no portfolio changes during the four-year period ended August 1998. Mitchell, Mottola, Utkus, and Yamaguchi (2006) study trading patterns of 1.2 million participants in 1,500 plans. During 2003 and 2004, 80 percent of participants made no adjustments to their portfolios.⁶⁷

An interesting question is whether participants who have been defaulted into a retirement plan are more likely to make investment changes since the default choice may not comport with their preferences. Benartzi and Thaler’s (2002) finding that the majority of people (80 percent) who expressed an interest in choosing their own investments ended up preferring a portfolio selected by a managed account service would suggest that participants may not be any more likely to change their investments even when they have been selected by others. However, as reported above, even four years after automatic enrollment, Choi et al. (2006) found that between 29 and 48 percent of participants remain in the default fund. This suggests that participants who are initially defaulted into an investment may in fact be more likely to change from it.

Employer Stock

In 2011, the aggregate allocation to employer stock in 401(k) plans was 16 or 19.7 percent, depending on the other funds offered alongside it (see Table 9 above). This highlights another

⁶⁷ The most commonly found attributes of those who do trade are: male, higher income, older, longer tenure (Agnew, Balduzzi and Sunden, 2003; Mitchell et al., 2006). Mitchell et al. (2006) further finds traders tend to use the Internet, hold a greater number of funds and invest in actively managed funds. The presence of employer stock in a plan is associated with increased trading levels. Choi, Laibson and Metrick (2002) provide evidence that the introduction of web-enabled trading increases trading levels, and in contrast to Agnew (2006a) and Mitchell et al. (2006), they find younger individuals are more likely to trade.

difference between defined contribution and defined benefit plans. In defined benefit plans, no more than 10 percent of plan assets may be invested in employer securities; no such limitation to control risk applies to defined contribution plans.

While a majority of participants invest less than 20 percent of their retirement plan account balances in employer stock, a significant portion of each age group invests more, as evidenced in Table 13 below.⁶⁸ Agnew (2006a) finds that males are more likely to overinvest in company stock, and Utkus and Young (2012) also find a small negative effect from education (a college-educated employee holds 1.2 percentage points less than an employee without a college education).

Table 13. Asset allocation distribution of participant account balances to company stock in 401(k) plans with company stock, by participant age

Age Group	Percent of Participants, ^{a, b} 2011										
	Percentage of Account Balance Invested in Company Stock										
	0	1–10%	11–20%	21–30%	31–40%	41–50%	51–60%	61–70%	71–80%	81–90%	91–100%
20s	65.8%	8.9%	5.0%	3.9%	3.2%	5.0%	2.3%	1.0%	0.7%	0.5%	3.8%
30s	52.5%	13.6%	9.1%	6.3%	4.5%	4.2%	2.5%	1.5%	1.0%	0.8%	4.1%
40s	48.2%	14.9%	9.6%	6.9%	4.8%	4.1%	2.7%	1.7%	1.3%	1.0%	4.8%
50s	45.9%	16.6%	9.8%	6.8%	4.7%	3.8%	2.7%	1.8%	1.4%	1.1%	5.5%
60s	49.4%	15.7%	8.7%	5.9%	4.0%	3.3%	2.3%	1.6%	1.3%	1.1%	6.8%
All	51.0%	14.3%	8.8%	6.2%	4.4%	4.0%	2.5%	1.6%	1.2%	0.9%	5.0%

Original source: Tabulations from EBRI/ICI Participant-Directed Retirement Plan Data Collection Project

^aThe analysis includes the 9.1 million participants in plans with company stock at year-end 2010.

^b Row percentages may not add to 100 percent because of rounding.

Note. From “401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2011,” by J. VanDerhei, S. Holden, L. Alonso, & S. Bass, 2012, EBRI Issue Brief 380. Employee Benefit Research Institute.

Employees’ investment in company stock is especially troubling to behaviorists for at least two reasons. First, single-stock investment involves company-specific risk (idiosyncratic risk) that can easily be diversified away. Meulbroek (2002) estimates that on average, employer stock is worth only 58 cents to the dollar.⁶⁹ Second, an employee’s human capital (future income stream) is already invested in the employer.

Why do employees invest in their employer’s securities? In some cases, employer contributions may be made in securities, with transferability restrictions. However, regulation prohibits these restrictions once an employee reaches three years of service, so it is unlikely these restrictions account for all, or even most, investment in employer stock. Researchers offer several other potential explanations.

⁶⁸ Utkus and Young (2012) find that within a subset of Vanguard’s recordkeeping data, only 10 percent of participants invest more than 20 percent in employer securities.

⁶⁹ Meulbroek’s 2002 analysis is as of December 31, 1998. Updated analyses are unavailable.

First, Benartzi (2001) finds through survey work that participants perceive the employer's contribution of employer securities as implicit investment advice. Regression models in Utkus and Young (2012) estimate that when employer matching contributions are made in employer securities, participant allocations to company stock are 17 percentage points higher. The effect from other employer contributions in company stock is an increase of 12 percentage points.⁷⁰ Some of these increases likely result from transferability restrictions, but again, it is difficult to believe restrictions account for all of the increases.

Second, Huberman (2001) posits that employees may ignore portfolio theory and invest in employer stock because it is familiar to them (in the sense that they are familiar with their employer). Huberman, Iyengar and Jiang (2007) note that lower-income employees (those making below \$40,000) are more likely to participate in plans that offer company stock, possibly because at least one option in the plan is familiar to them.

Third, Benartzi and Thaler (2001) offer that employees mentally account for employer stock as a separate asset class. They observe that when employer stock is available in plans, employees naively allocate the remainder of their assets between equities and fixed income. In other words, it appears that employees do not consider employer securities as a component of their equity holdings but instead as a separate asset class.

Fourth, employees may be chasing performance. Using plan-level data from public company filings, Benartzi (2001) is the first to study the relationship between past returns and employee allocations to company stocks. He finds that past 10-year returns are positively related to current contribution allocations to company stock. Benartzi's work is further confirmed by Liang and Weisbenner (2002) who study a larger number of companies over a longer time period (also using plan-level data from public filings). Huberman and Sengmuller (2004) continue this work and find that past three-year returns predict higher contribution allocations and transfers. They also reveal that while employees react positively to favorable past returns, the converse is not true: Unfavorable past returns do not seem to motivate a reduction in employer stock holdings. Agnew (2002) and Choi, Laibson, Madrian, and Metrick (2004b) study individual-level data and draw the same conclusion that employees' investment decisions are driven in part by past returns. Choi et al. (2004b) also find that favorable past returns predict employees' reallocation of employer stock holdings to other equities.

Fifth, evidence suggests that employees simply do not understand the risk associated with company stock. Benartzi (2001) reports that just 18 percent of respondents to a John Hancock Financial Services survey know company stock is riskier than a diversified stock fund. Mitchell and Utkus (2003) also report Vanguard survey results. Vanguard Group (2002) finds that even employees who understand individual stocks are riskier than a diversified stock fund don't think *their* company stock is riskier, suggesting some overconfidence.⁷¹

⁷⁰ It is possible (and even likely) that inertia accounts for some company stock investments originating from employer contributions.

⁷¹ The declines of Enron, WorldCom and Global Crossing, all of which occurred in 2002, could have illuminated the risks of holding employer stock. However, Choi, Laibson and Madrian (2005) set forth a detailed analysis casting doubt on the effects of this media-provided education on actual investment behavior. They estimate only a 2 percentage-point decline in employer-stock holdings as a result of the publicized falls of Enron, WorldCom and Global Crossing.

Leakage

For purposes of this section, leakage refers to employees' *preretirement* removal of assets from retirement-designated accounts in the form of a loan, hardship withdrawal or "cash-out." While loan and hardship withdrawal decisions only occur within the context of defined contribution plans, participants covered by either type of retirement plan (defined benefit or defined contribution) are often offered the option of taking a lump-sum payout prior to reaching normal retirement age.⁷² In this section, we report on research that explores these three sources of leakage which drain employees' retirement resources.

Withdrawals

Over half of participants in defined benefit plans have access to lump-sum distributions upon separation from their employer (U.S. Department of Labor, 2007). In addition to access to retirement funds at job separation, defined contribution plan participants may also have access to age-specific in-service withdrawals or "hardship" withdrawals.⁷³ Over three-quarters of defined contribution plans permit age-based in-service and financial hardship withdrawals (PSCA, 2011).

An estimated 14 to 16.2 million participants in the 2004 SIPP panel had received a withdrawal (of any type) from a retirement plan (also of any type) through 2006 (Copeland, 2009, and Purcell, 2009b).⁷⁴ The median amount of all distributions received is relatively small at \$10,000 (in 2006 dollars) and has shown a downward trend when amounts are aged according to when they were received. A majority (54.5 percent) of the most recent distributions reported were received by respondents who were 40 or younger at the time of the distribution (Copeland, 2009).

Participants who receive distributions prior to retirement generally face two alternatives: They can roll the proceeds into a tax-deferred retirement account or they may use it for other purposes. When the proceeds are not rolled into another tax-deferred retirement account (such as an individual retirement account, or IRA), the withdrawal becomes a cash-out and participants must pay a 10 percent penalty (in addition to taxes) if they are younger than 59 1/2.

As evidenced in more detail in Table 14 below, younger, nonwhite, unmarried, lower-income and less-educated recipients were more likely to spend all or a part of a distribution (Purcell 2009b). Purcell (2009b) also finds that smaller distributions and those received prior to 1990 were more likely to have been partially or fully spent. Finally, distributions that were the result of some type of involuntary event (such as sickness or employer closure) were more likely to be spent.

⁷² Although loans are permitted in cash balance plans, they are rarely offered due to administration complexities.

⁷³ For a good summary of the rules related to lump-sum distributions, hardship withdrawals and loans, see U.S. GAO (2009).

⁷⁴ Although both researchers use 2004 SIPP data, Copeland (2009) includes respondents 21 and older who have left a job but not retired. Purcell's (2009b) 16.2 million includes all respondents 21 and older.

Table 14. Disposition of most recently received lump-sum distribution, lump sums received between 1980 and 2006 by individuals younger than 60

	Received a distribution (thousands)	Rolled over entire amount (percent)	Saved some of the distribution (percent)	Spent entire distribution (percent)
Age when received				
Under 35	6,003	38.0	45.0	17.0
35 to 44	4,005	49.1	37.9	13.0
45 to 54	2,859	50.1	41.3	8.6
55 to 59	1,047	57.9	34.3	7.8
Race				
White	12,219	47.1	40.0	12.9
Other	1,695	31.2	51.5	17.3
Sex				
Male	6,532	46.7	40.4	12.9
Female	7,382	43.8	42.3	13.9
Marital status in 2004				
Married	8,851	50.3	38.1	11.6
Not married	5,063	36.2	47.2	16.6
Education				
High school or less	3,072	30.2	52.7	17.1
Some college	5,375	40.2	46.0	13.8
College graduate	5,463	58.4	30.6	11.0
Monthly income in 2006				
Lowest income quartile	3,479	36.2	47.6	16.4
Second-lowest quartile	3,486	35.9	48.7	15.4
Second-highest quartile	3,472	44.4	43.3	12.3
Highest income quartile	3,477	64.2	26.1	9.7
Amount of distribution				
Less than \$5,000	4,972	26.1	52.9	21.0
\$5,000 to \$9,999	2,388	47.0	39.2	13.8
\$10,000 to \$19,999	2,277	47.7	40.4	11.9
\$20,000 or more	4,278	65.0	29.8	5.2
Reason for distribution				
Retired or quit job	7,511	51.0	36.1	12.9
All other reasons	6,402	38.3	47.6	14.1
Year of distribution				
1980 to 1989	1,794	37.4	44.4	18.2
1990 to 1999	4,846	46.9	40.8	12.3
2000 to 2006	7,274	45.9	41.1	13.0
Total	13,914	45.2	41.4	13.4

Source: CRS tabulations from the Survey of Income and Program Participation

Notes: Monthly income is person's average income over four months in 2006. Quartile rank is based on income of individuals who received a lump sum between 1980 and 2006 before age 60. Individuals with total monthly individual income of less than \$1,464 in 2006 were in the fourth (lowest) income quartile. Those with income of more than \$4,754 were in the first (highest) income quartile. Median total monthly individual income among those who had received a lump sum was \$2,876. Lump-sum distributions were adjusted to 2006 dollars.

Note. From “Pension Issues: Lump-Sum Distributions and Retirement Income Security,” by P. Purcell, 2009b, Library of Congress Congressional Research Service. Reprinted with permission.

Other research delves exclusively into withdrawals from defined contribution plans and separately analyzes cash-outs and hardship withdrawals. While the individual consequences of cash-outs and hardship withdrawals may be significant, U.S. GAO (2009) reports that less than 10 and 7 percent of 401(k) participants (a year) are affected by cash outs and hardship withdrawals, respectively.⁷⁵ The 2006 aggregate amounts involved are also relatively small: Approximately 2.7 percent of 401(k) assets are withdrawn at job change and .3 percent due to hardship. U.S. GAO (2009) reports a median cash-out of \$4,166 and a median hardship withdrawal of \$3,123 in 2006.

Cash-outs from defined contribution plans tend to be taken by participants who are younger, with lower incomes and lower account balances (Munnell, 2012, Aon Hewitt, 2011).^{76,77} The consequences can be significant. The EBRI/ICI 401(k) Accumulation Projection Model estimates that cash-outs at job change reduce the median estimated replacement rate for lower-income participants in voluntary plans by 21 percent (Holden & VanDerhei, 2002).

In-Service Withdrawals

Plan recordkeepers report that between 6.9 percent (Aon Hewitt, 2011) and 4 percent (Vanguard Group, 2013) of participants took in-service withdrawals (which include hardship withdrawals) in 2010 and 2011, respectively.⁷⁸ Aon Hewitt’s data show that in-service withdrawals have trended upward from 2006, when 4.9 percent of participants took them. Approximately 20 percent of these withdrawals are hardship withdrawals. Vanguard Group (2013) and Fidelity Investments (2010) report that approximately 2 percent of participants took hardship withdrawals in 2012 and during the year ended June 30, 2010, respectively.⁷⁹ Demographics related to hardship withdrawals include:

- Forty-five percent of prior-year recipients took another hardship withdrawal in the current year (Fidelity Investments, 2010).
- Participants between the ages of 35 and 55 are more likely to take hardship withdrawals (Fidelity Investments, 2010).
- Women earning between \$20,000 and \$40,000 were twice as likely to take a hardship withdrawal as were men in the same income bracket (Fidelity Investments, 2010).

The average hardship withdrawal at Fidelity was \$6,000 (measured over the year ended June 30, 2010), which is similar to that reported by Aon Hewitt (2011), which was \$5,510 in 2010. The

⁷⁵ U.S. GAO’s (2009) report is based on SIPP data from the 1996, 2001 and 2004 panels for 401(k) participants between the ages of 15 and 60, inclusively.

⁷⁶ For a more complete analysis of withdrawal recipients, see Butrica, Zedlewski and Issa (2010). This work uses recent SIPP data to analyze the recipients of and reasons for preretirement cash-outs and withdrawals.

⁷⁷ Munnell (2012) is based on the most recent SCF data.

⁷⁸ Aon Hewitt’s data is derived from the behaviors of 1.8 million participants in 110 large defined contribution plans. Vanguard reports on the activities of 3 million participants in 1,700 plans.

⁷⁹ Fidelity’s analysis is based on the behaviors of 11 million participants in nearly 17,000 plans as of June 30, 2010.

most common reasons for hardship withdrawals are: to prevent eviction (50.4 percent), education costs (12.6 percent), medical costs (12.6 percent), past-due bills (7 percent), home purchase (6.3 percent) and tax payments (4 percent) (Aon Hewitt 2011).

The reasons for hardship are also often given for any withdrawal, as reported in Butrica, Zedlewski and Issa (2010). Amromin and Smith (2003) posit that withdrawals with penalties are perhaps rational attempts by liquidity-constrained households to smooth consumption as opposed to “squandering of pension assets.”⁸⁰

Loans

Loans can be another form of leakage, especially if there is a default, as is typically the case when a terminating employee has an outstanding loan (Lu, Mitchell, & Utkus, 2010).⁸¹ U.S. GAO (2009) estimates leakage attributable to plan loans in defined contribution plans to be \$8 billion in 2006; however, some researchers suggest that future leakage could be much more significant due to the recent economic downturn. Litan and Singer (2012) estimate that loan leakage could increase to as much as \$37 billion.

Citing the U.S. Department of Labor, VanDerhei et al. (2012) report that plan loans represent a negligible portion of plan assets. This is despite the fact that most participants are in defined contribution plans, which permit loans. In EBRI’s database, 87 percent of participants had access to loans in 2011 (VanDerhei et al., 2012), but access varied widely by plan size. Thirty-four percent of very small plans (10 or fewer participants) offer a loan provision, whereas 93 percent of plans with 10,000 or more participants do. Approximately 20 percent of participants who have access to plan loans take advantage of the provision; again, this varies by plan size, ranging from 19 to 24 percent (VanDerhei et al., 2012). At the end of 2011, the median and average loan amounts outstanding were \$3,785 and \$7,027, respectively, which were slightly higher than prior year amounts (VanDerhei et al., 2012).

Workers in the middle of their careers are more likely to borrow from their retirement-plan assets (VanDerhei et al., 2012; Lu & Mitchell, 2010; Aon Hewitt, 2011). When demographic and other variables are controlled for, tenure is positively related and compensation is negatively related to having a loan (Beshears, Choi, Laibson, & Madrian, 2011; Utkus & Young, 2011). Loan amounts, expressed as percentages of total balance, correlate positively with compensation and show a tendency to be larger among middle-age workers (Beshears et al., 2011). Utkus and Young (2011) also find that loan-taking is related to lower levels of financial literacy and education, as well as the failure to fully pay credit card balances each month.⁸²

The loan provisions also play a role in both the propensity to take a loan and the amount of the loan taken.⁸³ As expected, the higher the interest rate charged, the lower the likelihood of taking

⁸⁰ Amromin and Smith’s (2003) work is based on information contained in 10 years of tax returns (1987 through 1996) for a representative cross-section of 88,000 returns in 1987.

⁸¹ Their work is based on three years (July 2005 through June 2008) of recordkeeping data from Vanguard for 959 plans. Most of the analysis relates to the behaviors of nearly 104,000 participants who severed employment with an outstanding loan.

⁸² Utkus and Young (2011) analyze 900 participant survey responses collected in August and September 2008.

⁸³ For a thorough discussion of loan provisions, see Beshears et al., (2011, Section III). For most of their work discussed here, they use data from Aon Hewitt.

a loan. When interest rates are higher, the loan amounts tend to be higher (Beshears et al., 2011; Lu, Mitchell, & Utkus, 2010). Other relationships include: loan duration (less than five years relates to lower loan balances), number of loans permitted (probability of taking a loan is higher in plans that permit two loans, as compared to plans that permit only one or more than two (a finding dissimilar to Lu and Mitchell [2010], who find a positive relationship between the number of loans permitted and the likelihood of having a loan), and permitted loan purpose (the existence of loans to purchase a home are negatively related to loan utilization).

Additional insight is gained by considering the reasons people take loans. Using SCF data, Beshears et al., (2011) find that the most common uses of loan proceeds are to purchase (or improve) a home or other durables such as an automobile or appliance, and to pay for educational, medical and occasional expenses (such as a wedding). Utkus and Young (2011) also find that 40 percent of survey respondents used the proceeds for debt consolidation.

Borrowing from one's retirement plan is rather innocuous, assuming the loan is repaid. The EBRI/ICI 401(k) Accumulation Projection Model estimate a relatively minor reduction in median replacement rates (less than half a percentage point) as a result of loan taking in voluntary retirement plans (Holden & VanDerhei, 2002). Some researchers even suggest that certain groups would be better off if they accessed this form of credit to a greater extent (see G. Li & Smith, 2010). The risk is that the loan is not repaid (and becomes a withdrawal with taxes and penalty). Lu, Mitchell and Utkus (2010) find that 80 percent of terminating employees with an outstanding loan default. Employees with low levels of total wealth, income and retirement-plan assets show a higher probability of defaulting (Lu, Mitchell & Utkus, 2010).

The Effects of Workplace Financial Education

Empirical evidence presented thus far points to an opportunity for improvement in retirement-related decision-making, the importance of which is heightened in an environment where employees are primarily responsible for their financial security in retirement. Previously, employees' lack of knowledge about the types and features of plans offered by their employers has been covered. In this section, additional evidence related to workers' financial literacy, the implications and the results of educational attempts to improve it are presented. Readers will note that low levels of financial literacy are undisputed and that all but one study documents the expected relationship between financial literacy and financial decision-making. Positive effects of workplace financial education are reported, but most of the research analyzing actual behavioral change (rather than self-reported surveys) suggests the effects are statistically insignificant or small in absolute terms.

Financial Literacy

Americans' low level of financial literacy is well documented. For example, see Bernheim (1995, 1998), Hogarth and Hilgert (2002), Moore (2003), Harris Interactive Inc. (2005), and Lusardi, Mitchell and Curto (2010).⁸⁴ Lusardi and Mitchell (2007a, 2007b, 2008, 2009, 2011)

⁸⁴ For a more complete list of work related to financial literacy, see Huston (2010). This paper, as well as Hung, Parker and Yoong (2009), discuss the measurement and definition of financial literacy.

have made significant contributions highlighting the low level of literacy among older Americans. Their development of three basic questions for inclusion in a supplement to the HRS has demonstrated that:

- One-third of older Americans could not correctly choose (from three alternatives: more than \$102, exactly \$102 or less than \$102) the correct amount in a savings account earning 2 percent for five years.
- Nearly a quarter could not determine whether they'd be able to buy more, the same or less (than they currently could) at the end of one year if their money were in a savings account earning 1 percent and inflation was 2 percent for that year.
- Over half of respondents incorrectly thought that buying a single company stock provides a safer return than a stock mutual fund (Lusardi & Mitchell, 2011).

Implications

This level of financial illiteracy is concerning, particularly given the transfer of retirement-planning responsibility from employers to employees over the past three decades, *if* low levels of literacy are associated with poor retirement preparation. Several researchers have empirically demonstrated the existence of this connection. For example, see Bernheim (1998), who finds that financial test scores are a significant predictor (along with college degree attainment) of accumulated retirement wealth. Hilgert, Hogarth and Beverly (2003) also find statistically significant relationships between saving and investment knowledge and saving and investment behaviors in their work using University of Michigan's Surveys of Consumers from November and December 2001. Lusardi and Mitchell (2011) find their measure of financial literacy is positively associated with the likelihood of planning for retirement, as do Hung, Parker and Yoong (2009). Utkus and Young (2011) report that low levels of literacy are associated with a greater propensity to borrow from one's 401(k) plan. Brown, Kapteyn, Luttmner, and Mitchell (2011) find that the ability to make informed annuity-related choices is also correlated with higher literacy levels. However, Hung, Parker and Yoong (2009) find that financial literacy is not associated with higher savings levels.

Effect of Education

In a 2011 survey of 458 employers, SHRM found that over 50 percent of employers offer financial education to their employees; larger organizations (with between 2,500 and 24,999) were twice as likely as organizations with less than 100 employees to offer it (72 vs. 36 percent) (SHRM, 2012). Presumably, employers believe there are benefits derived from this financial education.

Recent empirical evidence directly attributing observed behavioral changes to the effects of workplace financial education programs is scant. Most research relies on self-reported data from surveys. Main takeaways from this survey-based research are that workers report some benefit from employer-based education (even workplace satisfaction, Hira & Loibl, 2005), and that the effects are stronger in some demographic segments than others. Bernheim and Garrett (2003) and

Lusardi (2004) find no effect from workplace financial education on total wealth. Employees also have greater intention than execution (Clark, d'Ambrosio, McDermed, & Sawant, 2006). One study suggests that employees have a relatively low level of retention (about 35 percent) one year later (Clark, Morrill, & Allen, 2011). Bayer, Bernheim and Scholz (2009) find no effect from printed materials and that seminar frequency is important. See Table 15 below for additional information on survey-based research.

Table 15. Survey-based research on the effects of workplace financial education

Study	Findings
Research based on individual surveys	
<p><i>Kratzer, Brunson, Garman, Kim, and Joo (1998)</i></p> <p>178 employee post-seminar surveys collected in late 1997 or early 1998 (actual date not provided)</p>	<p>The researchers state, “Most of the workers report that since their participation in the financial education workshops, they make better financial decisions, have increased confidence when making investment decisions, changed their investment strategy by appropriately diversifying or being more aggressive in their investment choices, and have an improved financial situation.”</p> <p>Also, they note that since a pre- and post-seminar survey format was not employed, the results cannot be directly attributable to the educational seminars.</p>
<p><i>McCarthy and Turner (2000)</i></p> <p>855 surveys of employees covered by the Thrift Savings Plan (collected in 1990)</p>	<p>The authors find “that written financial information provided by employers increases the self-assessed financial knowledge of employees and that individuals who have a higher self-assessment of their financial knowledge are more likely to contribute to their defined contribution pension plan and more likely to invest in risky assets.”</p>
<p><i>Muller (2001/2002)</i></p> <p>640 respondents in the 1992 HRS wave</p>	<p>Retirement education is not associated with the <i>overall</i> likelihood that participants will spend a retirement plan distribution. However, it is associated with decreases in the probability that participants age 40 and under will spend a distribution and increases in the probability that college graduates and women will.</p>
<p><i>Bernheim and Garrett (2003)</i></p> <p>Cross-sectional telephone survey of 2,055 individuals between the ages of 30 and 48, conducted in fall 1994</p>	<p>Participation rates are estimated to be 12.1 percentage points higher when employment-based financial education is offered.</p> <p>The availability of financial education is associated with higher savings rates, account balances and retirement wealth at lower saving levels (below 50th percentile).</p>

Study	Findings
	No relationship between the availability of workplace financial education and total wealth was found.
<p><i>Muller (2003)</i></p> <p>1,107 respondents in the 1992 HRS wave</p>	<p>When individuals are categorized according to their risk aversion (low, moderate, high or extremely risk averse), individuals who are highly risk averse are likely to allocate 20 percentage points more to equities after attending a retirement class.</p>
<p><i>Lusardi (2004)</i></p> <p>1992 HRS survey data (nearly 5,300 observations, approximately 500 indicating past retirement seminar attendance)</p>	<p>Positive associations between retirement seminar attendance and financial wealth and net worth are found, particularly in the lower quartiles.</p>
<p><i>Maki (2004)</i></p> <p>848 household survey responses, gathered in November 1995</p>	<p>“Respondents whose employers offered financial education were 10 percent more likely to correctly answer” (from a choice of stocks, bonds, savings accounts or certificates of deposit) which one had offered the best return over the past 20 years.</p> <p>These respondents were also less likely to report not knowing various features of their plans.</p>
<p><i>Hira and Loibl (2005)</i></p> <p>700 surveys (collected in 1999) of employees of a national insurance company who had attended a half-day employer-sponsored seminar</p>	<p>A significant, positive relationship between seminar participation and perceived improvement in financial literacy was found. In turn, a significant, positive relationship between subjective literacy improvement and confidence and optimism about the future existed in the results.</p>
<p><i>Clark et al. (2006)</i></p> <p>633 pre- and post-seminar surveys and a subsequent survey from a subset of this larger group of higher education employees from a variety of schools who attended a workplace retirement education seminar between March 2001 and May 2002</p>	<p>A significant number of post-seminar survey respondents indicated they intended to make a change in their retirement goals, savings behavior and/or investments. However, three months later, the authors find over a majority of respondents who had planned to take action had not done so.</p>
<p><i>Bayer, Bernheim and Scholz (2009)</i></p> <p>1993 (n=910) and 1994 (n=861) employer telephone surveys collected by KPMG for the KPMG Peat Marwick Retirement Benefits Survey</p>	<p>Frequently conducted seminars are associated with higher participation and contribution rates within the nonhighly compensated employee group. No effect is</p>

Study	Findings
	found from the provision of printed educational materials.
<p data-bbox="186 338 391 365"><i>Clark et al. (2011)</i></p> <p data-bbox="186 396 781 512">Pre- and post-seminar surveys from attendees at five companies collected between June 2008 and December 2009 (n=1,182), and follow-up surveys collected one year later (n=187)</p>	<p data-bbox="820 396 1393 512">Their “analysis confirms that participants believe that these [retirement] programs increased their financial knowledge and in response to enhanced financial literacy, many alter their retirement plans.”</p> <p data-bbox="820 548 1393 663">One year later, respondents’ knowledge levels remain higher than pre-seminar knowledge levels, but the average retention rate is 34.8 percent of that recorded immediately after the seminars.</p>

In studies that directly measure the effect of employee education on attendees’ actual behaviors, we see mixed results. Generally, the results are positive, and in some cases, small in absolute terms. As above, employees’ intentions exceed their execution (Madrian & Shea, 2001b), and interventions can have varying effects on different demographic segments. See Table 16 below for additional information from these behavioral studies.

Table 16. Research using administrative data to assess the effects of workplace financial education

Study	Findings
Research that incorporates behavioral administrative data	
<p data-bbox="186 1182 480 1209"><i>Clark and Schieber (1998)</i></p> <p data-bbox="186 1241 781 1297">1994 participant and plan data from 19 firms ranging in size from 700 to 10,000</p>	<p data-bbox="820 1241 1425 1356">Higher rates of participation are found when employees are offered generic educational materials (15 percentage-point increase) and tailored educational materials (21 percentage-point increase)</p> <p data-bbox="820 1388 1409 1503">The availability of generic educational materials has no impact on contribution levels, but tailored materials are associated with a 2 percentage-point increase in contribution rates.</p>
<p data-bbox="186 1554 480 1581"><i>Madrian and Shea (2001b)</i></p> <p data-bbox="186 1612 781 1787">Individual cross-sectional plan data from one company (as of five different points from June 1999 through June 2000, n=29,011) and educational seminar attendance data (indicating which employees attended a workplace seminar, which was offered from January through June 2000, n=1,779)</p>	<p data-bbox="820 1612 1419 1755">The authors find that the seminars increase plan participation and diversification into riskier assets (stocks and bonds) from money market investments in a statistically significant but small way. A majority of attendees made no changes after the seminar.</p>
<p data-bbox="186 1858 435 1885"><i>Duflo and Saez (2003)</i></p>	

<p>Randomized experiment involving in excess of 6,000 nonfaculty staff at a university to assess the influence of a number of factors, including the impact of benefit fair attendance on plan enrollment</p> <p>Researchers had access to administrative plan records</p>	<p>The authors find benefit fair attendance has a positive effect on plan enrollment that is small in absolute terms.</p> <p>They also find an upper bound of the effect of attending the benefit fair on enrollment to be 14 percentage points after 11 months.</p>
<p><i>Dolvin and Templeton (2006)</i></p> <p>72 surveys of law firm employees, some of who attended a workplace educational seminar in 2004, matched with plan administrative data</p>	<p>Seminar attendees had better diversified and more efficient portfolios with lower equity allocations than respondents who had not attended a seminar.</p>
<p><i>Choi, Laibson and Madrian (2011)</i></p> <p>Experimental survey (in 2004) of employees over the age of 59 1/2 at one company (n=678), matched with administrative records</p> <p>Treatment condition included information related to the cost of failing to take advantage of the (fully vested) company-matching contributions</p>	<p>The difference between the contribution rate changes for the control group and the treatment group (that received the informational intervention) was statistically insignificant.</p>
<p><i>Clark, Maki and Morrill (2014)</i></p> <p>Surveys (collected in March and August 2011) and administrative data for employees hired from 2008 through 2010 by one employer</p> <p>A controlled experiment to test the effects of providing a plan informational flier using nonparticipating subjects (1,370 in each of three groups) provides the data for the main findings reported here.</p>	<p>No statistically significant effect from the informational treatment is found overall. However, subjects in the treatment groups who were in the 18–24 age bracket were twice as likely as similarly aged subjects in the control group were to begin participating in the plan. A similar, statistically significant positive effect for subjects age 35–44 was also found. A statistically significant negative effect was found for subjects older than 45.</p>

Financial Decisions at Retirement

Differences between the decision-making contexts of defined benefit and defined contribution plans continue at the point of retirement with a general trend toward greater immediate accessibility to one’s retirement wealth via the availability of a lump-sum payout option in both types of plans, for which retirees generally exhibit a preference. However, life-cycle economic models suggest better outcomes for most individuals if they were to annuitize some or most of their retirement wealth. Researchers have explored a number of rational explanations for the divide between the predictions of economic models and actual observed behaviors. Coming up short, more recent efforts have focused on possible behavioral biases that may impact annuitization decisions.

In this section, we discuss the context in which the plan payout decision is made and report research results from analyses of actual and planned payout behaviors at retirement. Next, we reference research that explores possible *rational* explanations for the low levels of annuitization before covering relevant work that seeks to reveal behavioral explanations.

Retirees covered by both types of plans (defined benefit and defined contribution) may face similar distribution options, depending on plan provisions. Within the context of a defined benefit plan, retiring participants are now offered more choices than ever. Many can choose an annuity or a lump-sum payout, and in a relatively small percentage of plans, a combination of the two may be selected. In 2010, nearly a quarter of participants covered by traditional defined benefit plans in private industry could receive a lump-sum payout of their benefits, and virtually all (96 percent) of nontraditional defined benefit plan participants could (U.S. Department of Labor, 2011).⁸⁵ However, in the past, it was much more common for defined benefit plans to distribute benefits only in the form of an annuity. In 1989, only 2 percent of defined benefit plans offered by medium and large private-industry firms permitted lump-sum distributions (U.S. Department of Labor, 1990).

Retiring defined contribution plan participants may face more choices. Depending on plan provisions, they may choose a lump-sum payment, regular installments, an annuity, deferral (remaining in the plan) or a combination thereof. In a representative survey of workers retiring between 2002 and 2007 who were covered by defined contribution plans, 70 percent reported having a choice in the form of benefit distribution (Sabelhaus, Bogdan, & Holden, 2008). At the same time that a lump-sum payout feature has become more prevalent in defined benefit plans, the annuity form of payout from defined contribution plans has become less common. In 2010, less than 17 percent of defined contribution plans offered an annuity as a form of distribution, compared to nearly 38 percent of plans in 1998 (PSCA, 2011 and 1999).⁸⁶

Distribution Choices within a Defined Benefit Context

The importance of the choice of payout options from a defined benefit plan cannot be understated. Should an employee choose a lump-sum option, she takes on responsibility for (and risks associated with) investing and withdrawal decisions during her retirement years—a time when decision-making abilities of many, if not most, are on the decline (Agarwal, Driscoll, Gabaix, & Laibson, 2009). Otherwise, she receives a fixed (or inflation-adjusted) monthly payment for the rest of her life.

Given the stark difference in these two paths, one might expect more research in this area. Although limited, the research presented here (in Table 17 below) shows wide dispersion in the percentage of employees choosing a lump-sum distribution—from 12 to 96 percent—suggesting significant contextual differences, which is highlighted in work by EBRI (Banerjee, 2013). Within these contexts, correlation with individual characteristics is observed, but they do not hold across all studies. As observed throughout this review, decision-making shortcomings are evident. These include:

⁸⁵ Seven percent of private-industry workers were in traditional defined benefit plans permitting a partial lump-sum payout with a reduced annuity in 2010 (U.S. Department of Labor, 2011).

⁸⁶ For comparison purposes, the U.S. Department of Labor (2010) reports 17 percent of participants in private-industry defined contribution plans had access to an annuity form of payout in 2009.

- Choices appear to be influenced by the type of defined benefit plan (traditional vs. cash balance) (Mottola & Utkus, 2007; Benartzi, Previtro & Thaler, 2011).
- Employees exhibit “myopic extrapolation of stock market performance,” meaning that they are more likely to choose an annuity after short-term unfavorable market performance (Previtro, 2011).
- Partial lump-sum distributions appeal to retirees when annuities are more valuable (Chalmers & Reuter, 2012).

Table 17. Research on defined benefit plan choices at retirement

Study	Findings
<p><i>Banerjee (2013)</i></p> <p>Banerjee analyzes 118,730 payout decisions between 2005 and 2010 in 84 defined benefit plans that included both traditional and cash balance plans</p>	<p>Payout decisions are strongly influenced by plan design, particularly related to the extent to which lump-sum distributions are constrained. Reported annuitization rates are:</p> <ul style="list-style-type: none"> • 98.8 percent in the case of no lump-sum distribution restrictions, • 94.5 percent in traditional plans with “strong” lump-sum constraints, • 44.3 percent in plans with no restrictions on lump-sum payments, and • 22.3 percent in cash balance plans with no restrictions on lump-sum payments. <p>Annuitization rates increase with age and tenure.</p>
<p><i>Mottola and Utkus (2007)</i></p> <p>Authors analyze distribution choices from two Fortune 500 plans from 2000 through 2006: 7,000 distributions from a traditional defined benefit plan, and 21,000 distributions from a cash balance plan</p>	<p>Participants in the defined benefit plan were more likely to choose an annuity, but most preferred the lump-sum option. Twenty-seven and 17 percent of participants choose the annuity form of payout in the traditional defined benefit and cash balance plan, respectively.</p> <p>Age is a strong predictor of an increased probability of choosing an annuity. The authors estimate that a five-year increase in age results in an 8 and 7 percentage-point increase in the likelihood of choosing an annuity form of distribution from the traditional benefit and cash balance plan, respectively. Nearly half of the traditional plan participants age 70 and older chose an annuity compared with less than 20 percent for participants between ages 55 and 60. An annuity was chosen by 62 percent of cash balance plan participants age 70 and older.</p> <p>Males and higher-income participants were less likely to annuitize.</p>

<p><i>Benartzi, Previtro and Thaler (2011)</i></p> <p>Payout choices from 75 traditional defined benefit plans and 37 cash balance plans</p>	<p>Similar to above, traditional defined benefit plan participants were more likely to annuitize (53 percent) than cash balance plan participants were (41 percent).</p> <p>Regression estimates are that cash balance plan participants are 17 percentage points less likely to annuitize.</p> <p>The authors suggest framing effects.</p>
<p><i>Previtro (2011)</i></p> <p>Defined benefit plan payout choices using two data sets are analyzed. The first includes payout data for the period from 2002 through 2008 for over 103,000 retirees, enrolled in 112 different defined benefit plans from 63 different companies. The second data set includes 18,000 payout choices made by IBM retirees between 2000 and 2009.</p>	<p>Forty-nine percent of participants in the first data set chose an annuity.</p> <p>Eighty-eight percent of retirees in the second data set chose an annuity, and 6 percent chose a lump-sum distribution. The remainder selected a combination of an annuity and a lump-sum payout.</p> <p>Previtro finds a strong negative relationship between stock market returns and annuitization, estimating that an increase of one standard deviation in stock market return relates to a 6 percentage-point decrease in the probability of annuitizing.</p>
<p><i>Chalmers and Reuter (2012)</i></p> <p>Study of the payout decisions of over 32,000 retirees from the Oregon Public Employees Retirement System (PERS) between 1990 and June 2002 where retirees have the unusual option of selecting a partial lump-sum payment in exchange for a reduction in their lifetime annuity</p> <p>The annuity is calculated in two or three (depending on hire date) ways, and annuitants are automatically paid based on the highest calculated value. This feature enables the researchers to analyze the impact of the relative value of the annuity and compare its variation to lump-sum payout preferences.</p>	<p>Eighty-five percent pass up the opportunity to take a partial lump sum.</p> <p>Retirees show greater preference for lump-sum distributions precisely when the annuity is more valuable, even controlling for market performance, which could motivate a preference for lump-sum payouts.</p> <p>As standard economic theory might predict, the following individuals were more likely to choose a lump-sum payout: those with shorter post-retirement lives, retirees who died within the first two years following retirement, retirees who were less risk averse, shorter-tenured PERS employees and lower-income retirees.</p>
<p><i>Medill (2009)</i></p> <p>1997 study of 1,607 payouts from the Nebraska Public Employees Retirement System (a defined benefit system)</p>	<p>Less than 4 percent chose an annuity at retirement</p>

Distribution Choices within a Defined Contribution Context

While some workers have access to installment payments and an annuity form of distribution, most workers retiring from a company that sponsors a defined contribution plan have two choices: take it or leave it (assuming the balance is over \$5,000). In the research summarized in Table 18 below, virtually all of which is based on survey work, a very strong preference for lump-sum distributions is observed. While taking a lump-sum distribution may allow retirees to take advantage of greater investment and tax planning flexibility, often, lower-cost investments are available in a company-sponsored plan due to the plan’s purchasing power.

Table 18. Research on defined contribution plan choices at retirement

Study	Findings
<p><i>Utkus and Young (2010)</i></p> <p>Post-termination behaviors of 133,300 plan participants 60 and older with average account balances ranging from \$110,000 to just under \$150,000 (depending on year of termination) who terminated between 2004 and 2008</p>	<p>In plans that permit partial distributions, a higher percentage (27) of participants remained in the plan five years after termination. In plans that did not permit partial distributions, 18 percent of participants chose to remain in the plan. However, only about 10 percent of plans in their data set permitted partial distributions.</p> <p>Table 19 summarizes their results.</p>
<p><i>Ameriks (2004)</i></p> <p>TIAA-CREF participants taking distributions between 1978 and 2001</p>	<p>After introduction of other forms of distribution in 1989, selection of the annuity form of distribution declined steadily, and by 2001, it was chosen by less than half of participants retiring from a TIAA-CREF defined contribution plan.</p>
<p><i>Clark, Morrill and Allen (2014)</i></p> <p>Survey of intentions of 620 older employees in two companies that offer both a defined benefit plan and a defined contribution plan (in 2008 and 2009)</p>	<p>Over 70 percent of respondents reported they would take the annuity form of distribution from their defined benefit plan and a lump-sum distribution from their defined contribution plan.⁸⁷</p>
<p><i>Sabelhaus, Bogdan and Holden (2008)</i></p> <p>Two surveys of individuals who retired from companies that sponsored defined contribution plans (between 1995 and 2000 in one survey [n=418] and between 2002 and 2007 in another [n=420])</p>	<p>Forty-seven and 54 percent of retirees with a distribution choice reported taking a lump-sum distribution in the 2000 and 2007 surveys, respectively.</p> <p>About a quarter of participants (with a distribution choice) deferred distribution and nearly as many</p>

⁸⁷ The purpose of this study was in part to assess participant responses after attending an educational seminar, and these percentages are post-seminar results. Pre-seminar results were slightly lower for the annuity form of payment from the defined benefit plan (but still in excess of 70 percent) and approximately 7 percentage points higher for the lump-sum payment of defined contribution assets.

Study	Findings
	<p>indicated they had purchased an annuity in both surveys.</p> <p>Ten percent elected to receive installment payments (in both surveys).</p> <p>Of the respondents who reported they had received lump-sum distributions, 62 percent said they had reinvested all of the proceeds. Twenty-four percent said they had reinvested some and spent some, and the remaining 14 percent said they had spent it all.</p>
<p><i>Johnson, Burman and Kobes (2004)</i>⁸⁸</p> <p>Data from the 1992 through 2000 HRS waves</p>	<p>Approximately one-third of participants leaving their jobs after the age of 55 left their money in the plan; another third rolled it into an IRA.</p> <p>Approximately 15 percent withdrew or made other (unknown) choices.</p> <p>Four percent chose to annuitize their retirement assets.⁸⁹</p> <p>Individuals with lower account balances, lower income and less schooling are more likely to withdraw their assets. Table 20 summarizes these results.</p>

Table 19. Participant distribution behavior as of year-end 2009, participants 60 and older by termination year

	Year of Termination				
	2004	2005	2006	2007	2008
Percent of participants at year-end 2009					
Rollover	57%	59%	58%	55%	47%
Cash	22%	20%	19%	19%	19%
Remain in plan	11%	13%	16%	19%	27%
Combination	6%	5%	5%	5%	5%
Installments	4%	3%	2%	2%	2%

Note. From “Distribution Decisions Among Retirement-Age Defined Contribution Plan Participants” by S.P. Utkus and J.A. Young, 2010. ©2010 by Vanguard. Modified with permission.

⁸⁸ Hurd and Panis (2006) study this same data and find a vast majority (79 percent) of retirees keep their money in the company-sponsored defined contribution plan. Another 14 percent cashes out, and 6 percent annuitizes.

⁸⁹ The authors report that of those who left their jobs after the age of 65, 10 percent annuitized.

Table 20. Disposition of DC plan assets for adults 55 and older, 1992–2000

	Percent of sample	Convert to an annuity	Roll over into IRA	Withdraw	Leave to accumulate	Other
All	100%	4%	34%	15%	33%	14%
Gender						
Male	53	4	36	12	33	15
Female	47	3	32	18	34	13
Age						
55–59	54	2	34	13	31	19
60–64	34	4	35	16	37	9
65 and older	12	10	29	21	34	6
Education						
Not high school graduate	16	5	40	26	19	10
High school graduate	35	3	35	17	32	14
Some college	22	3	34	14	33	15
College graduate	26	5	29	8	42	17
Race						
Non-Hispanic white	84	3	35	14	33	15
Non-Hispanic black	8	8	22	20	36	14
Hispanic	4	8	20	23	41	8
Other	3	0	50	26	19	12
Marital status						
Married	74	4	34	13	34	15
Divorced or separated	8	5	33	11	34	17
Widowed	15	5	35	23	29	8
Never married	3	0	28	23	37	12
Children						
No children	20	3	26	14	24	33
Any children	80	4	36	15	35	10
One child	9	4	49	14	20	13
Two children	24	1	41	14	35	10
Three or more children	47	5	31	17	39	9
Employment status						
Full time	29	1	32	14	38	15
Part time	12	4	40	12	33	11
Not working	57	5	34	17	31	14
Size of DC balance						
Bottom quintile	20	1	24	38	23	15
Second quintile	20	2	35	21	33	9

	Percent of sample	Convert to an annuity	Roll over into IRA	Withdraw	Leave to accumulate	Other
Third quintile	20	7	36	6	38	13
Fourth quintile	20	7	35	5	40	14
Top quintile	20	2	40	5	33	21
Household net worth						
Bottom quintile	20	4	23	33	23	17
Second quintile	20	5	28	16	36	14
Third quintile	20	3	33	11	35	19
Fourth quintile	20	3	41	8	43	7
Top quintile	20	5	45	6	31	13
Household income						
Bottom quintile	20	5	36	27	21	12
Second quintile	20	3	37	18	34	10
Third quintile	20	4	31	13	37	15
Fourth quintile	20	4	30	9	40	18
Top quintile	20	4	37	8	37	14

Note. From “Annuitized Wealth at Older Ages: Evidence from the Health and Retirement Study,” by R.W. Johnson, L.E. Burman, and D.I. Kobes, 2004, Final Report to the Employee Benefits Security Administration U.S. Department of Labor. ©2004 by The Urban Institute. Reprinted with permission.

Single-Life or Joint-and-Survivor Annuity?

As has been seen throughout this paper, a significant portion of participants tends to passively accept default choices. However, Johnson, Uccello and Goldwyn (2005) have a different finding when it comes to the acceptance of joint-and-survivor annuities. In both defined benefit and defined contribution plans, the default annuity choice is one that continues to pay benefits for as long as one of the couple lives (a joint-and-survivor annuity). Should a married participant prefer a single-life annuity, action (spousal consent) is required. Their study using HRS data analyzed annuity choices found that nearly 30 percent of married men and 70 percent of married women chose single-life annuities (Johnson, Uccello, & Goldwyn, 2005). They further review other potential sources of survivor protection and when other sources are considered, only 7 percent of married men and 3 percent of women choose single-life annuities.

Disposition of Lump-Sum Payouts

For insight into the disposition of lump-sum payouts, research by Moore and Muller (2002), Hurd and Panis (2006), Purcell (2009b) and Verma and Lichtenstein (2006) is useful. Although these works include analyses of distributions at any time in workers’ careers, one can reasonably assume that a portion of activity of the 65-and-over population relates to retirees. Copeland analyzes 2004 SIPP data to determine that approximately 44 percent of lump-sum distribution recipients who were 65 or older contributed at least a portion to tax-qualified savings accounts

(2009).⁹⁰ Nearly 28 percent of recipients used some portion to pay for a home, business or debt reduction. Another 23 percent reported that the funds were partially used for consumption (Copeland, 2009).

The Annuity Puzzle

Most theoretical economic models predict that partial or full annuitization of retirement wealth is rational for risk-averse individuals under a relatively wide range of conditions (Yaari, 1965; Mitchell, Poterba, Warshawsky, & Brown, 1999; Davidoff, Brown, & Diamond, 2005; Gong & Webb, 2008).⁹¹ And yet, a relatively low level of annuitization is observed. This difference between theoretical predictions and observed behaviors has come to be known as the “Annuity Puzzle.”

Early efforts to explain the annuity puzzle focused on rational explanations for individuals’ preferences.⁹² First, some retirees already receive sufficient annuity income from Social Security and defined benefit plans (Dushi & Webb, 2004), but Brown, Casey and Mitchell (2008) demonstrate this to be an insufficient explanation. Second, bequest motives may reduce the optimal level of annuitization (Friedman & Warshawsky, 1990; Bernheim, 1991; Laitner & Juster, 1996; Lockwood, 2012), but the importance of bequest motives within the American population is not clear (Hurd, 1989; Brown, 2001; Kopczuk & Lupton, 2007). Third, a family support system may enable risk sharing, thereby reducing the need for annuities (Kotlikoff & Spivak, 1981; Brown & Poterba, 2000; Brown, 2001). Concerns about future large, unpredictable expenditures such as health care may also reduce the attractiveness of illiquid annuities (Sinclair & Smetters, 2004; Turra & Mitchell, 2004). Finally, the high loads due to adverse selection could also explain the lack of annuity purchases, but researchers have found this to be an incomplete explanation (Mitchell et al., 1999, Brown et al., 2008). In fact, it is generally accepted that rational explanations fail to fully account for the low levels of annuitization (Brown, 2007).

In the continued quest to solve the annuity puzzle, investigators have begun to explore behavioral biases that may impact annuity-related decision-making. To date, researchers have suggested several behavioral biases that may help solve the annuity puzzle: loss aversion (Hu & Scott, 2007; Brown, 2007), an endowment effect stemming from loss aversion (Gazzale & Walker, 2009), mental accounting (Hu & Scott, 2007; Brown, 2007) and framing (Agnew Anderson, Gerlach & Szykman, 2008; Brown, Kling, Mullainathan, Wiens, & Wrobel, 2008; Benartzi, Previtro and Thaler, 2011), among others (see Brown, 2007). Work by Brown et al. (2011) also suggests that complexity and literacy may also have an impact on annuitization. Below we briefly describe each of these behavioral biases and selected research papers.

Hu and Scott (2007) were one of the first research teams to set forth specific theories on behavioral biases that may explain annuity purchase behaviors. In contrast to the standard utility

⁹⁰ Verma and Lichtenstein (2006) report similar results from their analysis of 2003 SIPP data.

⁹¹ However, Reichling and Smetters (2013) find that when stochastic, rather than deterministic, survival probabilities are modeled, annuitization is not appropriate for most households.

⁹² For a complete review of possible explanations, including those that are supply-related, see Brown (2007).

model, they develop a behavioral model that reflects mental accounting (Thaler, 1985) and cumulative prospect theory (Tversky & Kahneman, 1992), finding these biases theoretically explain, at least in part, why more people don't annuitize.⁹³ As it relates to the annuity purchase decision, mental accounting could be at work if individuals narrowly think about the annuity as a separate and distinct gamble in which they can win only if they live long enough for the annuity to pay off, without considering its potential effect on their overall lifelong consumption.

Cumulative prospect theory, as set forth by Tversky and Kahneman (1992), relates to several behavioral biases and is based on the combination of three aspects of decision-making: individuals' use of a reference point against which a decision will be evaluated (rather than a final outcome), the tendency to overweight extreme events with low probabilities of occurrence and loss aversion. Its application to the annuitization decision is obvious. The reference point would tend to be the status quo, which in the case of a single-premium life annuity, would be the ownership of liquid assets equivalent to the annuity purchase price, the extreme event that could be overweighted is an early death, and Hu and Scott (2007) simply explain the effect of loss aversion. "Loss aversion always reduces the attractiveness of annuities. Simply put, an actuarially fair immediate annuity will be rejected because the loss from possible early death looms twice as large as a gain possible from living long enough to earn back the annuity premium."

How the annuity choice is framed matters (Agnew et al., 2008; Brown et al., 2008).⁹⁴ Using a controlled experiment with 945 nonstudent subjects⁹⁵ in Williamsburg, Virginia, Agnew et al. (2008) found that both women and men were less likely to choose an annuity when they had viewed a five-minute slide show negatively framing annuities. However, only men were affected by a negative investment frame. The authors suggested that perhaps women are only impacted by negative frames that disconfirm prior beliefs. (The authors found that even after controlling for risk aversion and literacy, women were more likely to choose annuities than men were.)⁹⁶

Brown et al. (2008) also find strong framing effects in a between-subject online survey of 1,342 panel subjects, all over the age of 50. They frame four financial products (without using the names of the financial products) using a consumption frame and an investment frame and ask survey participants to indicate their preferences.⁹⁷ They find a majority of individuals prefer the annuity to the other financial products when the consumption frame was used. However, this was not the case when the financial instruments were framed in investment terms. In this condition, a majority of subjects preferred the alternative financial product.

The survey was structured to also test the effects of bequest motives, the loss of liquidity (associated with the annuity option), the mortality premium and principal protection. The researchers find preference for the annuity did decline (in both frames) when a strong bequest

⁹³ Hu and Scott (2007) also posit other behavioral biases potentially affecting the annuity purchase decision but do not quantify them. These include the availability heuristic, fear of illiquidity, hyperbolic discounting and risk vs. uncertainty.

⁹⁴ Benartzi, Previtro and Thaler (2011) also suggest framing effects as an explanation of their finding that participants in cash balance plans are less likely than participants in traditional defined benefit plans to annuitize.

⁹⁵ Subjects ranged in age from 19 to 89 with a variety of income and education levels. The average ages of female and male participants were 54 and 56, respectively.

⁹⁶ The authors also tested default effects and found none but offered this may have been caused by their use of a weak default.

⁹⁷ See Brown et al. (2007) for a complete description of the survey instrument.

motive was present, but in most cases, a majority still preferred the annuity when the consumption frame was used. The illiquidity of the annuity did not impact preference for the annuity in the consumption frame condition, but this was not the case when the investment frame was used. Additionally, the mortality premium had a positive effect when the consumption frame was in force, but had little or a negative effect when the options were framed as investments. As the researchers had hypothesized, principal protection is highly valued when the options are framed as investments.

In the first round of surveys, no purchase price for the financial instrument was mentioned. This was added to a follow-up survey; a summary of results is presented below in Table 21.

Table 21. Percent of respondents preferring annuities to alternative products comparison of investment, consumption and modified consumption frames

	Investment Frame % (1)	Consumption Frame % (2)	Modified Consumption Frame <i>(\$100,000 initial investment mentioned for each product)</i> % (3)
Life Annuity (\$650 per month) compared to:			
Traditional savings account 4% interest	21	72	68
20-year period annuity \$650 per month	48	77	79
35-year period annuity \$500 per month	40	76	73
Consol bond \$400 per month forever	27	71	70
N	321	352	406
Survey Arm	IB	IA	IIA

Note. From, “Research Brief: Framing, Reference Points, and Preferences for Life Annuities,” by J.R. Brown, J.R. Kling, S. Mullainathan, G.R. Wiens and M.V. Wrobel, 2008. ©2008 Brookings Institution. Reprinted with permission.

Notes:

1. Each question described two fictitious men’s decisions for investing/spending in retirement and asked, “Who has made the better choice?” All decisions were described in terms of amount and durations; the terms “annuity,” “savings account” and “bond” were not used to label decisions.
2. The Investment frame (Arm IB) used terms such as “invest” and “earnings,” described periods in terms of years, mentioned the value of the initial investment (\$100,000 in every case), and alluded to the account value at other points in the survey. The Consumption frame (Arm IA) used terms such as “spend” and “payment,” described periods in terms of the individual’s age, and never alluded to an account or its value. The Modified Consumption frame (Arm IIA) is the same as the Consumption frame, with the added mention of the initial payment (\$100,000 in every case) and added allusions to this account value at other points in the survey.
3. Standard errors range from 2.0 to 2.08 percentage points.
4. All survey respondents were 50 or older.
5. Survey Arms IA and IB were collected via an Internet survey in December 2007; Survey Arm IIA was collected via a separate Internet survey in April 2008.

Gazzale and Walker (2009) explore a possible endowment effect owing to the endowment of an annuity in the case of the traditional defined benefit plan and a lump-sum payout in the case of the cash balance plan. In their controlled laboratory experiment, 373 George Mason University students played a game to earn either annuity income or stock wealth. In a third condition, subjects earned nothing (no endowment). They were further allocated to either a sequential or simultaneous framing condition to determine the end of the annuity payout stream. In the sequential frame, subjects had to survive each round to continue, whereas in the simultaneous frame, a single draw determined the length of participation. The authors suggest that the stock-wealth endowment, sequential condition mimics the current frame for 401(k) participants.

The authors find participants in the annuity and no endowment treatment conditions were more likely to choose the annuity form of payout than participants in the lump-sum condition, regardless of the survival probability condition (sequential or simultaneous). They attribute this to an endowment effect stemming from loss aversion (prospect theory). Overly simplified, the endowment effect relates to the difference between the amount one is willing to pay for something and the amount he is willing to accept for something (his endowment) (Thaler, 1980). Research has found several circumstances where people have required a selling price that is about twice the price they would pay for it (Kahneman, Knetsch, & Thaler, 1990; Carmon & Ariely, 2000).

In addition, subjects in the sequential treatment condition were less likely to choose the annuity option than subjects in simultaneous condition. When risk-related measures were included in their regression model, the model estimates an effect of the sequential frame of lowering the probability of choosing an annuity by 15 percentage points. They attribute this to subjects overweighting the probability of dying early, relative to the probability of a long retirement (Gazzale & Walker, 2009).

Recent experimental survey work by Brown et al. (2011) highlights the role of complexity and literacy on consumers' ability to value annuities. Specifically, over 2,000 subjects from RAND's American Life Panel traded off between a hypothetical Social Security annuity and a lump-sum payment. They find that subjects valued the Social Security annuity more highly when asked to give them up than they did when given the option to buy them. Further, a series of trade-off inquiries produced uninformed, inconsistent choices among those with lower levels of literacy. The team suggests additional research to further explore their hypothesis that the complexity of the annuity decision may be a factor in consumers' annuity purchase decisions.

Conclusion

It certainly is easy to frame a review of research that provides insights into employees' retirement-related financial decision-making, knowledge and perceptions as a proverbial "glass half empty." As the retirement system in the United States has evolved over the last 30 years into one in which individuals directly shoulder the responsibility for funding their retirement years, we have had the opportunity to observe myriad shortcomings in their decision-making, as covered herein. Workers value retirement benefits, but many don't understand them. Albeit a

small percentage, some don't even know they are contributing to a retirement plan. While there is certainly significant evidence that employees simply follow the "path of least resistance" (Choi et al., 2002), which may mean they never begin saving if they happen to work for a sponsor with traditional enrollment processes, there is also ample evidence that sometimes they actively choose. Many times, choices, whether passively or actively made, are suboptimal with costly consequences. Overwhelmed by choice, employees may fail to diversify and choose investments that are too conservative. Or, they may simply split contributions among a manageable number of options. They may ignore the fine print, look in the rear view mirror, and invest in what has historically been the best performing fund, without regard for the risk involved. Employer stock seems safe, possibly because it is familiar. Retirement savings are often lost at job change with the potential effect of slashing retirement income by two-thirds. None of this should be surprising because financial literacy is abysmally low and financial education is often ineffective. Over 40 percent of baby boomers are at risk of not having enough money in retirement (VanDerhei, 2012). Finally, few retirees purchase an annuity to protect themselves in the event they outlast their money.

However, there is another frame. The retirement saving glass can also be viewed as one that is half full with many stakeholders working hard to fill it. It has been only 30 years that workers have been saving for retirement in 401(k) plans, the most popular type of defined contribution plan. How would plan sponsor decision-making have been evaluated in the early 1900s—just 30 years after the first known defined benefit plans began? A frequent precursor to improvement is identifying the nature and source of the problem. As evidenced by much of the research described herein, researchers and industry leaders have made significant contributions doing just that. They have observed the predictable, irrational (and human) tendencies that undermine fully rational decision-making. But not only have researchers and industry leaders uncovered decision-making shortcomings and quantified their potential impact, they have also shown ways to motivate better choices and outcomes by exploiting the very behavioral tendencies that can hinder retirement outcomes. Automatic enrollment and automatic salary-deferral increase programs turn inertia into positive outcomes by increasing participation and contribution rates. Automatic and simplified enrollment reduce choice overload, making it easier for employees to become participants. Researchers are uncovering behavioral aspects of the annuity purchase decision, showing that individuals' perceptions are greatly influenced by framing, the endowment effect and product complexity. Additional decision-making "prescriptions" and improved outcomes are likely to follow.