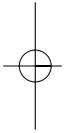
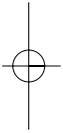


# **Pension Design and Structure**

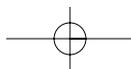
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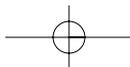
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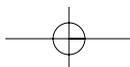
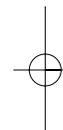
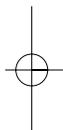
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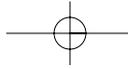
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## Chapter 1

# **Lessons from Behavioral Finance for Retirement Plan Design**

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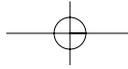
*Olivia S. Mitchell and Stephen P. Utkus*

Participant-directed defined contribution (DC) plans have become the cornerstone of the private-sector retirement system around the world. In the United States, participant choice has spread not only to pensions, but also to a great many other aspects of the employee benefit package as well, including healthcare plans, flexible benefit programs, and time-off arrangements. The trend toward giving participants more choice also underlies recent proposals to reform Social Security by adding personal accounts, and Medicare proposals to permit seniors to choose whether they want a public versus a privately managed healthcare plan. Participant-managed DC plans are the main feature of national pension reforms already implemented in many Latin American nations, as well as in Germany, Sweden, and most recently, Russia.

Underlying this global movement spurring participant choice is an implicit assumption about behavior: That the employee–citizen to whom the responsibility of choice has been handed is a well-informed economic agent who acts rationally to maximize his self-interest. To this end, it is assumed that he can interpret and weigh information presented regarding options offered by employers and governments, appropriately evaluate and balance these choices, and then make an informed decision based on a weighing of the alternatives.

Recently, however, a different perspective has emerged regarding how “real” people make economic decisions, one developed by social scientists working at the interface of economics, finance, psychology, and even sociology. This perspective is consistent with the fundamental economic proposition that people can and do try to maximize their self-interest, but it also recognizes that such decisions are often made with less-than perfect outcomes. In the real world, peoples’ decisions are subject to “bounded rationality,” as Herbert Simon called it (Simon, 1955). Certain types of decisions and problems may be simply too complex for individuals to

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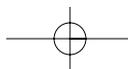
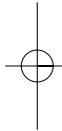
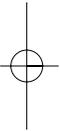
master on their own. There is also what Mullainathan and Thaler (2000) call “bounded self-control”—individuals have the right intentions or beliefs, but they lack the willpower to carry out the appropriate changes in behavior. And last, there is the problem of “bounded self-interest” or “bounded selfishness” (Mullainathan and Thaler, 2000). This acknowledges that many people do seek to maximize their personal welfare, yet they prove far more cooperative and altruistic than economic theory predicts they will be.

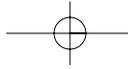
These new notions of how people make decisions have spurred the rapidly growing fields of *behavioral economics and finance*. The central question addressed by this research is how markets work and how consumers make decisions when some (or even many) people labor under such mental or emotional constraints and complications.<sup>1</sup> This research is having a profound impact on the way analysts now view varied aspects of economic and financial life, including the ways in which we understand how people decide to save, invest, and consume.<sup>2</sup> The goal of the present chapter is to evaluate key aspects of this new behavioral research in the light of what it tells us about better ways to design and manage retirement systems. In what follows, therefore, we analyze what insights this literature offers us on how workers decide to save, how they manage their retirement investments, and ultimately how they decide to draw down their assets in retirement. Our aim, in particular, is to understand how workers and retirees might deviate from the rational, all-knowing economic agents that underpin economic theory and often retirement plan design. Finally, we discuss implications of this literature for plan sponsors and policymakers who must design, regulate, and evaluate the institutions that help provide for economic security in old age.

#### **The Decision to Save**

Understanding why people save, and what they invest in, are questions of central importance to economists and policymakers. With the growth of DC saving plans in the United States and around the world, especially plans having a 401(k) or employee contributory feature, it is clear that having a meaningful retirement benefit depends increasingly on participants’ decisions to save and invest in their retirement plans.

Neoclassical economic theory casts the saving outcome as the result of people trading off current versus future consumption. Thus, households are thought to compare the benefit gained from consuming their income today, with the benefits of deferring some of that income into the future. This is what is thought to drive contributions to a 401(k) or individual retirement account, with the goal being to save for retirement. The life-cycle model of saving posits that individuals are rational planners of their consumption and saving needs over their lifetimes, taking into account the interests of their heirs (Modigliani and Brumberg, 1954). During their younger years, workers





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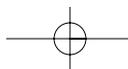
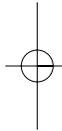
tend to be net dissavers, borrowing from the future by means of debt to boost current consumption; middle-aged individuals become net savers and purchasers of financial assets and enter “accumulation” phase, during which they stockpile assets for the final, retired phase of life. As labor earnings decline or disappear, people then decumulate or draw down their financial assets to finance old-age consumption. According to the tenets of life-cycle theory, people will logically develop assets for retirement that will be sufficient to protect them from unexpected declines in their standard of living in old age.

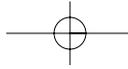
On balance, the life-cycle theory is thought to do a reasonable job of explaining patterns of household saving behavior. Saving generally rises with income and age, and it is positively associated with education and total wealth. Young households generally have more debt than assets, while prime-aged households do appear to begin saving more and accumulating financial holdings. Finally, in retirement, people do tend to consume portions of their financial assets as they age.<sup>3</sup>

On the other hand, some saving behavior appears to be at odds with the theory. Consider, first, a fundamental question: How good are households at calculating an appropriate saving goal for retirement? Arguably, if the life-cycle analysis is true, households should have some demonstrated skill at estimating their needs for retirement, and analysis of actual savings behavior should demonstrate some reasonably widespread competency at the task. Yet, superficially the retirement savings problem is perhaps an ideal illustration of Simon’s “bounded rationality.” Being good at retirement savings requires accurate estimates of uncertain future processes, including lifetime earnings, asset returns, tax rates, family and health status, and longevity. In order to solve this problem, the human brain as a calculating machine would need to have the capacity to solve many decades-long time value of money problems, with massive uncertainties as to stochastic cash flows and their timing.

In fact, survey and empirical research suggests that individuals are not particularly good at the retirement savings problem. Relatively few people feel they are able to plan effectively for retirement (Lusardi, Chapter 9, this volume). Indeed, surveys repeatedly find that fewer than 40 percent of US workers have calculated how much they will need to retire on, 30 percent have not saved anything for retirement, and only 20 percent feel very confident about having enough money to live comfortably in retirement (EBRI, 2003).

Furthermore, the empirical evidence suggests that failing to save enough also has serious negative consequences. A recent study of post-retirement consumption patterns indicates that US workers experience an unexpected decline in their standard of living after retirement (Bernheim, Skinner, and Weinberg, 2001). This consumption drop is even more precipitous in the United Kingdom (Banks, Blundell, and Tanner, 1998).<sup>4</sup> Other research





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suggests that only 30 percent of pre-retirees are fully prepared for retirement at age 65 in the United States (Moore and Mitchell, 2000). Of the remaining group, another 30 percent is likely to close the savings gap by age 65, though this hardly appears to be evidence of a long-term, lifelong rational planner at the heart of the life-cycle model. Finally, fully 40 percent appear unlikely to achieve a reasonable standard of replacement income by age 65. The numbers are much more pessimistic if retirement is planned for age 62, when the median American typically retires.

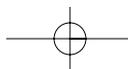
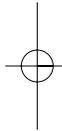
Behavioral economists would not find it surprising that people struggle with retirement saving in view of the problem's complexity. Indeed, many would take it as *prima facie* evidence that large groups of workers do not "get the saving problem right," contrary to the assumption of rationality and wise planning underlying the life-cycle model.

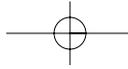
### The Problem of Self-Control

What might explain this lack of retirement preparation? Behavioralists tend to rely on a straightforward psychological explanation called "lack of willpower." This explanation is often described as "bounded self-control": That is, people try to save for retirement, but they too often prove to be limited in their capacity or desire to execute intentions (Thaler and Shefrin, 1981). In a sense, saving for retirement requires behavior similar to those undertaken in other behavior modification programs such as exercising, dieting, quitting smoking, or following through on New Year's resolutions. It would seem that while people intellectually "understand" the benefits of a specific behavior, and they may even have some idea of how to get started, they have difficulty implementing their intentions. Too often, they struggle to take action, and when they do act, their behaviors are often half-hearted or ineffective.

What evidence is there that problems of self-control may be important deterrents to saving for retirement? One body of researchers offers practical and theoretical insights into how individuals make tradeoffs regarding risk and time. Psychologists have shown that peoples' near-term discount rates are much higher than their long-term discount rates (Laibson, Repetto, and Tobacman, 1998). In Thaler's (1981) formulation, people confronting long-term decisions can exhibit high levels of patience. For instance, they might say "If I can receive an apple in 100 days and two apples in 101 days, I'll be happy to wait the extra day for another apple." But when the decision shifts to the present, their patience wears thin and they think: "I'd rather have an apple today than wait for two tomorrow."<sup>5</sup>

In standard time value of money calculations, discount rates are postulated to remain constant over time, so they do not vary today, tomorrow, or a year from now. Given this assumption, one dollar saved today would be perceived to be worth exponentially more (e.g. \$5.74) in 30 years' time





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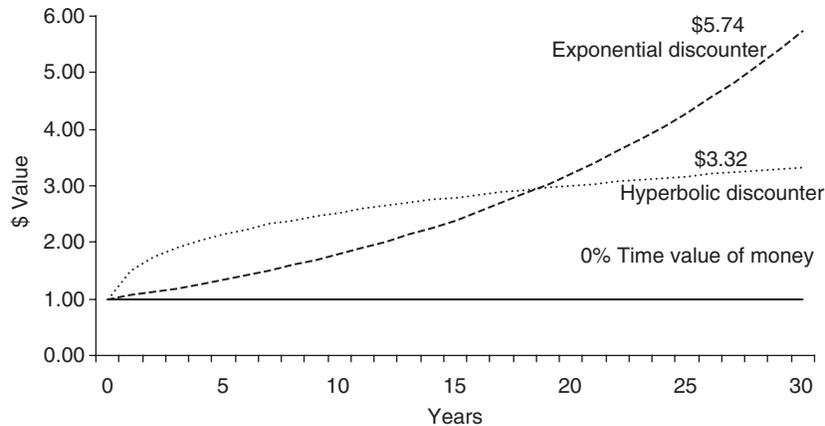
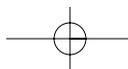


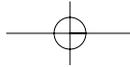
Figure 1-1. Exponential versus hyperbolic discounters—growth of \$1 over time.

Source: Authors' calculations.

(Figure 1-1). But when individuals are “hyperbolic discounters,” they apply high discount rates to the near term and lower discount rates to the future. In this case, one dollar’s worth of saving today is perceived as growing more rapidly in the short run, and less in the longer run. Hence the incremental gains from extending one’s time horizon are perceived to be relatively modest, compared to those of the conventional “exponential discounter.” As illustrated by the increasing slope of the exponential line, exponential savers foresee ever-increasing rewards to deferring consumption by another year. For hyperbolic discounters, rewards are left to accelerate quickly, and then taper off. Put simply, workers who are hyperbolic discounters place a lower value on future benefits and overvalue the present. The application to retirement is clear: They will overconsume today and undersave, as a result of self-control problems when it comes to saving for retirement.

Decision theorists working in this vein seek to understand the self-control problem in a deeper way, delving into the structure and processing mechanisms of the human brain. For instance, Weber (this volume) notes that the brain consists of an older, limbic system shared with lower-order animals, which is the source of emotional or affective decisionmaking; and a more “modern” cerebral layer, which is a late-stage evolutionary trait in humans and the source of conceptual or symbolic processing. Perhaps because of this, processing of emotions typically involves gauging risk in terms of two components: “Dread risk,” or the potential for catastrophe, and “uncertainty risk,” involving a generalized fear of the unknown or the new. Weber suggests that retirement risks rate low along both dimensions: Few people have a palpable fear of impending disaster or of great uncertainty in their retirement planning, as compared to other risks in their lives.



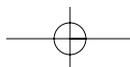
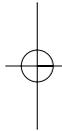


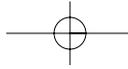
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In Weber's framework, the self-control problem of retirement saving must join both cerebral and emotional decisionmaking simultaneously, if people are to be prompted to take effective action. For example, if one were to experience the risks of retirement in the present so as to stimulate the brain's affective system, people might attempt a real-world experiment such as attempting to live on, say, two-thirds of their income for the next month.

Whether viewed from an economics or a decision theoretic perspective, the self-control problem supports the view of a wide divergence between individuals' desires and their actual behaviors (Saliterman and Sheckley, this volume). A survey of 10,000 employees at a single firm found that 68 percent of participants said their retirement savings rate was "too low" (Choi et al., 2001*a*). When queried, they reported that they *should* be saving 14 percent of average earnings, whereas in fact, they were only saving about 6 percent. (The remaining one-third of the participants believed their saving patterns were just about right and fewer than 1 percent felt they were saving too much.) Similarly, in Clark et al. (this volume), retirement plan participants reported that they knew they were saving less than they should. In other words, a key obstacle to saving more is not necessarily lack of awareness, but rather the ability to take action on the knowledge. The difficult task is to overcome hyperbolic discounting, to merge conceptual and affective reasoning into a course of effective action.

In recognition of such problems, people often seek to protect themselves through the use of commitment devices, or mechanisms that help foster desirable changes in behavior (cf. Laibson, 1997; and Laibson, Repetto, and Tobacman, 1998). Commitment devices for saving may be an analogue of the fad diet: One way of imposing some degree of discipline on one's wayward behavior is to create some seemingly arbitrary rules about what one can and cannot eat. "Pay yourself first" is a standard commitment device used by financial planners seeking to encourage disciplined saving and budgeting; it is also the principle underlying US payroll-deduction 401(k) plans. These plans are one of the most successful commitment devices in current use, and they are formulated such that contributions are automatically deducted from workers' pay before the money can be spent. Participation rates in 401(k)-type plans, where payroll deduction is the norm, are at least four times as high as for Individual Retirement Accounts (IRA), where structured payroll deductions are uncommon; according to 1997 tax return data, some 27 percent of workers contributed to workplace savings plans, compared with 6 percent contributing to an IRA (CBO, 2003). Other commitment devices include tax refunds and Holiday Clubs, where individuals engage in seemingly irrational economic activity (e.g. loaning money to the government or to their local banks at below-market rates) in exchange for discipline at accumulating savings. Withdrawal restrictions on IRAs and 401(k)s and other retirement plans also appear to be commitment devices: Once the money is allocated to these plans,





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a psychological and financial hurdle is imposed on accessing the money, helping to counteract lapses in personal willpower.

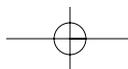
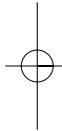
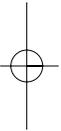
Other evidence that individuals vary in their capacity for self-control and financial discipline comes from industry surveys of workers' savings and planning behavior. Ameriks, Caplin, and Leahy (2003) as well as Lusardi (Chapter 9, this volume) find that workers' "propensity to plan" has strong positive influence on retirement wealth accumulation. MacFarland et al. (Chapter 6, this volume) indicate that as many as half of pension participants are dis- or uninterested in the financial and retirement planning activities thought necessary to plan successful retirement. In fact, a "planner" paradigm, where the individual consciously pursues retirement saving and investment goals in a disciplined, systematic way, appears to apply to only about half of the retirement plan population. The other half appears singularly unable to impose the self-control needed to solve this problem.

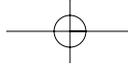
### Framing and Default Choices

Many individuals deviate from standard economic theory in another important way: They can be easily influenced by *decision framing*. Rational economic agents would not be expected to vary their responses to a question based on how it is asked. But in practice, many people do exactly that, both in the savings area and, as we show later, in investment decisionmaking as well. A by-now classic example of decision framing arises with automatic enrollment in retirement saving plans. Under the traditional (non-automatic) approach, the employee would have to make a "positive election" to join the 401(k) plan. By contrast, with automatic enrollment, the employee would be signed up by the employer for the plan at a given percentage contribution rate, and the employee retains the right to opt out of this decision.

This simple rephrasing of the saving question elicits a dramatically different response in plan participation rates. Madrian and Shea (2001) have powerfully shown that when workers are required to opt in, the default decision (or the non-decision) is to save nothing; by dramatic contrast, with automatic enrollment, the default decision proves to be that people save at the rate specified by the employer. For one large US firm, plan participation rates jumped from 37 percent to 86 percent for new hires after automatic enrollment was introduced (Figure 1-2). What this suggests, in the end, is that many workers do not have particularly firm convictions about their desired savings behavior. Merely by rephrasing the question, their preferences can be changed—from not saving to saving.

The impact of automatic enrollment is not just an illustration of framing questions, but also part of a broader behavioral phenomenon, namely the power of the "default option" and its influence on decisionmaking. When confronted with difficult decisions, individuals tend to adopt heuristics (shortcuts)





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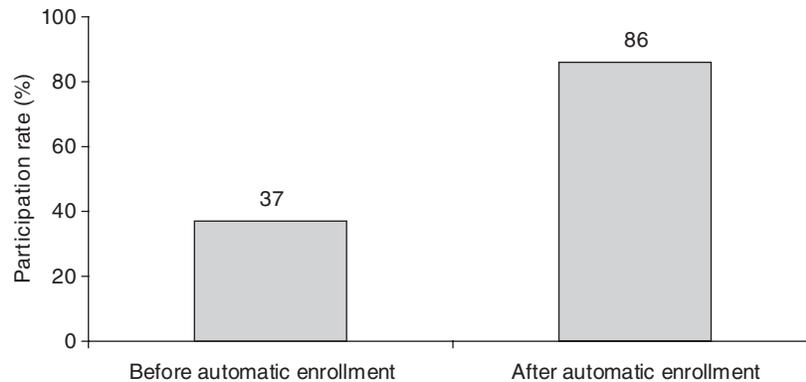


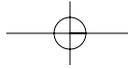
Figure 1-2. Decision framing: The impact of automatic enrollment on new hire plan participation rates.

Source: Madrian and Shea (2002).

that simplify the complex problems they face. One simple heuristic is to accept the available default option—that is, rather than making an active choice, accept the choice made by others. And, as noted in 401(k) enrollment, the simplest default is the non-decision: Do nothing.

An emerging literature indicates that individual behavior is easily swayed by default choices.<sup>6</sup> Again, automatic enrollment provides another illustration of the unexpected effects of default behavior. It turns out that while automatic enrollment boosts the number of individuals saving in a retirement plan, it might not actually increase total plan savings (Choi et al., 2001*b*). The reason is that, when automatically enrolled, people who would have voluntarily enrolled in the plan at higher contribution rates or chosen more aggressive investments decide to stick with the low saving rate and conservative investment option set by their employer. Thus, the positive effect is that saving rises for people who formerly did not participate, but an unexpectedly negative result is that saving falls for those who would have enrolled at higher rates and in more aggressive options, but instead elected to adopt the employer's defaults. On net, it appears that these two effects can largely offset one another.

More broadly, Choi et al. (2003) develop a model of a procrastination and default-driven saver and the choice of optimal savings rates. That study argues that optimal defaults for such savers are, in effect, the corner points or defaults of the plan savings problem—a saving rate of 0 percent, a saving rate equal to the employer matching contribution, and a saving rate at the maximum allowed by the plan. Both their theoretical models and the practical evidence on automatic enrollment underscore how profound the impact can be of the selection of a default option.



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### *Inertia and Procrastination*

Evidence on automatic enrollment has also revealed another anomaly about individuals and their saving behavior: The important impact that inertia or procrastination plays on decisionmaking. In Madrian and Shea's (2001) analysis of automatic enrollment, they showed that the benefit of higher plan participation rates appeared to be offset by a profound level of inertia. Most participants remained at the default savings and conservative investment choices set for them by their employer. Once enrolled, participants made few active changes to the contribution rates or investment mixes selected for them by their employer; rather, they simply stayed with what was assigned to them.

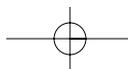
Another analysis (Choi et al., 2001*a*), explored how inertia and default behavior influenced several other defined contribution plan activities: Enrollment, cash distributions at termination, the match level, eligibility, and the impact of education, among others. The authors concluded that, more often than not, many participants followed "the path of least resistance" in their decisionmaking—in effect, making the easiest, rather than the best, decision. Again, the persistence of inertia and what might be called a passive approach to decisionmaking are both indicative of individuals being somewhat imperfect rational economic agents in their retirement and savings decisions.

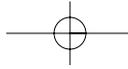
An illustration of this "desire versus action" compares workers' attitudes expressed after having attended an employee education seminar, with actual behavioral changes recorded on company administrative data systems (Choi et al., 2001*a*). Immediately following a seminar, for example, all workers not participating in a firm's 401(k) plan indicated in a survey that they would join the plan. In fact, however, over the next 6 months, only 14 percent did so. A similar, though smaller, gap between desire and action was true for other behaviors, including intentions to boost saving, change existing portfolio allocations, or change the mix of future contributions (see Table 1-1).

TABLE 1-1 The Self-Control Problem: Divergence between Desired and Actual Behavior

<i>Action</i>	<i>Planned Change (%)</i>	<i>Actual Change (%)</i>
Enroll in 401(k) plan	100	14
Increase contribution rate	28	8
Change fund selection	47	15
Change fund allocation	36	10

*Source:* Choi et al. (2001*a*: table 6).





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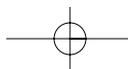
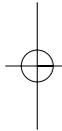
### Other Influences

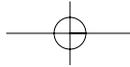
These behavioral findings are further supported by new research on the impact of investment choices and peer groups on saving rates. One tenet of contemporary economics is that more choice is better. Yet, as Sethi-Iyengar, Huberman, and Jiang (Chapter 5, this volume) show, offering workers many investment choices can produce “choice overload.” In this case, plan participants become overwhelmed with the complexity of the decision, and as a result, pension plan participation is reduced. Faced with complex investment choices, some participants may elect to simplify the decision by following the “default” heuristic (i.e. “Don’t decide, don’t join the plan.”) Similarly, Duflo and Saez (this volume) find that saving decisions can be strongly influenced by peers. For instance, in several striking experiments and case studies, they conclude that people with virtually identical demographic characteristics can have dramatically different saving rates, depending on whether their peers save for retirement. They also demonstrate that communications directed to an individual can influence not only the individual’s savings behavior, but also the behavior of others in his or her work group.

### Automatic Saving Plans: Save More Tomorrow

Such behavioral insights into saving behavior have been illustrated in an interesting way in the Save More Tomorrow (or SMT) program developed by Benartzi and Thaler (forthcoming). Under this program, plan participants indicate that they wish to increase their pension saving rates on a regularly scheduled basis, at prespecified future dates (e.g. on their anniversary date with the company). This mechanism is designed to address several behavioral anomalies. First, it recognizes that individuals have self-control problems and benefit from a precommitment device when it comes to retirement saving. Second, it exploits inertia, since people tend to sign up initially and the program is automatically carried out in the future. Third, it recognizes the possibility of hyperbolic discounting: That is, people tend to be averse to saving today but they are willing to push off their commitment to the future—to promise to “save more tomorrow.” As hyperbolic discounters, they significantly underestimate the impact of such future commitment. Last, the program exploits money illusion. Thus, participants often think only in terms of nominal take-home pay, so if the savings increase is designed to coincide with pay raises, they tend to believe that the savings increase had little or no cost, even though their real current consumption may have declined by a small amount.

In the initial study, the SMT program was offered to employees at a 300-person firm. Employees were given the option of financial counseling; most signed up for the counseling, and received the advice that they should boost their savings rates by an average of 5 percent. Nearly 80 workers took that





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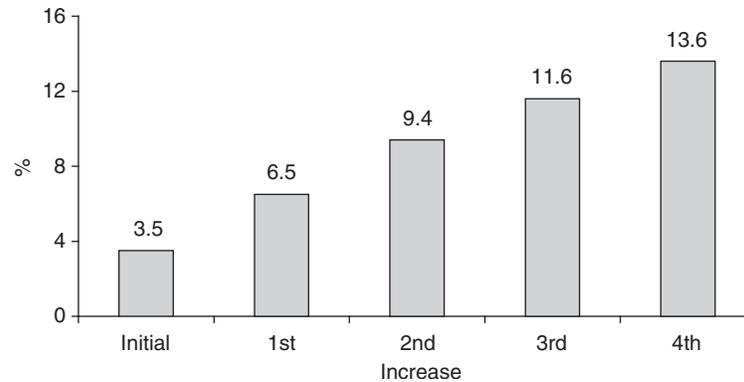


Figure 1-3. The impact of commitment devices and inertia: The impact of SMT on plan saving rates.

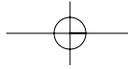
Source: Benartzi and Thaler (2004).

advice; many more, just over 160, signed up for the SMarT plan instead, which required annual increases of 3 percent. After 3 years, the individuals who signed up for SMT experienced a dramatic increase in their savings rates—from 3.5 percent before the plan began, to 11.6 percent (Figure 1-3).

The popularity of the SMT program provides further evidence of the divergence between real-world employees and the rational agents assumed by many economic theorists working on theoretical saving models. Many people attempt to save for retirement and even appear to know when they are not doing well as they should, but they struggle with exercising the right degree of self-control or willpower. Through inertia and procrastination, default decisions are easiest to maintain, including saving nothing at all, or at one's current rate, particularly if changing behavior requires incurring the costs of saving at a higher level. Reframing the saving decision to include defaults with automatically higher saving rates, and using commitment devices, inertia, and money illusion to address the self-control problems of hyperbolic discounters, all seem useful approaches to address the practical problems associated with the saving decision.

### The Investment Decision

As in the case of the saving problem, the question of how to invest one's money during the accumulation phase has been widely explored in a well-developed model of investment decisionmaking commonly denominated *modern portfolio theory* (MPT). The principles of MPT are at the heart of investment decisionmaking, both in employer-directed defined benefit (DB) plans, and employee-directed DC plans. MPT influences everything from strategic asset allocation decisions in defined benefit DB plans, and



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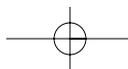
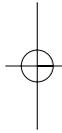
investment advice and education programs in defined contribution DC plans, to more technical issues such as performance attribution for investment managers.

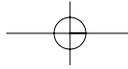
In broad-brush terms, MPT seeks to characterize capital market assets, whether stocks or fixed income investments, in terms of their expected mean return and their volatility or variance—hence, the term “mean-variance” investing. Rational investors seek out efficient combinations of securities that optimize risk and return, and a given portfolio is on the “efficient frontier” if it offers the highest return for a given level of risk. Individuals and institutions select from the array of portfolio choices on the efficient frontier based on their expected utility. In their utility preferences, individuals are presumed to be risk-averse, meaning that they penalize, or demand higher compensation for, riskier investments. Also, as risk increases, the compensation they require increases at a faster rate.

One of the important predictions of MPT is that investors will be inadequately compensated for assuming the risks of investing in an individual security. In other words, an efficient capital market will compensate investors only for the aggregate market risk they endure, so there will be no single-stock investments on the efficient frontier. Consequently, rational investors will seek to maximize portfolio diversification and eliminate all stock-specific risk, in the pursuit of optimal portfolio solutions. This principle has been at the foundation of the growth of low-cost index strategies as an investment management style in both DB and DC retirement plans.

Another implication of MPT is the theory of time diversification—the closer one is to an anticipated investment goal where spending from the portfolio begins (such as retirement), the less risky will be the investment portfolio. In practice, financial counselors frequently propose time diversification as a popular investment principle, suggesting, in one popular formulation, that people invest 100 percent minus their age in stocks. The time diversification view is also the basis for most DC education and advisory services, which suggest that older investors should hold more conservative portfolios than younger investors. Yet, this theory has important critics including Paul Samuelson (1989) and Bodie (1995), who suggest that investors ought to hold fixed asset allocation percentages over their entire lifetimes. Finally, richer versions of MPT extend the analysis beyond tradeable securities, to encompass the people’s broader wealth portfolio. For example, Campbell and Viceira (2002) and Davis and Willen (2002) suggest that risk and return tradeoffs should encompass illiquid holdings like housing and human capital.

As with saving theory, behavioral economics asks a very fundamental question about investors in general, and plan participants in particular: How good are they at actually understanding and acting on the predictions of mean-variance theory? Arguably, a rational investor should do a reasonable job of constructing mean-variance efficient portfolios, so there





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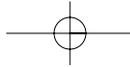
should be some evidence of widespread competency at these types of investment decisions. Worrisome for the MPT theorists are some key facts about investor behavior. Of US households who own stocks, the median family owns only two positions, and even the most affluent households hold a median of 15 (Polkovnichenko, 2003). These low levels of diversification fall well short of the number of positions thought to represent a well-diversified portfolio. It appears that for many investors, diversification is more akin to holding a variety of assets rather than the construction of a well-diversified portfolio in an MPT sense.<sup>7</sup> A related diversification puzzle is why, in DC retirement plans, do so many participants overinvest in their employer's stock? A recent study by Mitchell and Utkus (2003) estimated that more than 11 million participants held over 20 percent of their 401(k) account in their employer's stock; of that group, 5 million participants had 60 percent or more in company stock. Finally, broad stock market fluctuations—like the technology bubble of the late 1990s and the subsequent bear market—seem hard to reconcile with a model of the investor as a rational, mean–variance optimizing agent. So do levels of individual and institutional trading in the stock market.

In this section, we first summarize the accumulated evidence on mean–variance behavior among investors—or rather, the case against mean–variance behavior among investors. Much of this research, importantly, has been drawn from participants in DC retirement plans in the United States. We then turn to the attempts to develop alternative theories explaining investor behavior.

### *Lack of Firm Preferences*

The findings cited earlier on automatic enrollment illustrate that many workers lack firm preferences for saving. Merely by rephrasing the question from a positive to a negative election, workers who were not planning to save suddenly find themselves saving—and workers who would have saved at higher savings rates find themselves saving at the default set by their employer. A similar lack of strong preferences appears to affect investment decisions. Arguably, if investors were rational in a mean–variance sense, one would first expect them to have well-defined preferences over their portfolios. That is, they should have the courage of their convictions. After all, the portfolio they select represents their unique expectations of risk and return, and it is tailored to their own utility preferences.

In fact, retirement plan participants appear to have relatively weak preferences for the portfolio they, in fact, elect (Benartzi and Thaler, 2002). This was found in experiments where workers were given a choice between holding their own portfolio, the portfolio of a median participant in their plan, and the portfolio of the average participant: About eight out of ten participants preferred the median to their own. Only 21 percent continued



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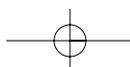
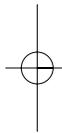
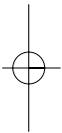
to prefer the portfolio they initially selected. Furthermore, many found the average portfolio to be quite satisfactory. In other words, pension participants seemed to be quite happy (or perhaps even happier!) with portfolios constructed at the statistical average of their co-workers' behavior, than with the portfolios they themselves constructed.

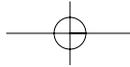
This finding is supported by psychological literature regarding preference reversals. That is, individuals often do not arrive at a decision with firm preferences in mind; preferences appear not be hard-wired. Rather, individual preferences tend to be situational and emerge at the time a decision is made, based on the conditions and information surrounding that decision. To the extent this is true, preference reversals tend to be more common than might be expected. Individuals who thought not to save find themselves saving; individuals who selected their own portfolio find themselves just as happy, if not happier, with another choice.

### Framing Effects

Just as saving choices can be affected by framing, so too can investment decisions be influenced, sometimes strongly, by framing effects. Much of the research in this area has investigated the impact of investment menu design on participant investment choices in DC retirement plans. The theme underlying this research is that menu design is a more powerful influence on participant decisionmaking than the underlying risk and return characteristics of the investments being offered. In this sense, the investment menu in a retirement plan is an "opaque" frame, which most participants cannot see through, to understand the underlying risk and return characteristics of their investments. Put another way, many participants appear to have weak convictions regarding risk and return, and they can easily be swayed in their decisions by the framing effects of an investment menu.

In one experiment, participants were asked to select an investment mix for their retirement plans given two fund offerings (Benartzi and Thaler, 2001). Some participants were presented with a stock fund and a bond fund; others with a stock fund and a balanced fund; and a third group with a bond fund and a balanced fund. In all three cases, a common strategy was to choose a 50/50 mix of the two funds offered, although many participants did select different weightings. What was striking in the data was the fact that radically different underlying asset allocations ensued, given the different choices offered. For people given the choice of an equity fund and a bond fund, the average allocation to equities was 54 percent. For those offered two equity-oriented portfolios, a balanced fund and an equity fund, the average allocation to equities was 73 percent. And for those offered a balanced and a bond fund, the average allocation to equities was only 35 percent. In a related experiment using investment menus with five





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funds, the authors found that the asset allocations chosen by participants were again strongly influenced by menu design. If the plan offered several equity funds, participants invested more in equities; when it included more fixed income funds, they chose fixed income options instead.

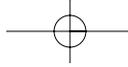
A different study also asked plan participants to select investments from three different menus, which the authors posed might be similar to the structure of a privatized Social Security account (Benartzi and Thaler, 2001). The investments allowed ranged from A (low risk) to D (high risk). The first menu offered included options A, B, and C; the second menu, just options B and C; and the third menu, options B, C, and D. Comparing options B and C, which were in all three menus, 29 percent of the participants preferred C over B in the first menu; 39 percent in the second menu; and 54 percent in the third menu. In other words, in the first menu, where option C was at the extreme, it was liked least; in the third menu, where option C was the middle choice, it was liked most. As with the asset allocation experiment above, this shows that participants appeared to use a naïve heuristic (i.e. “avoid extremes, pick the middle option”) rather than maintain a consistent set of well-ordered risk preferences to select from the investments offered.

Related research indicates that, beyond these menu effects, even simple changes in the way information is presented can influence asset allocation decisions (Benartzi and Thaler, 2001). In one experiment, plan participants were asked to make investment decisions based on reviewing the one-year return profile of US common stocks; in a second experiment, they made decisions based on a 30-year return profile. In the first instance, the average allocation to equities was 63 percent; in the second, 81 percent. The implication is that plan sponsors can alter asset allocations if return data are presented over different holding periods. And as Scott and Stein show (this volume), different types of investment education and information can substantially change retiree investment allocations.

Like the saving research discussed earlier, these findings underscore the powerful influence of framing effects on decisionmaking in retirement plans. Apparently, many plan participants seem to lack well-formed investment preferences, and these preferences appear to be easily altered by the way the choices are presented to them.

### *Inertia and Procrastination*

As with savings behavior, inertia also plays a large role in investment decisionmaking, in addition to these framing effects. Madrian and Shea (2001) and Choi et al. (2001*b*) reported high levels of inertia in investment decisionmaking in their studies of participants and automatic enrollment. To further underscore this point, we examined how 2.3 million plan participants at the Vanguard Group allocated their new contributions accounts



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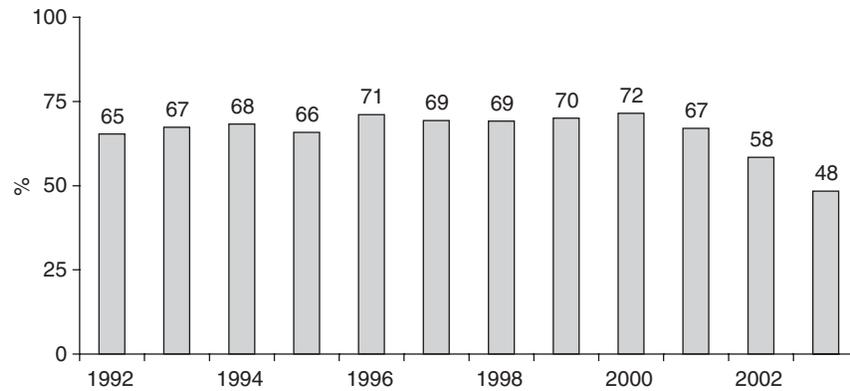
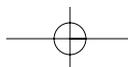


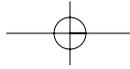
Figure 1-4. Anchoring and adjustment: Current equity contributions by plan entry date % contribution allocated to equity investments.

Source: Vanguard Group (2003).

as of June 30, 2003 (Figure 1-4). First, we found that fewer than 10 percent of plan participants change their contribution allocations each year. Further, participants who initially enrolled in their plans near the top of the bull market in 1999, allocated about 70 percent of new contributions to equities in June of 2003, notwithstanding the huge market drop sustained over the preceding 3-year period. Meanwhile, participants who newly enrolled during the first 6 months of 2003, after the 3-year fall in US equity prices, allocated only 48 percent of new monies to equities. While this illustrates how sensitive participant investment decisions at enrollment are to then-current market conditions, it also demonstrates the power of inertia. It seems unlikely that participants enrolled in 1999 would have dramatically different risk preferences than those who enrolled in 2003, yet the recent enrollees were presumably making active choices based on then-current information, whereas earlier enrollees did not react so dramatically to market news.

Figure 1-4 also illustrates “anchoring” effects for pension investors. Anchoring refers to the notion that decisionmaking is strongly influenced by starting values, no matter how arbitrary they may be. Among participants, it appears that the relevant anchor is their initial allocation decision, and subsequent portfolio changes tend to be made with reference to that initial value, rather than on some absolute basis. For instance, participants who enrolled at the peak of the bull market continued to allocate seven out of ten dollars to equities by 2003, over 20 points higher than those enrolling in the first 6 months of 2003.





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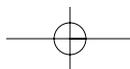
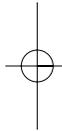
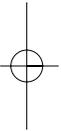
### The Conundrum of Employer Stock

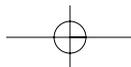
The use of company stock within US DC plans offers a compelling case study about the relevance of mean–variance models to investor decisionmaking. As noted earlier, Mitchell and Utkus (2003) have calculated that 11 million plan participants have allocations above 20 percent of their account balance in company stock—and 5 million have allocations above 60 percent of their account balance. A conventional economic explanation for this phenomenon is that employers and stockholders seek to promote employee productivity through stock ownership, and so they encourage or mandate large employee holdings of company stock. As rational agents, however, employees who are aware of the risks they are being required to assume, should demand compensation in some other form, such as higher wages or benefits.

There is some support for the “rational agent” view of workers holding company stock. This is because concentrated company stock positions are most common for large firms, and such firms typically pay higher wages and benefits to their employees. Yet, from a behavioral perspective, there is also evidence that concentration stock positions are not solely due to incentive effects; rather, it seems that computational or behavioral errors on the part of participants also help explain the phenomenon. For instance, Mitchell and Utkus (2003) use survey data to uncover evidence of “risk myopia” regarding employer stock, in that many participants rate their employer’s stock as *safer* than a diversified equity fund.

Another Vanguard survey (Table 1-2) illustrates that even after the post-Enron publicity surrounding company stock, two-thirds of participants rate their employer stock as safer than, or as safe as, a diversified portfolio of many stocks. Only one-third said it was more risky. What is striking about these results is the comparison between participant risk perceptions and the actual return and volatility of their employer’s stock. Looking at the risk ratings first, it is natural to conclude that at least two-thirds of participants are not mean–variance investors when it comes to company stock. They rate stock as safer than or as safe as a diversified portfolio, despite its actual higher volatility than a broad market index: A clear-cut “error” under modern portfolio theory. Arguably one-third of participants did assess the risk correctly, in that they rated their employer’s stock as riskier *and* its volatility higher. But it seems implausible to conclude that all participants who understand mean–variance analysis may only be found among the set holding riskier employer stocks; it is more likely that participant do not base their risk perceptions on volatility. Instead, participants’ risk ratings are well correlated with the historic relative returns of their employer’s stock.

The conclusion that plan participants overlook volatility and focus on returns is supported in Benartzi’s (2001) study of pension investments in employer stock. Specifically, he finds that participant allocations were





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TABLE 1-2 Perceptions of Company Stock Risk and Return

<i>Participant Report: Level of Risk in Company Stock<sup>b</sup></i>	<i>% of Participants</i>	<i>Actual Average Standard Deviation of Company Stock (%)<sup>a</sup></i>	<i>Actual Average Company Stock Return (%)<sup>a</sup></i>
<b>Q. Would you say your employer's stock is more risky, less risky or has about the same level of risk as an investment in a diversified stock fund with many different stocks? (n = 415)</b>			
More risky	33	40 <sup>b</sup>	-8.8 <sup>b</sup>
Same level of risk	42	36 <sup>b</sup>	-2.0 <sup>b</sup>
Less risky	22	31 <sup>b</sup>	2.2 <sup>b</sup>
Don't know	3	35	-6.0
Total	100		
S&P 500		18 <sup>b</sup>	-1.1 <sup>b</sup>

<sup>a</sup> Returns and standard deviations of participants' company stock returns for the 5-year period ending September 30, 2003. Standard deviation calculated over 60 months and annualized.

<sup>b</sup> "More risky," "same level of risk" and "less risky" categories are all significantly different from one another at the 95% or 99% level. Standard deviations are all significantly higher than the S&P 500 at the 99% level. Returns for "more risky" ("less risky") are significantly lower (higher) than the S&P 500 at the 99% level.

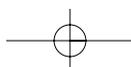
Source: Vanguard Group (2003).

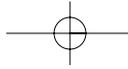
based on extrapolations of the company's historic stock performance. Participants who overweighted their employer's stock based on good past performance then found that those stocks subsequently generated below-average performance. Conversely, those participants who underweighted their employer's stock due to poor past performance subsequently saw the stock becoming an above-average performer.

Participants' allocations were also influenced by whether their employer provided a match in company stock, a phenomenon that Benartzi dubbed the "endorsement effect." The conclusion is that, just as menu design influences participant investment decisions, so too does the employer's plan design decision. Offering a match in company stock encourages participants to hold more in stock than workers whose employers do not match in stock. Other researchers have also argued that past performance, rather than risk, drives participants' portfolio decisions (e.g. Purcell, 2002; Huberman and Sengmueller, 2003; Poterba et al., 2003; Choi et al., Chapter 7, this volume).

### Reliance on Past Performance

Why do investors irrationally rely on past performance and fail to take expected returns as well as risk into account, as modern portfolio theory





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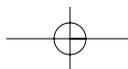
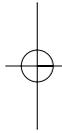
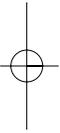
suggests they should? Two behavioral phenomena may offer some answers. A first issue is the pervasiveness of the “representativeness heuristic” in decisionmaking, explored by Tversky and Kahneman (1974). They found that people tend to see patterns in small series of randomly drawn numbers, and when making decisions, people attempt to impose some order or structure on the information that they see. For example, mutual fund investors might identify a fund manager with 3 years of top performance and conclude that the manager has unusual skill—rather than view it as a random process. Of course, viewed across the universe of thousands of investment managers, a given manager’s 3-year track record is just as likely an indication of chance as of skill. The representativeness bias may partly arise due to a framing problem: That is, rather than frame the skill versus luck decision in terms of the universe of all individuals making portfolio decisions, a fund investor may frame it narrowly in terms of the 3-year track record of a single investment manager. As a result, what may actually be a random outcome may instead appear to be logical sequence.

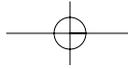
A second issue is that many people appear to be subject to what has been called an “availability heuristic”: When faced with difficult decisions, they tend to rely on readily available information. A simple reason that investors may rely on past performance could be because that information is cheaply available. As any plan participant knows, retirement plans and investment companies generate prodigious amounts of past performance data which they make available in statements, on websites, in enrollment materials, and in newsletter updates. Past performance is also pervasive in the media, but very few report systematically on expected returns. Of course, in the United States and elsewhere, reports on past investment performance are often accompanied by the legal disclaimer that “past performance is no guarantee of future results.” Yet, one need only compare the size of that disclaimer to the volume of past performance data to understand its limitations in the face of the availability heuristic.

In sum, the representativeness and availability heuristics may help explain why, for example, mutual fund investors invariably chase performance in their fund purchase decisions (Patel, Zeckhauser, and Hendricks, 1991). Patterns suggesting superior performance are constructed from small samples drawn either from skill or luck. And the pervasiveness of past performance data leads to an inevitable reliance on past performance, despite the legal caveats.

### Prospect Theory

If plan participants are not necessarily mean–variance investors, then how do they actually make decisions under uncertainty about their pension investments? This is a complex question, partly because behavioral research in the last 20 years has focused on analyzing how people evaluate





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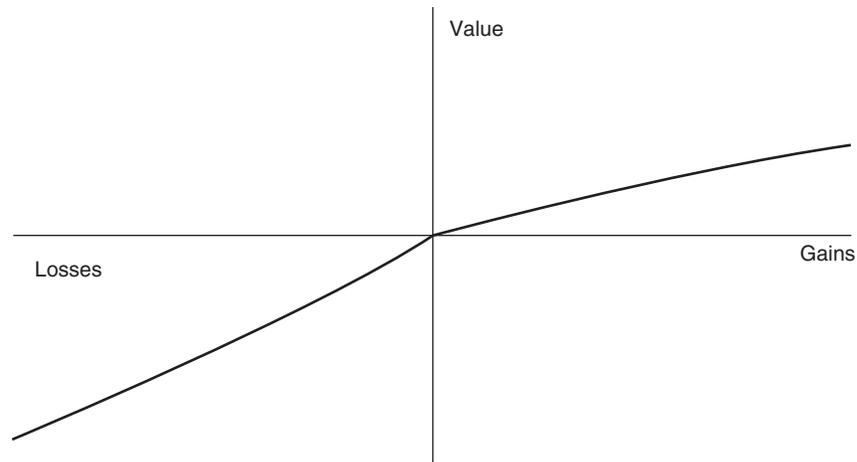


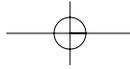
Figure 1-5. Prospect theory value function.

Source: Kahneman and Tversky (1979).

risky choices in general; only recently has interest turned to investment decisions.

The seminal theory of risky decisions was offered by Kahneman and Tversky (1979), who modeled individuals as though they made decisions to maximize an S-shaped value function depicted in Figure 1-5. This function differs from conventional utility maximization in two critical ways. First, individuals are thought to consider not how a decision influences total wealth (as in standard utility theory) but rather incremental gains and losses. Second, individuals are modeled as treating gains and losses quite differently. The gain function (to the right of the origin) is concave, while the loss function (to the left of the origin) is convex, with a much steeper slope. What this means is that individuals will experience losses more acutely than gains for a given dollar of gain or loss. Their experimental evidence suggested that the index of loss-aversion is about 2.5: In other words, when evaluating risky gambles, the individual will report that losses are 2.5 times as painful as the equivalent dollar value of gains. For example, if someone were presented with a 50 percent chance of losing \$1,000 or a 50 percent chance of gaining an unknown amount,  $\$X$ , the evidence suggests that many people would not entertain this gamble until the value  $X$  is on the order of \$2,500 or so.

This approach has come to be known as *prospect theory*, and it has potentially important implications for investment behavior. For instance, investors will seek to lock in certain gains and avoid certain losses. This implies that individuals tend to be risk-averse for a known gain, but they



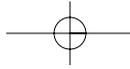
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can become risk-seeking in an effort to avoid a certain loss. In addition, actual behavior will depend on the exact sequence of gains and losses and how the individual has incorporated prior gains and losses into current perceptions. For example, suppose an individual wins \$100. If offered a reasonable chance to win more money or lose the \$100, many people would decline the additional gamble, because of the risk of forfeiting the \$100 sure gain. But if offered a choice to win more money while preserving a meaningful part of the \$100 gain, many people take the risk. This is known as the “house money” effect: While people are generally risk-averse in the domain of gains, if they feel they are risking someone else’s money (e.g. accumulated earnings from prior bets), they become more risk-seeking. On the loss side of the equation, after losing \$100, many people will accept a gamble that entails losing significantly more than \$100 in an effort to recoup the \$100 loss. This represents both the element of risk-seeking in the domain of losses, and the “breakeven” effect. Faced with the realization of a certain loss, many people seek additional risk, in an effort to recoup their investment, contrary to the conventional economic notion that “sunk costs are sunk costs” (i.e. rational agents should ignore realized losses). This approach offers an explanation for why investors have difficulty realizing losses on their investments (a strong desire to avoid loss realization and break even). It also might help explain why they sometimes increase risk-taking in risk equity markets (existing gains appear to be locked in and are “house money” which can be gambled) and in falling markets (existing losses appear temporary and extra risk-taking will help recoup those losses).<sup>8</sup>

Prospect theory and behavioral economics have been deemed relevant to investment decisionmaking in three ways (Kahneman, 2003). First, in the area of gains, investors are often characterized by overconfidence and excessive optimism: People tend to construct forecasts of the future that are typically too rosy. Second, in the area of losses, investor risk-aversion will lead to an unwillingness to realize investment losses, and a premature realization of investment gains (called by Shefrin and Statman the “disposition effect”; 1985). And third, if decisions are less than optimal due to both overconfidence and loss avoidance, the impact of these anomalies will be exacerbated by narrow framing effects. We consider each of these elements in turn.

### Overconfidence

In the domain of gains, one of the important findings of psychology and behavioral economics is that peoples’ future forecasts are often characterized by widespread overconfidence and excessive optimism. Overconfidence is a widely documented trait in human decisionmaking: Thus, people systematically overrate their skills on such parameters as driving skills and

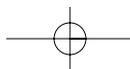
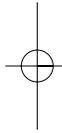


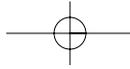
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humor. In business, managers tend to be overconfident about their abilities: For example, managers tend to overpay for mergers and acquisitions because of overoptimistic assessments. Other professionals in a range of diverse fields—in psychology, medicine, investments, engineering, and so on—have demonstrated overconfidence in their decisionmaking. In a study on future life prospects, college students were asked to evaluate the chances of certain positive and negative events occurring in their lives (e.g. having a bright career versus experiencing professional failure; maintaining ongoing good health versus contracting a mortal disease while young; having a happy versus a difficult domestic and emotional life). When asked to judge their own prospects, the students downplayed negative life events and emphasized positive outcomes. What was interesting was that, when asked the same questions of their college roommates, the students were more even-handed in their responses. Similarly, in medical decisionmaking, patients with mortal diseases were shown to be much more optimistic about their future prospects than their professional caregivers. Overall, the accumulated psychological evidence regarding overconfidence in decisionmaking has been described as the “Lake Wobegone” effect, named after a fictional US town described on a popular radio program where “all of the children are above average.”<sup>9</sup>

Such overconfidence may partly be the result of an inability to understand accurately the role of random chance in determining the future. As noted above in our discussion on representativeness, people are notoriously poor statisticians, and they find patterns and trends in data that could just as easily be explained by random chance. Individuals appear to significantly underestimate the impact of random chance on their lives, and in hindsight overemphasize the degree of control they have over outcomes. Lack of objectivity might help explain self-evaluations: Individuals generally perceive themselves as better than others—and have better views of themselves than others do. Poor risk calculations certainly play a role in overconfidence: Individuals who are “100 percent sure” of their responses to certain questions are usually wrong 20 percent of the time. Perceived sense of control also plays a role: the stronger one’s sense of control, the more powerful one’s sense of confidence. Asked about the risks of a disabling car accident, people are much more optimistic when they are driving, than when they are passengers. There is also a gender element at work: Men tend to be more overconfident than women.<sup>10</sup>

Overconfidence probably has some economic, psychological, and even evolutionary positive benefits: For example, it may be the wellspring of risk-taking and entrepreneurial activity, or it may allow fast recovery from life’s disappointments. But in the domain of investing, it may also lead to behaviors that are less than optimal and certainly at odds with mean–variance theory. For instance, overconfidence helps explain the high levels of trading activity in equity markets. Barber and Odean (2000) report high rates of turnover, on the order of 75 percent, among households owning brokerage





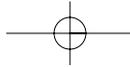
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accounts. They calculate that trading is typically hazardous to one's wealth, with active traders earning 11.4 percent over a 5-year period, while the market returned 17.9 percent, and low-turnover accounts 18.5 percent. That study also reports that men trade 45 percent more than women and the difference is even stronger for single men versus single women. Agnew, Balduzzi, and Sundén (2003) suggest that these trading results may be less relevant for retirement plans, since participants could mentally account for brokerage and retirement investments differently.

Other research focuses on affluent male equity investors, and it has confirmed that overconfidence and an emphasis on personal skill are both important attributes of investors, at least in the sample of experienced investors surveyed by De Bondt (1998). Most of these investors exhibited a high level of confidence about the stocks they had selected, while their outlook for the broad market was not as positively biased. They relied on their own skills at selecting companies and tended to downplay the importance of modern portfolio concepts like diversification. From their perspective, it seemed that diversification was less focused on non-correlated stock holdings and more about simple variety. These investors also tended to be surprised about the relationship between the overall market and their own holdings: That is, they downplayed the impact of market forces on their portfolios.<sup>11</sup> These diversification results seem consistent with Goetzmann and Kumar's findings (2001) that individual investors do own multiple stocks, but these are not drawn from uncorrelated industries and sectors so they are not typically diversified in the modern portfolio sense. Statman (Chapter 4, this volume) shows how behavioral theories of risk-taking may be used to formulate alternative theories for portfolio construction.

### *Loss-Aversion and the Disposition Effect*

If overconfidence helps explain behavior on the "upside" side of the prospect theory ledger, then the "downside" is dominated by aversion to loss realization. This plays out in interesting ways. For instance, as noted above, people are inclined to take a gamble if confronted with the choice of realizing an incurred but not-yet-realized loss, versus taking the gamble in which they might break or lose more. Particularly if there is a reasonable prospect of breaking even and avoiding a loss, many people take the gamble and risk losing even more money. In the investment setting, this manifests itself in what Shefrin and Statman (1985) call the "disposition effect." People who invest in stocks appear to rush to realize gains too quickly: They try to lock in or make certain the gains that they have already realized. On the other hand, they also appear to have trouble "cutting their losses"; that is, they hold onto loss-making stocks too long in the hope of recovering their investment. The impact of this effect on brokerage account investors is not small: Odean (1998*a*) calculated that investors who sold winning stocks saw



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those stocks outperform the market by 2 percent in the subsequent year, while investors who kept their losing stocks saw those stocks underperform by market by 1 percent over the same period. In total, the net impact of selling winners too quickly while holding losers cost investors 3 percent per year in terms of portfolio returns. These results also validated the notion of overconfidence in investment decisions: People continued to hold and to sell the wrong stocks, leading to lower returns, despite actual results.

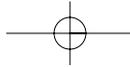
### Narrow Framing

Adding to what has already been discussed, there is evidence that overconfidence and loss-aversion are exacerbated by too narrow a framing of risky decisions (Kahneman, 2003). Few investors would take a gamble involving a 50 percent chance of winning \$1,500, versus a 50 percent chance of losing \$1,000. (With loss-aversion parameters of around 2.5, most investors would not take the gamble until the gain was closer to \$2,500.) Yet, experimental evidence indicates that people are more willing to accept this gamble when they are given the opportunity to play it many times, or when it is framed in terms of changes to their entire net worth. Perhaps, as Kahneman observes, it is more natural for investors to “think small” when facing a one-time gamble, but they may get it right and “think large” if facing sequences of gambles or changes to total wealth.

### The Decumulation Decision

The last phase of financial decisionmaking for retirement happens during the decumulation period. This is likely to occur during later middle age and beyond, and it is the period when most people decide how they will spend down their accumulated assets. Of course, if there were no uncertainty, the rational life-cycler would plan to spend down retirement assets so as to ensure optimal retirement consumption and protect bequest motives (if any). People having saved for retirement via a formal pension scheme would be expected to decumulate their assets just as their non-pensioned counterparts having the same total assets, except insofar as it reduced the retiree’s tax obligation (Brown et al., 1999).

In practice, of course, people confront many sources of risk during the retirement period. The most important of these are longevity risk, inflation risk, health risks (leading to unexpected expenses and costs), and capital market risks. All or a combination of these risks can contribute to experiencing consumption shortfalls during retirement—or simply running out of money. So many fundamental uncertainties, further complicated by the psychological considerations discussed above, combine to make it quite difficult for retirees to deftly manage the drawdown process for retirement accounts in old age. In this section, accordingly, we first summarize available evidence on how people deal with longevity risk, then turn to a discussion of



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inflation risk, and finally conclude with a brief discussion of how to manage capital market risk during the withdrawal period.

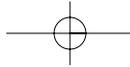
### Longevity Risk

People do not know precisely how long they will live, hence they run the risk of exhausting their assets before dying. Such risk exposure can be reduced by consuming less per year during retirement, but of course this simply elevates the chances that a retiree might die with “too much” wealth left over.

One way to offset longevity risk is to buy an annuity with all or part of one’s retirement assets (Brown et al., 2001; Mitchell and McCarthy, 2003; Drinkwater and Sondergeld, Chapter 15, this volume). Single premium lifelong annuities are relatively appealing, since they continue to pay benefits as long as the retiree lives, irrespective of whether the retiree outlives the life tables. Indeed, recent survey analysis (Panis, Chapter 14, this volume) finds that retirees holding annuities are more satisfied with their retirement, holding other things constant. Consequently, the implication is that at least partial annuitization may provide peace of mind associated with longevity protection.

Notwithstanding the substantial theoretical appeal of annuities, however, relatively little retirement money is currently devoted to the purchase of annuities in most developed countries. For instance, life annuity purchases in the United States amounted to more than \$120 billion in 1999, but the majority of sales were for variable annuities which are used mainly in the accumulation process rather than for decumulation products paying lifetime benefits (Brown et al., 2001). In the group pensions market, there is also growing attention to this issue. Previously, DB plans normally paid either single or joint and survivor life annuities as a matter of course; rarely was any sort of lump sum option available in lieu of the lifetime benefit stream. Of late, however, DB pensions have begun offering lump sum distributions to their retirees, akin to the payouts popularized in the DC world (Moore and Muller, 2002). As a result, workers reaching retirement age with pension coverage are increasingly unlikely to take their benefits as lifetime annuities. Indeed, a recent study found that three quarters of company pension distributions are currently paid as lump sum cashouts rather than as lifetime annuity payments (McGill et al., 2004). In this sense, fewer and fewer retirement plans are providing longevity insurance in the form of lifetime insured annuity benefits.

Several explanations for the declining demand for annuitization in retirement have been offered. One factor is that people may be poorly informed regarding their remaining life expectancies, tending to underestimate the risk of outliving one’s income. For instance, a recent industry survey reported that only one-third of the respondents knew that someone

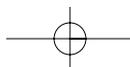


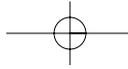
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who attained the age of 65 had a substantial chance of living beyond his life expectancy (Metlife, 2003). Yet other surveys report that older people's expected survival patterns track actuarial tables relatively closely (Hurd and McGarry, 1995), and retirement asset shortfalls appear uncorrelated with people expecting to die soon in retirement (Mitchell, Moore, and Phillips, 2000). A different factor discouraging annuity purchase is that retirees often have strong bequest motives, and many of them expect to have to pay for long-term care. In such cases, they might elect to hold on to their funds rather than annuitize them on retirement. And of course, to the extent they have Social Security and DB pension plans, they will be less likely to annuitize all their assets since they are partly protected against longevity risk already (Brown et al., 2002).

Three other "rational" explanations may provide insights into why annuity purchases are low despite the fact that baby boomers are moving into retirement age. First is an interest rate factor. The decision to annuitize at a given point in time represents an irreversible decision to "lock in" then-current yields (which underlie the contract pricing). A second is the cost factor: Retirees sometimes see insured products as uncompetitive with pure investments due to the loads levied by the insurance providers. Yet, the loads have decreased substantially over time, and evidence indicates that retirees can expect high "money's worth" for annuity products in many countries (Mitchell, Moore, and Phillips, 2000). Consequently the respectable returns combined with the insurance protection should induce more interest in this payout structure as the baby boomer generation moves into the retirement years. The other main reason lump sums are attractive is that regulations currently permit workers to take a relatively large lump sum computed with a temporarily depressed discount rate, and in many cases this is more economically profitable than leaving the funds in the plan to grow.<sup>12</sup>

Behavioral factors may also explain the low demand for annuities in retirement, including most importantly *loss-aversion*. This arises because some retirees may worry about potential losses to heirs in the event that they die "early," since annuitization typically eliminates the possibility for bequeathing these funds. Adding to the problem is that retirees may heavily discount future benefit coverage in the event that they live a long time in retirement. Such an asymmetric valuation could enhance peoples' probability of taking their pension accruals as a lump sum versus buying a life annuity, and may explain why some argue that "locking up" one's assets in annuities boosts rather than reduces risk. To meet such concerns, some insurers have begun to combine annuity offerings with life insurance, long-term care, and disability benefits, so as to reduce the fear of "losing it all" due to premature death. Employers wishing to help workers with their self-control problem might offer annuities as the default option at retirement, rather than making the lump sum the standard choice.





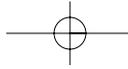
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Nonetheless, it does appear that many people fundamentally undervalue the appeal of a lifetime annuity—sometimes at substantial, if not overwhelming, cost. One fascinating example is a study of annuitization behavior for personnel at the US Department of Defense (DOD) (Warner and Pleeter, 2001). In 1992, about 65,000 officers and enlisted personnel were involved in a program to reduce staffing at the DOD. To this end, they were offered payments from their retirement plan in the form of an annuity or a lump sum. The internal rate of return on the annuity ranged from 17.5 percent to 19.8 percent, at a time when government bond rates were around 7 percent. Economists estimated that all of the officers and half of the enlisted personnel would take the annuity. In the end, contrary to expectations, 52 percent of the officers and 92 percent of the enlisted personnel took the lump sum. In total, the DOD employees forfeited a total of \$1.7 billion in economic value, by electing the lump sum over the annuity.

### *Inflation and Capital Market Risk*

Last, but certainly not least, we turn to the risk of inflation and capital market risk during the retirement period. It is somewhat well known that the common worker is rather poorly informed about volatility in asset returns and inflation rates (Bodie et al., 2002), a problem that also besets him during the retirement period as well. For instance, from the late 1970s to the late 1990s, the United States had a relatively low rate of inflation and rising stock prices that contributed to a widespread belief that equities serve as a good hedge for inflation. Yet, this is not accurate: During the 1970s, inflation moved into double digits, yet stock prices fell by over half in a short 2-year jolt (1974–75). Brown, Mitchell, and Poterba (2000) also confirm that stocks have been a poor inflation hedge in the United States, at least in the short to medium term. For this reason, retirees seeking protection against the destructive impact of inflation over a long retirement period would benefit substantially from holding at least a part of their financial assets in inflation-protected assets such as Treasury Inflation-protected Securities (TIPS).

The fact that workers take lump sums from their pensions, rather than have their funds continue to be managed by the pension fund itself, may also be of concern for several other reasons. One potential explanation is overconfidence: Many people believe they can live well on relatively small asset pools during retirement, yet after leaving work, they then find they run out of money, sometimes within a few months of retirement. This is exacerbated by the fact that the lump sum benefit is often “framed” in a way that induces them to overvalue the lump sum and undervalue the annuity. Offering a retiree a lump sum of \$100,000, versus taking a joint and survivor annuity of \$600 per month for life, tends to highlight the “massive sum” versus the longevity protection.



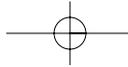
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Another concern is that, due to lack of self-control, people may be tempted to spend their lump sums once they are out of the pension plan. While recipients do roll over some of their lump sum distributions into Individual Retirement Accounts, they do use a large fraction to pay debts and cover current expenses (Moore and Muller, 2002). A problem with taking a lump sum from the pension, of course, is that the amount withdrawn becomes subject to regular income tax and it may also elicit excise tax if the recipient is younger than age 59½. Finally, many retirees are poorly equipped to manage their investments in old age, perhaps because they never were particularly financially literate, or perhaps they suffer diminished faculties due to poor health and lack of mobility with age. And it is difficult even for experts to undertake the sophisticated calculations required to simultaneously manage the investment portfolio, the draw-down rule, and the target horizon over which these decisions are made (Dus, Maurer, and Mitchell, 2004). Most financial planners are not particularly well versed in these techniques either, nor are their clients. But possibly due to overconfidence, they often expect the money to last longer and earn more than a prudent strategy would dictate.

#### **Policy and Plan Design Alternatives**

Our overview thus far has illustrated how behavioral economics and finance research of the last few years has fundamentally challenged the ways in which plan sponsors, retirement service providers, and policy-makers should think about retirement plan design in the future. At the most inclusive level, behavioral research offers several new insights about the nature of individual decisionmaking in retirement plans, which we enumerate next. After noting these, we turn to several plan design and policy responses to this new body of research.

1. *One lesson is that behavioral research challenges some of the most central assumptions of decisionmaking.* In particular, it challenges the notion that workers are rational, autonomous, microcalculators who exercise independent and unbiased judgment when it comes to their workplace retirement plans. The evidence suggests that people do strive to maximize their self-interest, but for a variety of reasons outlined here, they often fail to act in accordance with the expectations of rational economic and financial theory, in both the accumulation and decumulation phases. Some people have self-control problems when it comes to saving; such individuals could benefit from commitment devices. Others simply overdiscount the future and overvalue the present; such people could benefit from precommitment pension savings programs. Still others might be unduly influenced by defaults and inertia: as a result, their attitudes and action diverge so they very much *want* to save more for retirement, but they do not. Here too, precommitment devices can plan an important role. Also, some individuals



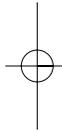
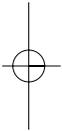
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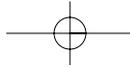
do not appear to evaluate their investment portfolios in mean–variance terms; that is, past performance and risk errors cloud their judgment. They are overconfident about the future and have trouble cutting their losses. Some trade too much, think “too small” in terms of gains and losses, and take lump sums when in fact all of these behaviors increase rather than reduce risk.

2. *Another lesson learned is that plan design drives participant decisions, often in unanticipated ways.* Behavioral finance and economics also challenge the notion that pension plan design is a neutral vehicle within which participants make their own choices independently. Because of default, framing, and inertia effects, we have argued that the design of a retirement system or plan has a profound effect on participant investment and saving decisions. Sponsors and policymakers can alter behavior in fundamental ways by choosing different default structures. In particular, the design decisions to set up automatic enrollment, automatic saving, or default investment programs, which makes some saving and investment decisions automatic, are particularly critical.

Using traditional policy and plan design language, DC plans are “employee directed,” with employees seen as the active agents while the employer is thought to play a minimal decisionmaking role. In some sense this is a libertarian decisionmaking model, where independent agents can act to maximize their personal welfare within the constraints of the system. But behavioral research sketches a different picture of many workers. These are people with weak or uncertain preferences about basic questions as how much to save, or how much risk to take. Plan design decisions then emit powerful signals about “appropriate” employee behavior, and employer/policymaker design specifications trump independent decisionmaking. Such an environment is consistent with the “paternalistic libertarianism” notion advanced by Thaler and Sunstein (2003), where individuals can be offered choice, but paternalistic elements of retirement plan design play a powerful role in shaping the choices offered.

3. *A third finding is that the standard approach taken in most contemporary DC plans may be counterproductive in encouraging retirement saving.* Generally, participants are told that (i) saving for retirement is optional (since joining the plan is discretionary); (ii) the need to increase saving over time is optional (it requires a voluntary election by the worker); and (iii) investing for retirement should focus on principal stability, rather than taking on risk or balancing the portfolio (since the default fund in most retirement savings plans is a conservative fixed income option). It is interesting that employers and policymakers rely on a model of voluntary choice by the worker in retirement saving plans, although they do not do so in other components of workplace benefits programs. Here, a comparison is instructive between employer retirement saving plans and health insurance. In terms of health plan participation, it has been uncommon for





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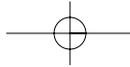
a US employer offering health insurance to allow employees to drop coverage altogether (particularly without proof of some other health insurance). Employers also regularly make decisions about healthcare plan coverage levels and, for example, types of procedures and catastrophic coverage, rather than leaving such choices to voluntary election by the worker. Perhaps this is because lack of healthcare coverage might be felt immediately in the workplace if a worker became ill, while low levels of retirement saving have no immediate consequence. If this is true, employers may be subject to the same type of “hyperbolic discounting” as many workers, overvaluing present-day risks, and overdiscounting future concerns.

4. *A fourth lesson is that the current education model in 401(k) plans may have reached its effective limits.* Accompanying the growth of participant-directed DC retirement plans has been a large expansion in the provision of workplace education. Much of the educational effort has been motivated by nondiscrimination testing—employers have an incentive to encourage plan use among lower-paid employees, to allow highly paid employees greater ability to contribute to the plan. Other motivations have been employers’ desires to promote a popular saving benefit, and to minimize fiduciary liability for participant investment decisions. The current educational model tends to emphasize communication and education activities, both of which are aimed at producing behavioral change (e.g. joining the plan, boosting saving, investing more effectively). Yet, the behavioral literature suggests that for many workers, this model is limited in its applicability. There is the problem of inertia, which we have described as the divergence between desire and effective action. There is also the notion that only part of the workforce is motivated to learn about personal finances or interested in using financial education. Contemporary education practices assume that most workers are rational agents and planners, but the evidence we offer suggests that large numbers of workers simply are not.

As Selnow (Chapter 2, this volume) suggests, an alternative model is that desired behavior must precede education. Mechanisms must be found, whether through plan defaults or delegation to a third party, where workers begin practicing the right behaviors at the outset. Education then can play an ancillary role, explaining the rationale for the defaults and alternative courses of future action. In effect, behavioral economics suggest a reversal in the causality of education: A shift from education driving behavioral change, to initial behavioral change preceding education.

These broad themes—imperfect investors and savers, the critical role of system design, a new model for education—suggest a number of policy and plan design choices. Four issues deserve prominent attention:

1. *Much depends on the DC arrangement in DC plans.* One way to exploit the findings of this rich new behavioral literature would be to alter the

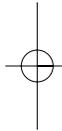


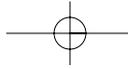
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nature of default decisionmaking in US retirement saving plans. Inertia, procrastination, and lack of decisionmaking willpower can be exploited to encourage more retirement saving. An “auto-pilot” 401(k) is one possibility. Also automatic enrollment of all eligible employees; scheduled annual savings increases (as in the Save More Tomorrow plan); and a selection of default investment choices that represent optimal portfolio choices, such as a series of age-based balanced portfolios. In this way, the passive decisionmaker may rely on system design to reach a near-optimal retirement outcome. While workers will still retain the right to “opt out” of this arrangement, allowing for freedom of choice, the system design always directs workers toward desirable saving and investment behaviors.

Auto-pilot 401(k) solutions are not without their drawbacks: Most notably, the automatic enrollment of employees will raise costs above the current model where workers must opt in (e.g. higher employer matching contributions, higher administrative costs for employers and providers). Offsetting these costs, in part, could be the greater asset pool resulting from higher contribution rates over time, as well as higher-fee investments as default options. Just as employees are easily influenced by employer plan design decisions, so employers are influenced by implicit and explicit policymaker directions. Currently, clear-cut regulatory guidance exists only for automatic enrollment components; to generalize this success, some type of regulatory or statutory endorsement for automatic saving and age-based investment choices would be required. A further consideration, of course, is whether the auto-pilot 401(k) model would be an alternative to existing nondiscrimination testing requirements. From a policy perspective, nondiscrimination testing rules were introduced to ensure that low-paid workers take sufficient advantage of tax-deferred retirement savings plans, and that tax benefits of such plans did not accrue solely to the highly paid. An auto-pilot 401(k), perhaps with some standardized eligibility and matching contributions (as in today’s “safe harbor” design), might accomplish the same objective in a different way. It would offer other benefits for lower-paid workers as well—including automatic retirement savings increases and better portfolio choices for many.

2. *Simplified menu design in retirement plans could be very useful.* One of the more practical conclusions from behavioral finance is that investment menu design must be closely scrutinized. Iyengar, Huberman, and Jiang (Chapter 5, this volume) describe the “choice overload” hypothesis in detail: Complex investment menus may discourage plan participation. But it is also clear that even simple pension design decisions, such as the composition of equity versus fixed income funds, can also strongly influence participant investment behavior. Certainly, one implication from the research is that many participants lack skills needed to make complex investment choices among highly differentiated options. There is little evidence that participants





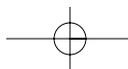
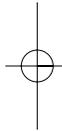
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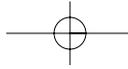
are constructing the mean–variance optimal portfolios that employers use to justify the inclusion of different investment classes, styles, and managers. Instead they use informal heuristics, including past performance, to make choices.

As a result, the research suggests that the “laundry list” approach to investment options—where workers are given 50 or 100 choices of funds—will be confusing and demotivating for some. Accordingly, plan sponsors might experiment with tiered investment choices, where communication resources are devoted to educating participants about a limited menu of core options, and additional choices for sophisticated investors could be segregated from the core menu.

More broadly, both employers and policymakers need to rethink the trend toward expanding the myriad and complex active saving decisions presented to workers. Behavioral research suggests that there are natural, inevitable limits to a policy of ever-increasing choices and decisions. For example, tax legislation in 2001 authorized an after-tax version of 401(k) saving plans (dubbed a “Roth” provision, in which contributions are made after-tax and all future earnings and distributions are tax-free). The idea is that employers could offer employees a choice between pre- and post-tax savings in the same plan. The Administration has also recently proposed to create a system of after-tax personal saving accounts which compete with pre-tax workplace saving plans. Whatever the merits of these proposals, it seems likely that adding new choices will further complicate investment and saving decisions. Since the evidence suggests that many workers already struggle with the basic decisions to save, invest, and spend during retirement, it seems likely that new options will further challenge already-burdened decisionmakers.

3. *New approaches are needed to help workers and retirees better manage company stock risk.* Congress and employers have attempted to address the risks of holding excessive company stock through education and educational/disclosure activities, yet the behavioral evidence suggests that this strategy will have limited impact. One problem is inertia; reducing concentrated stock positions requires taking a disciplined approach to selling stock holdings, but few participants tend to follow such a self-motivated, disciplined approach to managing their saving due to inertia and procrastination. Another problem is risk perceptions and the influence of past returns with company stock. Employees significantly underestimate the risks of their own company’s stock, and they are also unduly and erroneously influenced by past stock performance. The findings regarding overconfidence and aversion to realizing losses may also come into play with company stock. When workers have too rosy a view of the future but have trouble selling their company stock at a loss, it is unlikely that providing additional information will quickly alter these attitudes and produce changes in investment portfolios.



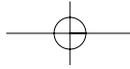


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As in the auto-pilot 401(k) case, one policy option would be to provide employees with an optional statutory mechanism that automatically reduces their exposure to company stock to a given percentage that declined with age (e.g. 20 percent or 10 percent of assets by age 65). For example, a plan might offer a provision that drew down the participant's position steadily each quarter over some prescribed period, say 3 or 5 years. In other words, participants may need a precommitment device that works automatically for them as they near retirement, a concept dubbed as the "sell more tomorrow" idea by the originators of the "Save More Tomorrow" plan.

4. *Sensible plan design includes default choices at retirement.* Current policy has permitted the conversion of pensions from plans that pay life annuities, into programs that give workers a choice to receive their lifelong saving in a lump sum at retirement. Behavioral research suggests that annuity versus lump sum decisions at retirement could be better framed, taking into account participants' understanding of mortality versus investment risks. One question has to do with what should be the default choice. In DB plans, the default has traditionally been an annuity, though more plans are now offering lump sum options. In DC plans, the default is generally a lump sum, with no annuity option. An alternative approach might be to frame the default as some mixture of annuity and lump sum, rather than as an either-or decision. Of course, it would be essential to ensure that the two options are compared on an "apples-to-apples" basis to avoid framing bias. To better preserve the longevity protection that pensions once offered, policymakers may find it sensible to make annuitization the default, and to make loans against the pension accruals more difficult to obtain.

In sum, this research overview on behavioral decisionmaking finds important and valuable new insights into how plan sponsors, benefit plan consultants, and policymakers must rethink pension plan design in this new century. It seems clear that participants can be better served, when they make the hard decisions to accumulate and decumulate retirement assets. It is because retirement saving decisions are, at least an order of magnitude, more complex than other economic decisions, that people need help. The thought process requires a sequence of critical savings and investment decisions over a lifetime, backed by a complex and ongoing forecast of needs and resources. It should not be surprising, then, that for a substantial segment of the workforce, this task proves daunting and discouraging. And for some people, the problem may be so complex that they are forced to rely on decision heuristics that simplify decisionmaking, but may not necessarily produce appropriate outcomes. While much has been learned, a central question remains: How can the various stakeholders strike the best balance between encouragement and compulsion? What system can both preserve participant decisionmaking while offering limits on



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choice, so as to encourage the outcomes that rational and forward thinking consumers would want for themselves? This volume offers much to inform the debate.

#### Notes

<sup>1</sup> For a recent review see Kahneman and Tversky (2000); Mullainathan and Thaler (2000); Shefrin (2003) and Barberis and Thaler (2002). For a review of retirement and portfolio implications, see also Statman (Chapter 4, this volume), Duflo and Saez (Chapter 8, this volume), and Choi et al. (Chapter 7, this volume).

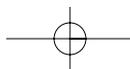
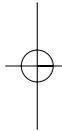
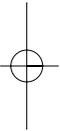
<sup>2</sup> Indeed the 2002 Nobel Prize in economics awarded to Daniel Kahneman and Vernon Smith, recognized the far-reaching importance of this shift in paradigm. The Prize Committee noted “[t]raditionally, much of economic research has relied on the assumption of a ‘homo oeconomicus’ motivated by self-interest and capable of rational decisionmaking. Economics has also been widely considered a non-experimental science, relying on observation of real-world economies rather than controlled laboratory experiments. Nowadays, however, a growing body of research is devoted to modifying and testing basic economic assumptions . . . This research has its roots in two distinct, but currently converging, areas: The analysis of human judgment and decisionmaking by cognitive psychologists, and the empirical testing of predictions from economic theory by experimental economists.” ([www.mea.uni-mannheim.de/winter/lehre/03-ss/behav.htm](http://www.mea.uni-mannheim.de/winter/lehre/03-ss/behav.htm))

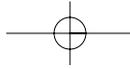
<sup>3</sup> Aizcorbe, Kennickell, and Moore (2003) summarize results from the 2001 Survey of Consumer Finances, and he finds for example, age-related fluctuations in net worth, financial assets, and debt consistent with the life-cycle hypothesis.

<sup>4</sup> There are methodological or substantive caveats regarding this research, yet on the whole the research does indicate that at least some households are not particularly good at solving the retirement saving problem. Hurd and Rohwedder (2003) find, for example, that households anticipate a 20% drop in consumption, and so the decline in retiree consumption may be rationally anticipated, not unexpected. One concern about Bernheim et al. (2001) is that it uses data on food consumption (both in and out of the home) as a proxy for total consumption.

<sup>5</sup> See also Loewenstein and Prelec (1992), Laibson (1997), and Frederick, Loewenstein, and O’Donoghue (2002). As Thaler recalls, doubts among economists about the consistency of individual time preferences dates back at least to Robert Strotz, who in the mid-1950s wrote that “special attention should be given . . . to a discount function . . . [that] ‘overvalues’ the more proximate satisfaction relative to the more distant ones . . .” (cited in Thaler, 1981: 127).

<sup>6</sup> Two examples are drawn from insurance and healthcare (Thaler and Sunstein, 2003). In the United States, in the state of New Jersey, the default option under the state’s car insurance regulations offers workers a limited right to sue for damages (with a lower insurance premium). In the neighboring state of Pennsylvania, the default is the regular right to sue; to obtain the limited right to sue and the lower premium, the car driver must make a positive election. In New Jersey, 20% of individuals retain the full right to sue, which requires a positive election, while in Pennsylvania, 75% retain the full right to sue, which is the default. Similarly, the donation of vital organs upon one’s death is common in a number of European countries, with over 90% of individuals donating organs; yet, it is comparatively rare in the United States,





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with less than 20% making organ donations. In the European countries, organ donation is the default; in the United States, it requires a positive election.

<sup>7</sup> Goetzman and Kumar (2001), De Bondt (1998).

<sup>8</sup> See Thaler and Johnson (1990) for a discussion of break-even thinking and the house money effect.

<sup>9</sup> See Arkes et al. (1995), Odean (1998*a*), Svenson (1981), Teger (1979), and Weinstein (1980). Taylor and Brown (1988) point out that overoptimism offers psychological benefits as well.

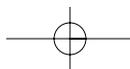
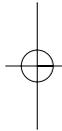
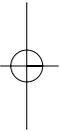
<sup>10</sup> For an overview of the overconfidence literature, particularly on the ability of individuals to calibrate their forecasts, see Lichtenstein, Fischhoff, and Phillips (1982). Odean (1998*a,b*) also summarizes findings on overconfidence.

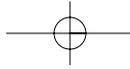
<sup>11</sup> Shefrin (2003) summarizes both these conclusions from De Bondt (1998) and related literature on overconfidence in investing.

<sup>12</sup> It may be worth noting that opting for a lump sum permits retirees to avoid using the unisex mortality tables required by law for employee benefit plans. This could be an appealing result for those who anticipate living less long than the combined male/female life expectancy. Taking the lump sum and spending it also makes the near-poor retiree more likely to be eligible for social welfare benefits payable to the indigent.

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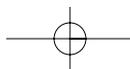
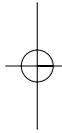
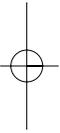
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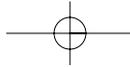




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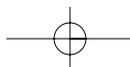
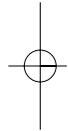
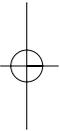
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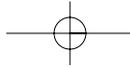




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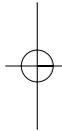
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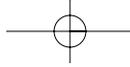




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