

Heuristics and Biases in Retirement Savings Behavior

Forthcoming, Journal of Economic Perspectives

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INTRODUCTION

There is a worldwide trend, in both the public and private sectors, away from defined benefit (DB) retirement plans toward defined contribution (DC) plans. DC plans transfer much of the decision making authority about how much to save and how to invest from the employer or government to the employee. DC plans have many attractive features for participants, such as portability and flexibility, but these attractions come with an increased responsibility to choose wisely. The plans also provide economists with an attractive domain in which to study savings behavior.

* Benartzi is grateful for financial support from Reish Luftman and the Vanguard Group. We are also grateful to Jodi Dizenzo, Wayne Gates of John Hancock, Lori Lucas of Hewitt Associates, John Rekenhaller of Morningstar, Jason Scott of Financial Engines, Brian Tarbox, Steve Utkus of the Vanguard Group, and Carol Waddell of T. Rowe Price for all the data they have provided us over the years.

The standard theory of savings (e.g., the life-cycle model of Modigliani) has two imbedded rationality assumptions, one explicit and one implicit. The explicit assumption is that savers accumulate and then decumulate assets to maximize some lifetime utility function (possibly including bequests). The implicit assumption is that, having determined the optimal lifetime consumption path, households have sufficient willpower to execute this plan. If instead, consumers submit to the temptation of spending now and worrying about retirement later, they might not save enough.¹

Of course, no economic model is intended to be taken literally. Even among economists it is rare to find someone who has spent much time determining the optimal savings rate, given all the uncertainties about future rates of return, income flows, retirement plans, health, and so forth. Instead, most people attempt to cope by adopting simple heuristics, or rules of thumb. One of the primary lessons from psychology is that such heuristics, though often useful and accurate, can lead to systematic biases (Griffen, Gilovich and Kahneman, 2002). In this paper, we investigate both the heuristics and the biases that emerge in this important domain. We do not cover whether people are saving enough for retirement, a topic that is covered in a companion paper by Skinner (this issue). Instead, we examine the decisions employees make about whether to join the savings plan, how much to contribute, and how to invest. We then discuss the possible role of interventions, in terms of either education or plan design.

1. Enrollment Decisions: To Join or Not to Join

Defined contribution retirement plans are attractive savings vehicles. Contributions are tax deductible, and accumulations are tax deferred. In addition, many plans offer to match

¹ The opposite problem, miserliness, could also be observed if people worry excessively about saving for retirement and lack the willpower to go out and spend!

employees' contributions. For example, a common plan is to match employees' contributions at a rate of 50 percent up to some cap threshold, such as 6 percent of salary. Taking advantage of this match should be a “no brainer” for all but the most impatient and/or liquidity-constrained household. Nevertheless, enrollment rates in such plans are far from 100 percent.

An extreme example of reluctance to join comes from the U.K. Some defined benefit plans in the U.K. do not require any employee contributions and are fully paid for by the employer. They do require employees to take action to join the plan. Data on 25 such plans reveals that only half of the eligible employees (51%) have signed up.²

One solution is to change the default. If workers were automatically signed up for those free DB plans it is hard to imagine many choosing to opt out. This strategy, called automatic enrollment (or negative election), has proven to be quite effective in U.S. DB plans (Madrian and Shea, 2001a; Choi et al., 2004a, 2002). In the usual “positive election” or opt in plan, workers must complete an election form. Under automatic enrollment, at the time of eligibility, workers are notified that they will be enrolled in the plan (at a specified savings rate and asset allocation) unless they actively elect not to participate or they change the default selections. In one plan Madrian and Shea studied, participation rates under the standard opt-in approach were barely 20 percent after three months of employment, gradually increasing to 65 percent after 36 months of employment. When automatic enrollment was adopted, enrollment of new employees jumped to 90 percent immediately and increased to more than 98 percent within 36 months. Automatic enrollment thus has two effects: participants join sooner, and more participants join eventually.

There is a downside. These programs are typically set with a relatively low default saving rate of 2 or 3 percent and a very conservative investment choice, such as a money market

² We thank David Blake and the U.K. Department of Work and Pensions for providing us with the data.

account. Madrian and Shea found that many employees continue saving at the default rate of 2 percent, a rate far too low to provide sufficient funding for retirement. Furthermore, many employees remain in the default investment fund. We will later discuss how plan sponsors and policy makers could keep the high participation rates of automatic enrollment plans and at the same time promote higher deferral rates and more broadly diversified portfolios.

One alternative to automatic enrollment is to require that workers make an active decision whether to join the plan (Choi et al. 2005). One company switched from an opt-in regime to active decisions and found that participation rates increased by about 25 percent. It follows that the simpler it is for workers to join, the higher enrollments will go. Choi et al. (2005) tested this idea by analyzing three companies offering a simplified enrollment form. At one of the companies, new employees were handed enrollment cards during orientation with a “yes” box for joining the plan at a 2-percent saving rate with a pre-selected asset allocation. Employees did not have to spend time choosing a saving rate and asset allocation but could just check the “yes” box for participation. Choi et al. report an increase in participation rates during the first four months of employment from 9 percent to 34 percent. Similar results were obtained in the other two companies. But while quick enrollment shares some of the benefits of automatic enrollment, it also shares the downsides. Those employees who elect the quick enrollment options have a strong tendency to stick with the (low) default savings rate and (conservative) asset allocation.

While automatic enrollment or “quick” enrollment makes the process of joining less daunting, adding funds to the plan can have the opposite effect. For example, Iyengar and Jiang (2003) find a negative correlation between the number of investment options offered in the plan

and participation rates. They estimate the addition of 10 funds to the menu of investment options reduces the likelihood of employee participation by two percentage points.

Does automatic enrollment merely overcome the inertia caused by procrastination and disorganization? Or does automatic enrollment somehow trick employees into joining the plan, seducing workers to save when they would prefer to be spending? Evidence shows that under automatic enrollment, very few employees drop out of the plan once enrolled. For example, in the four companies Choi et al. (forthcoming) studied that adopted automatic enrollment, the fraction of 401(k) participants who dropped out of the plan in the first year was only 0.3 to 0.6 percentage points higher than it had been before automatic enrollment was introduced. This suggests that workers are not suddenly discovering, to their dismay, that they are saving more than they want.

There are some workers for whom joining the plan amounts to an arbitrage opportunity, implying that procrastination and inertia are the only plausible explanations for a failure to join. Choi et al. (2004b) identify one group of workers with this arbitrage opportunity, namely employees who are (1) older than 59¹/₂ years old, so there is no tax penalty when they withdraw funds from their retirement account, (2) have an employer match, and (3) are allowed by their employer to withdraw funds from their retirement account while still working. For this group of employees, joining the plan is a sure profit opportunity because they can immediately withdraw their contributions without any penalty, yet they get to keep the employer match. Even in this situation, Choi et al. find that 40 percent of individuals either do not join the plan or do not save enough to get the full match.³

³ Duflo et al. (2005) find a similar unexploited arbitrage opportunity in the context of tax filers eligible for the savers tax credit.

2. Contribution Rates

Having decided to join a retirement savings plan, employees are then typically asked to determine how much they want to contribute, except when automatic enrollment is used. In this paper, we do not attempt to answer the question of whether the average employee is contributing “enough.” This is a difficult question to answer definitively because researchers often lack crucial information about households’ other sources of wealth and savings, and there is no agreed upon standard for how much retirement savings is adequate (see Jon Skinner, in this issue, for more on this topic). We do want to make two simple points, however. First, for workers who do not have other significant sources of retirement income, the savings rates typically observed in 401(k) plans are unlikely to provide anything close to complete income replacement in retirement. Second, when asked, employees themselves indicate that they think they should be saving more. Choi et al. (2002) report that 68 percent of 401(k) participants feel their saving rate is “too low,” 31 percent feel their saving rate is “about right,” and only 1 percent believe their saving rate is “too high”.⁴

How do participants choose their particular deferral rate? Do they attempt to calculate their funding needs, or do they just use some sort of rule of thumb? One indication that people are not solving the relevant dynamic programming problem is that they spend very little time on this important financial decision. For example, in a survey of USC faculty and staff, we found that 58 percent spent less than one hour determining their deferral rate and investment elections (Benartzi and Thaler, 1999).

⁴ Economists tend to make fun of such statements of intention, and partly for good reason, given that few of the participants who say they should be saving more make any changes in their behavior in the following year. Yet such statements are not meaningless or random. Many people announce an intention to eat less and exercise more next year, but very few say they hope to smoke more next year or watch more sitcom reruns. We interpret the statement “I should be saving (exercising) more” to imply that they would be open to commitment strategies that would help them achieve these goals. We discuss one such plan below.

Data by Hewitt (2002a) provides some hints as to the specific shortcuts or “saving heuristics” people tend to use. In many plans, participants are asked to state a desired saving rate as a percentage of pay. The distribution of deferral rates spikes at multiples of 5 percent. It is important to note that the analysis done by Hewitt excludes plans that offer an employer match with a threshold of either 5 or 10 percent, ruling out the possibility that employees simply maximize the amount contributed by their employer on their behalf, a strategy we discuss below.

Another saving heuristic we explored in a joint research project with Hewitt is picking the maximum deferral rate allowed by the plan (Hewitt, 2002b). Although this can be a sensible strategy, changes in the tax code enabled us to explore whether the rule of “saving the max” is the result of careful thinking or just another saving heuristic. The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) retained dollar caps on contributions but eliminated the restrictions on the percentage of salary that could be contributed. People with a low salary (e.g., a part-time worker) that is less than the dollar cap could choose to save 100 percent of their pay. This could be an attractive strategy for a couple that wants to save all or most of the second earner’s pay. Traditional economic analysis predicts that EGTRRA would most likely result in increased deferral rates, as some participants could now increase their savings rate. But to the extent that employees used the maximum deferral percentage prior to EGTRRA as a saving heuristic, some employees might actually pick a lower saving rate under EGTRRA, as saving the max (i.e., 100 percent) is not really feasible for most people.

The analysis of one plan that increased the maximum deferral rate from 16 percent to 100 percent of pay is provided in Figure 1. We compared the distribution of deferral rates for those joining the plan at the fourth quarter of 2001, when the maximum was 16 percent, with those joining the plan at the first quarter of 2002, just after the limit was raised to 100 percent. The

fraction of new employees selecting a deferral rate of 16 percent dropped from 21 percent to 5 percent as a result of the limit being raised to 100 percent. Only 7 percent of new employees saved more than 16 percent. We believe that some employees who would have been attracted to the “maximum deferral heuristic” prior to EGTRRA found the 100 percent max too high and switched to the “round number heuristic.” This explains the increased popularity of deferral rates of 10 and 15 percent after EGTRRA.

[Insert Figure 1 about Here]

Another common behavior is to save the minimum that is necessary to get the full match. For example, if the employer matches employees' contributions up to 6 percent of pay, then many employees end up contributing six percent. Looking at Figure 1, 28 percent of the participants contributed at that level. Obviously, it can be a rational strategy to save at least 6 percent in this environment, but some workers whose optimal savings rate is higher than 6 percent might simply adopt this anchor and stop thinking about it. If participants are behaving this way, then firms desiring to encourage employee savings might alter their matching formula to achieve this goal. For example, we suspect that changing the match formula from 50 percent on the first 6 percent of pay to 30 percent on the first 10 percent of pay would result in higher contribution rates for two reasons. First, those who use the match threshold as a rule of thumb would naturally save more with a 10-percent threshold instead of the 6-percent threshold. Second, picking a round number as the threshold would also capture those who use the “round number heuristic” we discussed above.

3. Asset Allocation

3.1. Naïve diversification strategies:

Having decided to join the plan, and having picked an amount to save, participants must then decide how to invest their contributions. Picking the best point on the efficient frontier is easier said than done. Indeed, when asked about how he allocated his retirement investments in his TIAA-CREF account, Nobel laureate Harry Markowitz, the “father” of modern portfolio theory, admitted that “I should have computed the historic covariances of the asset classes and drawn an efficient frontier. Instead, ... I split my contributions fifty-fifty between bonds and equities” (Zweig, 1998). Markowitz was not alone. During the period when TIAA-CREF had only two options (TIAA is fixed income and CREF is equities), more than half the participants had selected a 50/50 split.

Markowitz’s strategy is a simple example of a naïve diversification strategy: when faced with “n” options, simply divide assets evenly across the options. We have dubbed this heuristic the “1/n rule.” Consider the following experiment Read and Loewenstein (1995) conducted on Halloween night. The “subjects” in the experiment were trick-or-treaters. In one condition, the children approached two adjacent houses and were offered a choice between two candy bars (Three Musketeers and Milky Way) at each house. In the other condition, they approached a single house where they were asked to “choose whichever two candy bars you like.” Large piles of both candies were displayed to ensure that the children would not think it was rude to take two of the same. The results showed a strong diversification bias in the simultaneous choice condition: every child selected one of each candy. In contrast, only 48 percent of the children in the sequential choice condition picked different candies. The remaining 52 percent picked two of the same candies, presumably their favorite. (see also earlier work by Simonson, 1990).

Though children might mistakenly apply naïve diversification heuristics on Halloween, there is really not much harm in picking two different candies. Applying naïve diversification heuristics to portfolio selection could have more significant consequences,. In one study, we asked UCLA employees to allocate their retirement contributions among five investment funds. One group of employees was presented with four equity funds and one fixed-income fund, whereas another group of employees was presented with the reverse mix of funds, that is, four fixed-income funds and one equity fund. This experiment was designed to replicate the actual menu of funds then offered to UCLA employees and TWA pilots, with TWA having the equity-dominated menu of funds. The results indicate that the menu of funds has a strong effect on portfolio choices. Those offered one equity fund allocated 43 percent to equities, whereas those offered multiple equity funds ended up with 68 percent in equities. The results are in line with the actual equity exposure of the two plans, which are 34 percent for UCLA and 75 percent for TWA (Benartzi and Thaler, 2001).

To complement this experiment, we also examined cross-sectional data on 170 retirement saving plans. We used the number of equity funds relative to the total number of funds offered to categorize retirement saving plans into three equal-sized groups.⁵ The relative number of equity funds for the three groups was 0.37, 0.65, and 0.81, respectively. For a plan with ten investment options, for example, a 0.37 figure implies that roughly four of the options are equity funds. Next, we calculated the mean allocations to equities for each group, which were 48.64 percent, 59.82 percent, and 64.07 percent. Consistent with the diversification heuristic, there is a

⁵ We made some adjustments for the time each investment fund was introduced to the plan, because inertia predicts that newer funds will be slow to attract money, everything else being equal. See Benartzi and Thaler (2001) for more details on the exact calculations.

positive correlation between the relative number of equity funds and the percentage invested in equities ($p < 0.01$).

The heuristics people use depend on the complexity of the situation. For example, in deciding what to eat at a buffet dinner, if the number of choices is small, then some version of the $1/n$ strategy works fine (take a little bit of each item). But when the number of options gets large, people have to devise other simplifying strategies, such as to take one item from each category. Using this logic in the world of 401(k) plans, it follows that adding options to plans will no longer have an effect once the number of options gets large. This intuition is confirmed by Huberman and Jiang (forthcoming). They find a positive correlation between the fraction of equity funds offered and the resulting allocation to equities for plans that offer up to 10 investment choices, but the correlation is no longer significant in plans with more than 10 funds.

Huberman and Jiang find additional evidence consistent with naïve diversification. The vast majority of participants choose a small number of funds, with the median between three and four funds, and there is a strong tendency to divide assets equally among the funds chosen, what Huberman and Jiang call the conditional $1/n$ rule. The use of the conditional $1/n$ rule appears related to the ease of applying it. When 100 is divisible by n , the conditional $1/n$ rule is quite popular, but when 100 is not divisible by n , the $1/n$ rule (or something close to it) is rarely used. For example, when $n = 2$ or $n = 4$, the $1/n$ rule is used by 37 to 64 percent of the participants, but when $n = 3$ the rule is only used by 18 percent of the participants. Instead, when using three funds, many people adopt some other arithmetically simple rules, such as .50, .25, .25.

The finding that people choose a small number of funds led us to wonder whether there was some limit on the number of funds a participant chooses. An informal poll of several members of the University of Chicago finance and economics community revealed that most had

selected four funds and thought that this was the maximum number allowed. A quick look at the sign-up form revealed why faculty had this (incorrect) impression: The form has only four lines for investment elections. To choose more than four funds, a second form is needed, admittedly a small cost but one that might be nearly insurmountable for the typical disorganized professor.

This led us to consider whether small details, such as the number of lines on the sign-up form, might influence the number of funds selected. We conducted an experiment on the Morningstar.com web site, which contains mutual fund and other financial information. We asked two groups of Morningstar.com subscribers to indicate how they would allocate their retirement funds among a list of eight funds. The first group was presented with an election form with just four lines on it, though the participants could easily select additional funds by clicking on a highlighted link, as shown below:

“Based solely on the above, please indicate how you would allocate your retirement contributions. You may choose up to four funds. (If you would like to elect more than four funds, please [click here.](#))”

The second group of participants was shown an election form with eight lines on it.

The results of the experiment are displayed in Figure 2. Despite the ease of simply clicking on the link, only 10 percent of the subjects selected more than four funds. In contrast, 40 percent of those viewing the election form with the eight lines ended up picking more than four funds. The evidence in support of the number of lines hypothesis is quite strong.

[Insert Figure 2 about Here]

As the number of funds increases, and the $1/n$ rule becomes impractical, investors must adopt some other strategy, including “giving up.” For example, Iyengar and Jiang (2003) report that people are more likely to choose the safest investment as the menu of funds expands and becomes overwhelming. They estimate that the addition of 10 funds increases the fraction allocated by participants to money market funds by four percentage points.

One step many plans have adopted to help participants deal with the difficult problem of portfolio construction is to offer “lifestyle” funds. Such funds consist of a blend of stocks and bonds designed to meet the needs of different levels of risk tolerance. (Think of these funds as picking three points on the efficient frontier.)⁶ For example, an employer might offer three lifestyle funds: conservative, moderate, and aggressive. The main feature of these funds is that they are already diversified, so individuals need only pick the one fund that fits their risk preference.

Do participants understand how to use these diversified funds? We studied one plan that offers both lifestyle funds and core funds. The three lifestyle funds are conservative, moderate, and aggressive, and the six core funds include an equity index fund and a growth fund, among others. The results are displayed in Table 1. Those who invest in the conservative lifestyle fund allocate just 31 percent to that fund, with the rest being allocated to the core funds. Because the menu of core funds is dominated by equity funds, the resulting equity exposure of those in the conservative fund is 77 percent. These participants end up with a fairly aggressive portfolio, probably without being aware of it. It seems that participants are reluctant to stick with one fund, even when that fund already contains several different funds. Vanguard (2004) reports

⁶ Some funds also adjust the asset allocation with the age of the participant.

similar findings using a much larger sample of plans. They find that participants who elect a lifestyle fund allocate only 37 percent of their account balance to the lifestyle fund.

[Insert Table 1 about Here]

Another question is whether individuals choosing among lifestyle funds end up picking the same level of risk as those constructing their own portfolios from the core options. We conducted an experiment in which UCLA employees were assigned to one of two conditions. One group was asked to allocate their funds between a stock fund and a bond fund. The second group was asked to choose one of five lifestyle funds whose equity allocation varied from zero to 100 percent in 25 percent increments. Economic theory predicts that the choices made under these two conditions should be roughly the same, except for rounding errors.

The results indicate a dramatic difference between the two conditions. Under the mix-it-yourself condition, individuals found the fifty-fifty allocation fairly attractive (32 percent selected it), and only 15 chose an all-equity allocation. In contrast, 51 percent of those who chose among the pre-mixed portfolios selected the most aggressive portfolio of 100 percent stocks. Notice that the diversification heuristic does not seem to apply when people pick among pre-mixed funds, as all the funds are perceived to be equally diversified to a naïve investor who confuses diversification with the number of funds (in this case, each lifestyle fund counts as just one fund, regardless of its composition).⁷ One might still wonder why the 100 percent stock portfolio was such a popular choice. We ran our experiment in the late '90s, and we believe people were attracted to the remarkable stock performance at the time. Our findings are quite

⁷ See also work by Fox and Langer (2005).

troubling, as small variations in the framing of the problem result in dramatically different portfolio choices. In fact, our experiment was designed to replicate the actual difference between 401(k) plans in the U.S., where most people construct their own portfolios, and the Chilean social security system, where individuals pick one of several lifestyle funds. Our findings raise difficult questions for policy makers with respect to the design of social security systems or other retirement saving programs.

3.2. Company stock:

One of the extreme examples of poor diversification is the case of employees investing in their employer's stock. Mitchell and Utkus (2004) estimate that five million Americans have over 60 percent of their retirement savings invested in company stock. This concentration is risky on two counts. First, a single security is much riskier than the portfolios offered by mutual funds. Second, as employees of Enron and WorldCom discovered the hard way, it is possible to lose one's job and the bulk of one's retirement savings all at once.

For several reasons, many employees still do not think these risks apply to their own employer. First, they do not understand the risk and return profile of company stock. When the Boston Research Group (2002) surveyed 401(k) participants, they found that despite a high level of awareness of the Enron experience, half of the respondents said that their company stock carries the same or less risk than a money market fund. Similarly, Benartzi et al. (forthcoming) find that only 33 percent of the respondents who own company stock realize that it is riskier than a "diversified fund with many different stocks." Despite financial education initiatives by fund providers and plan sponsors, participants have continued to rate company stock as safer than a

domestic stock fund in each of the John Hancock Financial Services surveys conducted during the 1992 to 2004 period.

Second, plan participants tend to extrapolate past performance too long into the future. To investigate this phenomenon, Benartzi (2001) sorted firms into quintiles based on their stock performance over the prior 10 years and examined subsequent allocations to company stock. Employees at the worst performing firms allocated 10 percent of their retirement contributions to company stock, whereas those at the best performing firms allocated 40 percent of their contributions to company stock. Benartzi also examined the subsequent stock performance and found no evidence that employees have any superior information regarding their firm's future prospects.

Third, employees who receive their employer matching contribution in company stock view their employer's decision to match in company stock as implicit advice. In particular, those who exercise discretion over the employer match allocate 18 percent of their own funds to company stock, whereas those who receive the match in stock allocate 29 percent of their discretionary contributions to company stock.

Meulbroek (2002) has estimated the costs of investing in a single security instead of a diversified portfolio.⁸ The relative value to the employee of a dollar of company stock, as opposed to a diversified stock portfolio, is inversely related to the proportion of wealth held in company stock, the number of years the stock will be held, and the volatility of the stock. For example, with an assumed investment horizon of ten years and 25 percent of the assets in company stock, a dollar in company stock only provides 58 percent as much risk adjusted value as a diversified portfolio. Lengthening the investment horizon to 15 years, and increasing the

⁸ See also calculations by Poterba (2003) and Ramaswamy (2004).

allocation to company stock to 50 percent, would further reduce the value to 33 cents on the dollar. These results probably under-estimate the costs of being under-diversified as they ignore the correlation between human capital and the performance of company stock.

Given the substantial costs of being under-diversified, why do some employers require employees to receive the match in company stock? Roughly speaking, employers are spending a dollar to give employees 50 cents of benefits (in risk-adjusted utility terms). How could such an equilibrium persist? Why does Congress permit the use of company stock in 401(k) plans? It is noteworthy that company stock is the only investment in 401(k) plans that is exempt from ERISA's diversification requirement, and no other individual stock is allowed to be offered in a 401(k) plan.

To understand why some employers provide the match in company stock, we surveyed Vanguard clients (see Benartzi et al., forthcoming). Employers believe that the potential increase in motivation and productivity, the advantageous tax treatment of company stock, and placing shares in friendly hands are the most important factors. Some of the alleged benefits employers attribute to company stock are overstated. For example, the evidence on the increase in productivity is at best mixed (Prendergast, 1999). Furthermore, the increase in productivity is uncorrelated with the degree of employee ownership (Kruse and Blasi, 1995). It is the notion of being an owner, not the magnitude of ownership, that matters. This should not come as a surprise, because each employee owns an extremely small fraction of the firm and has an incredibly small effect on the overall performance. The tax advantages of company stock are also exaggerated, and we estimate them at somewhat less than 10 percent of the value of the stock. As to the friendly hands argument, if employers are requiring their employees to hold shares in the company to avoid takeovers, their claims to protection by the law are rather flimsy.

3.3. Market timing: Buy high, sell low:

Throughout the 1990s, participants were increasing their asset allocation to equities, both in terms of the percentage of money contributed each year and the account balances held. At the time we speculated that there could be two reasons for this behavior, both related to “learning.” One remote possibility was that investors had spent the decade pouring over finance and economics journals, and had learned that stock returns were substantially higher than bond returns over a long period, and so rationally decided to exploit this by investing in stocks. The other possibility was that investors had “learned” that stocks only go up, or, that even if stock prices fall, that is just another buying opportunity since they quickly go back up. When asked which of these two hypotheses we favored, we could only reply that it would take a bear market to find out. Luckily for us (unfortunately for investors), the stock market provided us with the opportunity to test these competing hypotheses during 2000-2002.

Using data from the Vanguard Group, we calculated the mean allocations to equities from 1992 through 2002. Our calculations are based on the allocations of contributions rather than account balances since balances are heavily influenced by the performance of the funds. We examine the behavior of the entire sample as well as the subsample of newly eligible participants. Because of the strong inertia exhibited by existing participants, the choices of new participants provide more insight into the current thinking of investors. The results are shown in Panel A of Figure 3.

As expected, the asset allocations of all participants move quite slowly over time, though the asset allocation did increase from 52 percent in 1992 to 65 percent in 2000 and did not change much thereafter. But looking at the allocations of new participants in any given year, a

very different picture emerges.⁹ New participants were already allocating 58 percent of their assets to equities in 1992, but that percentage rose to 74 percent in 2000. In the next two years, however, the allocation to equities fell back to 54 percent. Their market timing was exactly wrong.

[Insert Figure 3 about Here]

Similar behavior is observed in the asset allocations within equities. In some plans with many fund options, it is possible for investors to choose funds that specialize in particular industries or sectors. To determine how this option affects investors, we studied data from Hewitt Associates on a plan that offers a technology fund. Panel B of Figure 3 displays the percentage of new participants selecting the technology fund as well the fund's performance. The fraction of new participants selecting that fund increased dramatically from 12 percent to 37 percent over the course of two years, and then it decreased by half, from 37 percent to 18 percent over the course of one year. Again, participants were buying into the technology fund most aggressively at the peak.¹⁰

3.4. Mental accounting and framing:

Mental accounting refers to the implicit methods individuals use to code and evaluate financial outcomes: transactions, investments, gambles and so on (Kahneman and Tversky, 1984;

⁹ One caveat is that the data we obtained were a snapshot of the plan participants as of midyear 2002. While we knew the enrollment date for each participant, we observed their allocations as of midyear 2002. To the extent that participants may have made changes to their allocations over time, any bias should be fairly minimal for the 2000 to 2002 samples, however, as those data points are relatively recent.

¹⁰ See also Elton, Gruber and Blake (2005) for related findings for plan sponsors and participants.

Thaler, 1985). We believe that participants use separate mental accounts for “old money” (amounts they have already accumulated in the plan), and for “new money” (amounts they have not yet contributed). The propensity to adjust the allocation of old money is much lower than that of new money. One possible explanation for this is that investors fear the potential regret of reallocating old money and observing the new investment choices underperforming the original choices. With regard to new money, however, a reference point has not been set yet, so there is less potential for regretting any changes. Ameriks and Zeldes (2000) report that over the 1987 – 1996 period, only 47 percent of the TIAA-CREF participants they studied reallocated their accumulated assets, though 73 percent reallocated their future contributions.

Mental accounting also affects company stock. In particular, it appears that employees view company stock as a unique asset class that is neither stocks nor bonds. In our sample, plans that do not have access to company stock have half in stock funds and half in bond funds, whereas plans with access to company stock have 42 percent in company stock and the remaining 58 percent split evenly between stock funds and bond funds (Benartzi and Thaler, 2001). As a result, those with access to company stock invest 71 percent (42 plus half of 58) in equities. It seems that individuals investing in company stock do not realize that company stock is part of their equity portfolio, and they do not adjust their remaining funds to reflect the fact that they have significant exposure to the stock market.

Framing is another important factor in participants’ behavior. We have learned that providing plan participants with short-term rates of return on the different investment funds induces “myopic loss aversion” (Benartzi and Thaler, 1995). Loss aversion refers to the tendency of individuals to weigh losses about twice as much as gains (Kahneman and Tversky, 1979, 1991), whereas the myopic component is the tendency of individuals to evaluate their

portfolios too often. Using the language of Kahneman and Tversky's prospect theory, individuals reset their reference point too often. As a result, they are hypersensitive to short-term losses. In an experiment we ran, we showed individuals one-year returns or long-term simulated returns for a stock fund and a bond fund. We found that those viewing the one-year returns allocated just 41 percent to stocks, whereas those viewing the longer-term returns allocated 82 percent to stocks (Benartzi and Thaler, 1999). These results have significant implications for how often plan sponsors and plan providers can best convey information to plan participants. To some extent, the ease of receiving information in the Internet age could induce a high degree of myopic loss aversion.

3.5. Peer effects

Rational but unsophisticated investors may ask for help from a knowledgeable expert. Our research indicates that while individuals do ask others for advice, their "advisors" tend to be their spouses and friends, who don't necessarily qualify as experts (Benartzi and Thaler, 1999). One interesting anecdote comes from a chain of supermarkets operating in Texas.¹¹ The plan provider noticed that participants' behavior in each supermarket was remarkably homogeneous, but the behavior across supermarkets was fairly heterogeneous. It turns out that most of the supermarket employees considered the store butcher to be the investment maven and would turn to him for advice. Depending on the investment philosophy of the butcher at each individual location, employees ended up being heavily invested in stocks or heavily invested in bonds.

The same type of strong peer effects are documented by Duflo and Saez (2000, 2002) in a study of the retirement plan participation at 11 libraries of a large university. What makes their

¹¹ We thank Ken Robertson from the 401kcompany for sharing his data and experience with us.

study unique is that prospective librarians are interviewed and hired by the central library, and they do not know ahead of time to which library they will be assigned. Hence, one should not expect, a priori, a large variation across the libraries in demographics or in the propensity to save. Indeed, the data confirmed that there were no demographic differences across libraries, yet plan participation varied dramatically across libraries, from a low of 14 percent to a high of 73 percent, illustrating strong peer effects.

3.6. How much is investor autonomy worth?

One of the advantages of DC retirement plans is that they allow for individual variation in tastes, both for saving and for risk bearing. The trend over time has been to allow more flexibility, both in savings rates and investments. For example, although private 401(k) plans are relatively new, DC plans have existed at universities since 1918 when TIAA was formed. In these plans, there was only one option (TIAA—a fixed income vehicle) until 1952, when CREF (which invests in equities) was launched. The number of options remained at two until 1988. Furthermore, at many universities, a minimum savings rate is specified by the university. The employee is required to save at least x percent and the university will contribute y percent. These minimums are quite high ($x+y$ is often between 10 and 15 percent) relative to the average savings rates in private plans.

Do private plans that offer more choice in savings rates have higher contribution rates than the university plans that are more restricted? We know of no thorough analysis of this question, but the low savings rates observed in some private plans certainly raise questions about savings adequacy.

In studying asset allocation, we asked whether participants do a good job (as judged by themselves) in picking a portfolio. Using a plan with participants defaulted into a professionally managed account based on their age (Benartzi and Thaler, 2002), we studied the choices of those participants who elected to opt out of the default investment and form their own portfolio. Using software provided by Financial Engines (the financial advice firm founded by William Sharpe), we projected for each employee the distribution of retirement income for three portfolios: (a) the employee's self-constructed portfolio, (b) the average portfolio for all employees who had opted out of the professionally managed accounts, and (c) the professionally managed account the employee turned down. We presented the subjects with the three (unlabeled) distributions of projected retirement income and asked them to rate the three investment programs on a scale of one (very unattractive) to five (very attractive).

Participants' self-constructed portfolios received the lowest average rating, 2.75, the average portfolio received slightly higher mean ratings of 3.03, but the professionally managed portfolios received the significantly higher mean rating of 3.50. We deliberately selected the sample of participants who stated a preference to construct their own portfolios, and yet, 80 percent of them found the managed account solution more attractive. We should point out that these employees were not behaving in a directly inconsistent manner, since when they made their initial decision to reject the default asset allocation and form their own, they were probably not using something like Financial Engines software. They might have asked their butcher! Of course, one could try to improve individual investment choices by providing similar software, but firms that have made such software available have not found a very high usage rate.

Another, more indirect, test of the value of active portfolio choices in retirement plans comes from the partial privatization of the Swedish Social Security system launched in 2000 (see

Cornqvist and Thaler, 2004). Private accounts were created for each worker, and a portion of the payroll tax was contributed to this account. Workers could choose from an array of 456 funds, one of which was designated as the default fund.¹² The default fund was carefully constructed, well diversified, and had very low fees (16 basis points), but participants were urged by the Swedish government to eschew the default fund and select their own portfolio of up to five funds. Two-thirds of participants took this advice and formed their own portfolios. The average portfolio actively selected had higher fees (77 basis points), more risk, and a very high concentration of Swedish stocks (48 percent), a rather strong “home bias” (French and Poterba, 1991). For what it is worth, the active portfolios also underperformed the default fund by 9.7 percent (cumulative) over the first three years of the system. It should not come as a surprise that the Swedish system has stopped encouraging active decision making, and of those workers joining the system for the first time in 2003, only 8.4 percent made an active choice.

4. Choosing Between DB and DC Plans

Employees of state retirement programs are often given a choice between a DB plan and a DC plan. This is another interesting opportunity to study high-stakes decision making in the savings domain. We illustrate the potential with an example of a large public employer letting its employees choose between a DB and a DC plan.

The employer in our study offered all employees three options: remain in the existing DB plan, choose a new DC plan, or keep existing benefits under the DB plan and accumulate future accruals under the DC plan (a hybrid option). Those (vested) employees who switched from the DB plan to the DC plan would receive a lump sum contribution to their DC plan to compensate

¹² The number of funds has since grown to over 600.

them for giving up their DB benefits. Because this lump-sum amount was intended to be actuarially fair, it was usually not possible to determine which was the “rational” choice for a given participant, with one important exception. The DB plan and the DC plan had very different vesting schedules: one year for the DC plan and six years for the DB plan. An employee whose tenure in the DB plan was anything less than six years received no benefits. This meant that it was crucial for employees to estimate their expected tenure to make a good choice. Turnover for young or new employees was particularly high, so these employees were almost certainly better off choosing the DB plan. For example, the plan actuary estimates that a 31-year-old employee with one year of service has approximately a one-in-ten chance of working for the same employer through the plan’s normal retirement age of 62.

In Figure 4 we illustrate the projected income replacement ratio for a 31-year-old employee under the DB and the DC plans as a function of the age at which the employee terminates employment. Whereas the DB plan could provide an income replacement ratio of 66.7% after 32 years of service, slightly higher than the 59.9% for the DC plan, under most scenarios the DB plan provides a lower income. The likelihood of breaking even under the DB plan, that is working long enough for the current employer so that the DC and DB replacement ratios are identical, is only 13 percent. And, of course, for those staying with the current employer for less than six years, the DB plan provides no benefits.

[Insert Figure 4 about Here]

Data on participants’ choices reveals that only 7 percent of those with less than two years of service selected the DC plan (data as of Feb. 28, 2003). There are several potential

explanations. First, as we have seen before, inertia plays a powerful role in participants' behavior. The DB plan was set as the default choice, and 63 percent of the participants ended up in the DB plan by default. Interestingly, when surveyed beforehand, only 10 percent of the participants planned on being defaulted into the DB plan (see Figure 5). More interestingly, many more predicted they would choose the DC plan than actually did. Second, participants have unrealistic expectations with respect to job tenure. Shorter service employees vastly overstate their anticipated tenure. For instance, when asked about the likelihood of remaining with their current employer until retirement age, the gap between participants' expectations and the plan actuary's predictions reaches 40 percent for new employees. Third, in spite of a serious effort to educate the employees about their options, they had very little understanding of the plan's features. For example, only 19 percent of the employees realized that there was a one-year vesting requirement under the DC plan.

[Insert Figure 5 about Here]

Other studies on the choice between DB and DC plans also suggest that only a few select the DC option and that the default could have a dramatic effect. Papke (2004), for example, reports that only 1.6 percent of the corrections workers covered by the State of Michigan Employee Retirement System elected the DC plan. A study by Yang (2005) is an exception, reporting take-up rates of up to 50 percent, though two caveats are worth mentioning. First, the plan choice in Yang's study took place in March 2000, at the peak of the bull market. Second, the information provided to employees displayed the projected DC benefits with the full employer match. Those selecting either a low deferral rate or not contributing their own money

to the plan would actually not get the full employer match and could expect much lower benefits from the DC plan. Interestingly, Yang finds that those defaulting into the DB plan were more similar to the DC choosers than the DB choosers. For example, the average age of DB defaulters was 38, closer to that of DC choosers at 40 than to that of DB choosers at 53.

5. Interventions by Plan Sponsors

What can employers do to improve decision making by plan participants? There are two broad classes of interventions: education and plan design.

5.1. Improving participant decision making through education and tools:

Many employers have tried to educate their employees to make better decisions or supplied tools to help them improve their choices. The empirical evidence does not suggest that this can solve the problems we have raised. Consider the experience we had with the same large employer discussed above that offered its employees the chance to switch from a DB plan to a DC plan. In the lead-up to the decision point, the employer offered a financial education program free of charge. The employer measured the effectiveness of this education by administering a before-and-after test of financial literacy. The quiz used a True/False format, so random answers would receive, on average, a score of 50 percent. Before the education, the average score of the employees was 54, barely above chance. After the education, the average score “jumped” to 55. As we professors always say, teaching is harder than it looks.

Using education to increase participation and contribution rates has also generally led to disappointing results. Employees often leave educational seminars excited about saving more but then fail to follow through on those good intentions. For example, Choi et al (2002)

measured the effectiveness of employee seminars. At the seminar everyone expressed an interest in saving more, but only 14 percent actually joined the plan, not much better than the 7 percent of comparable employees who did not attend a seminar and joined the plan.¹³

The difficulties of simply explaining the right choices to people are nicely illustrated by an experiment conducted by Choi, Laibson and Madrian (2004b), who were interested in finding out why participants fail to join a plan with a company match. For a subset of these employees, namely those whose age is greater than 59.5, joining the plan is an arbitrage opportunity, since the money can be withdrawn without penalty. This is a free lunch not eaten! Choi et al. conducted an experiment in which some employees received a survey about the free lunch and how to go about eating it. Filling out this survey had a negligible and insignificant effect on behavior.

The most optimistic results for saving are found by Douglas Bernheim and his colleagues (Bernheim and Garrett, 2003; Bernheim et al., 2001). They use cross-sectional surveys of individuals from the population rather than the employees in a specific company. For example, Bernheim and Garrett use a survey that asks people whether financial education is available in their workplace. They find that workers who report that financial education is available where they work are more likely to save, both retirement saving and other forms, but there are possible problems with this method that could induce a spurious correlation. For example, if a worker is enrolled in the 401(k) plan, he or she might be more tuned in to the availability of financial education. A young worker, not thinking about retirement and not in the plan, might ignore such notices.

¹³ See also Duflo and Saez (2003), who find that the attendance at a “benefit fair” has only a small effect on participation in a tax-deferred savings account.

5.2. Plan design features:

Plan sponsors are increasingly interested in low-cost methods of increasing savings rates. The simplest change is one we have already discussed, automatic enrollment. Although automatic enrollment is very effective at getting new and young workers to enroll sooner than they would have otherwise, participants tend to stick with the default contribution rate, which is typically quite low. To mitigate this problem, we devised a program of automatic escalation called Save More Tomorrow™.¹⁴

Save More Tomorrow was constructed with the following psychological principles in mind. First, people find it easier to accept self-control restrictions that take place in the future. For example, many people think of starting their diet the next day and joining a gym next month. Second, people are averse to what they might categorize as a loss. Kahneman and Tversky (1979, 1992) estimate that losses have roughly twice the impact of gains. Third, losses are evaluated in nominal terms (Kahneman, Knetsch, and Thaler, 1986; Shafir, Diamond, and Tversky, 1997), and fourth, inertia plays a powerful role in participants' behavior.

With the above principles in mind, Save More Tomorrow invites participants to pre-commit to save more every time they get a pay raise. By synchronizing pay raises and savings increases, participants never see their take-home amounts go down, and they don't view their increased retirement contributions as a loss. Once someone joins the program, the saving increases are automatic, using inertia to increase savings rather than prevent savings. When combined with automatic enrollment, this design can achieve both high participation rates and increased saving rates.

¹⁴ Save More Tomorrow™ is a trademark of Shlomo Benartzi and Richard H. Thaler.

Many retirement plan providers have adopted the idea, including the Vanguard Group, T. Rowe Price, TIAA-CREF, Fidelity, and Hewitt Associates, and it is now available in thousands of employer plans. The first implementation, at a mid-sized manufacturing firm, provides the longest time series of results. Initially, employees were invited to chat with a financial consultant, and about 90 percent accepted that offer. The advisor told the plan participants that they needed to save more, but he capped his recommended saving increase at 5 percent of pay, fearing that people might find larger increases impossible to implement. About one participant out of four increased his or her savings rates by the recommended 5 percent immediately. Those who rejected the advisor's advice were offered the Save More Tomorrow program. Specifically, they were told that their saving rates would go up by 3 percent every time they got a pay raise. Pay raises were about 3.25 percent to 3.50 percent. Out of the group who could not increase their savings rate immediately, 78 percent joined the program to increase their contribution every time they get a pay raise.

The results illustrate the dramatic effect the program can have. Those in the program started with the lowest savings rate, around 3.5 percent. After three and a half years and four pay raises, their saving rate almost quadrupled to 13.6 percent, considerably higher than the 8.8 percent savings rate for those who accepted the consultant's initial 5% recommendation. And most people in the program remained in it through the entire period. Furthermore, the few that did leave the program just stopped the increases; they did not set their retirement rate back to where it had been prior to joining the program.

The Save More Tomorrow program could be extremely effective at increasing saving rates if joining the program is made easy, or even automatic. One plan that automatically enrolled participants into the program reports that less than 5 percent of the participants opted

out after the first savings increase.¹⁵ We find this result especially encouraging because the savings increases and pay raises were not synchronized, so participants did see their take home amounts decrease.

Plan design features could also be used to improve participants' portfolio choices. One option is to offer a set of model portfolios that have varying degrees of risk. For example, a plan sponsor could offer "lifestyle funds" (conservative, moderate and aggressive portfolios). Though this solution seems simple, participants sometimes allocate their funds among several different lifestyle funds as well as core funds. Part of the problem might be that participants do not understand that a single fund could provide full diversification. Also, figuring out the fund that fits one's risk preferences is a difficult task.

Another option available to plan sponsors is to offer plan participants target maturity funds. Target maturity funds typically have a year in their name (e.g., 2010, 2030, 2040). A participant simply selects the fund that matches his or her expected retirement date. The managers of the target maturity funds select the degree of risk and reduce the allocation to stocks as the target date approaches.

Some vendors and plan sponsors have realized that many participants are confused, and have started to offer automated solutions for portfolio selection. In particular, some plan sponsors automatically assign participants to the target maturity fund based on a standard retirement age. Others are defaulting participants into "managed accounts," which are typically portfolios of stocks and bonds that are based on the age of the participants and possibly other information. In either case, participants can opt out of the default investment and choose their own portfolio. Providing these sensible default investment options is an idea with considerable

¹⁵ We are grateful to Jodi Dicenzo, who made this field experiment and many others happen.

merit, given that participants find the risk and return profiles of the automated solutions more attractive than their self-constructed portfolios.¹⁶ And, as Iyengar and Jiang (2003) noted, simplifying the investment selection process could encourage more employees to join the retirement plan.

6. Conclusion

Saving for retirement is a difficult problem, and most employees have little formal training to draw on in making the relevant decisions. Perhaps as a result, we observe that investors are relatively passive. They are slow to join advantageous plans, make infrequent changes, and adopt naïve diversification strategies. In short, they need all the help they can get. Fortunately, many effective ways to help participants are also the least costly interventions, namely, small changes in plan design, sensible default options and opportunities to automatically increase savings rates and rebalance portfolios. These design features help less sophisticated investors while maintaining flexibility for more sophisticated types.

¹⁶ We also encourage the readers to explore a solution we devised for company stock called “Sell More Tomorrow” (see Benartzi and Thaler, 2003), in which employees are first educated on the risk and return profile of company stock in plain English, and then they are offered a gradual selling program that automatically divests them of a small portion of their holdings every month. To ensure that employees don’t feel like they are “missing the boat,” the program could be set to keep a small portion of their portfolio (say 5%) in company stock.

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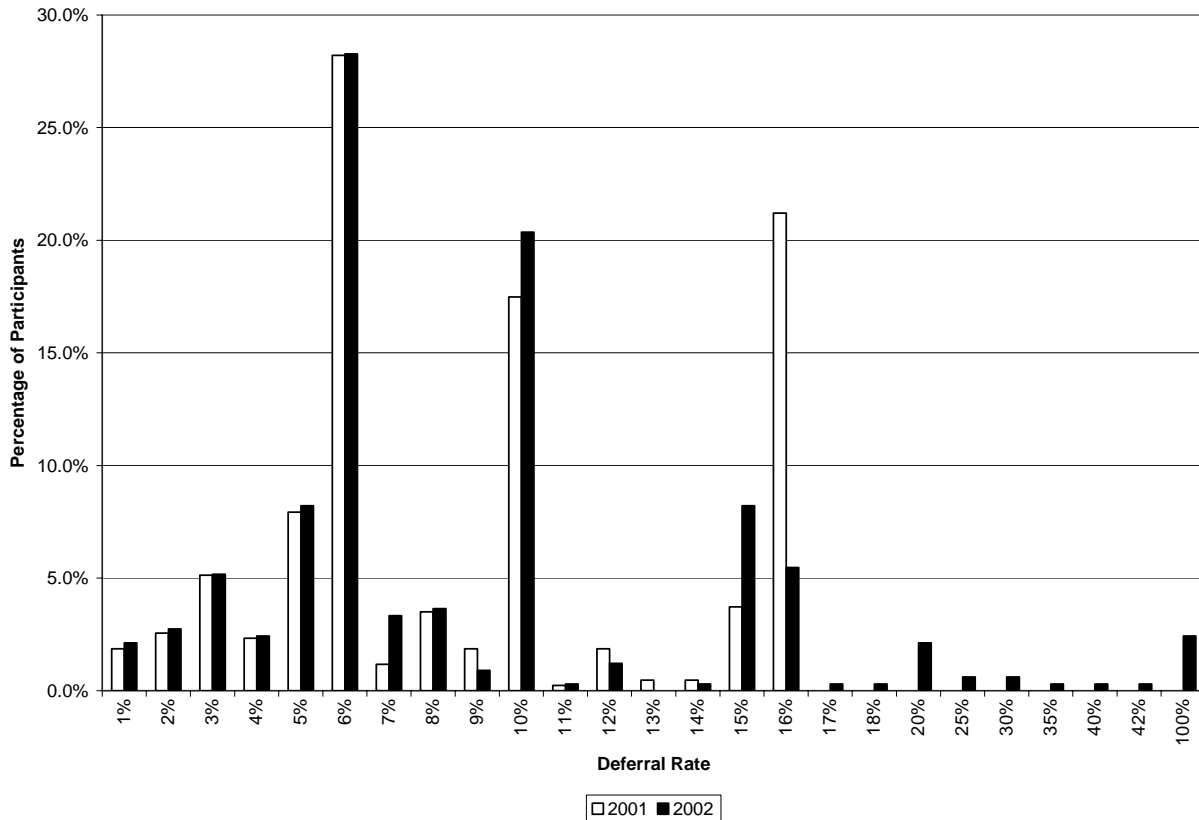
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FIGURE 1

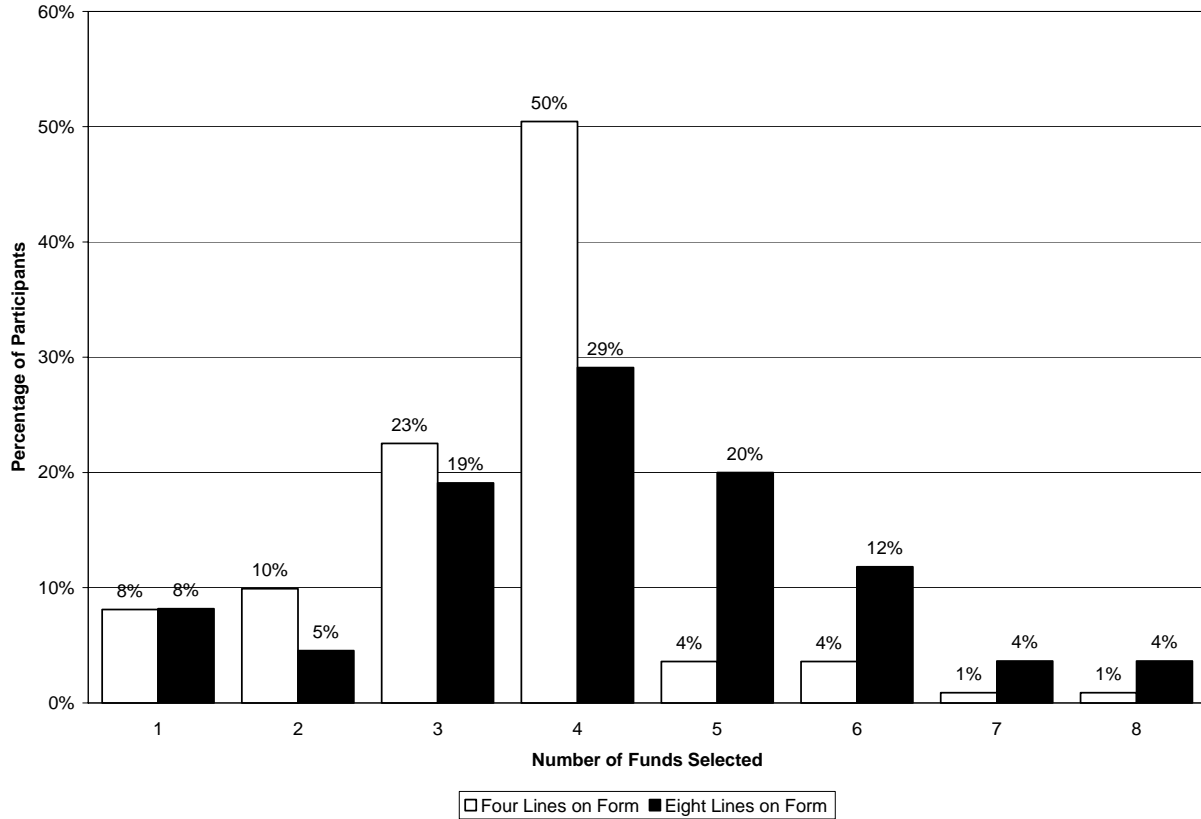
The Distribution of Deferral Rates for New Participants before and after the Maximum Rate was Increased from 16% to 100% of Pay



The above chart displays the distribution of deferral rates at a large defined contribution plan administered by Hewitt Associates. In 2002, the maximum deferral rate allowed under the plan was increased from 16 percent to 100 percent of pay in accordance with EGTRRA. The chart displays the distribution of deferral rates for participants who joined the plan in 2001 versus those who joined in 2002 after the maximum rate was increased. For more details, see Hewitt Financial Services (200b).

FIGURE 2

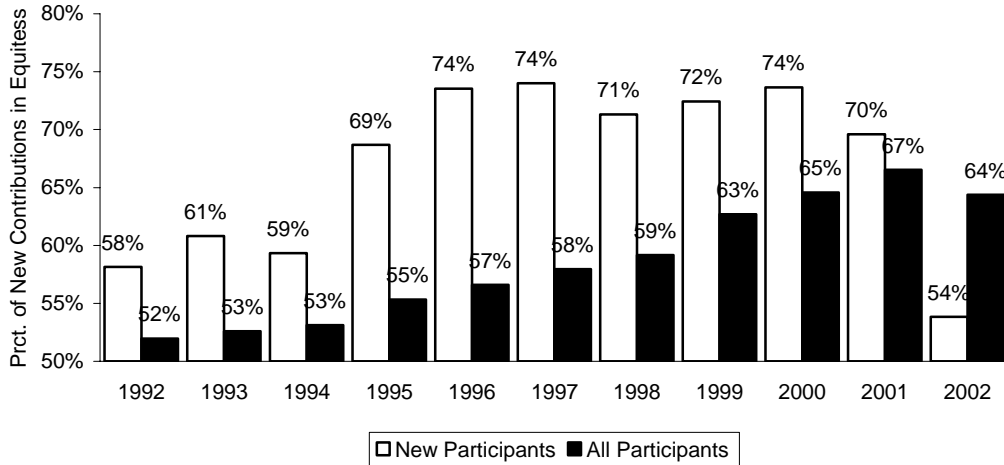
Number of Lines on the Investment Elections Form and the Number of Funds Selected



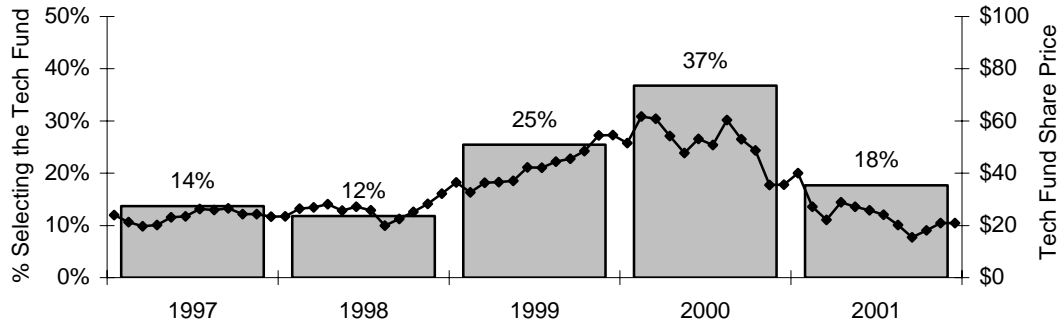
The above chart summarizes the results of an experiment we conducted on Morningstar.com, in which participants were presented with eight investment funds and were asked to construct a portfolio. Half the participants were presented with four lines on their investment election forms, though they could easily click on a link allowing them to pick up to eight funds. The other half of the participants were presented with eight lines on their investment election forms. The chart displays the distribution of the number of funds selected.

FIGURE 3

Panel A: The Equity Allocation of New versus All Plan Participants



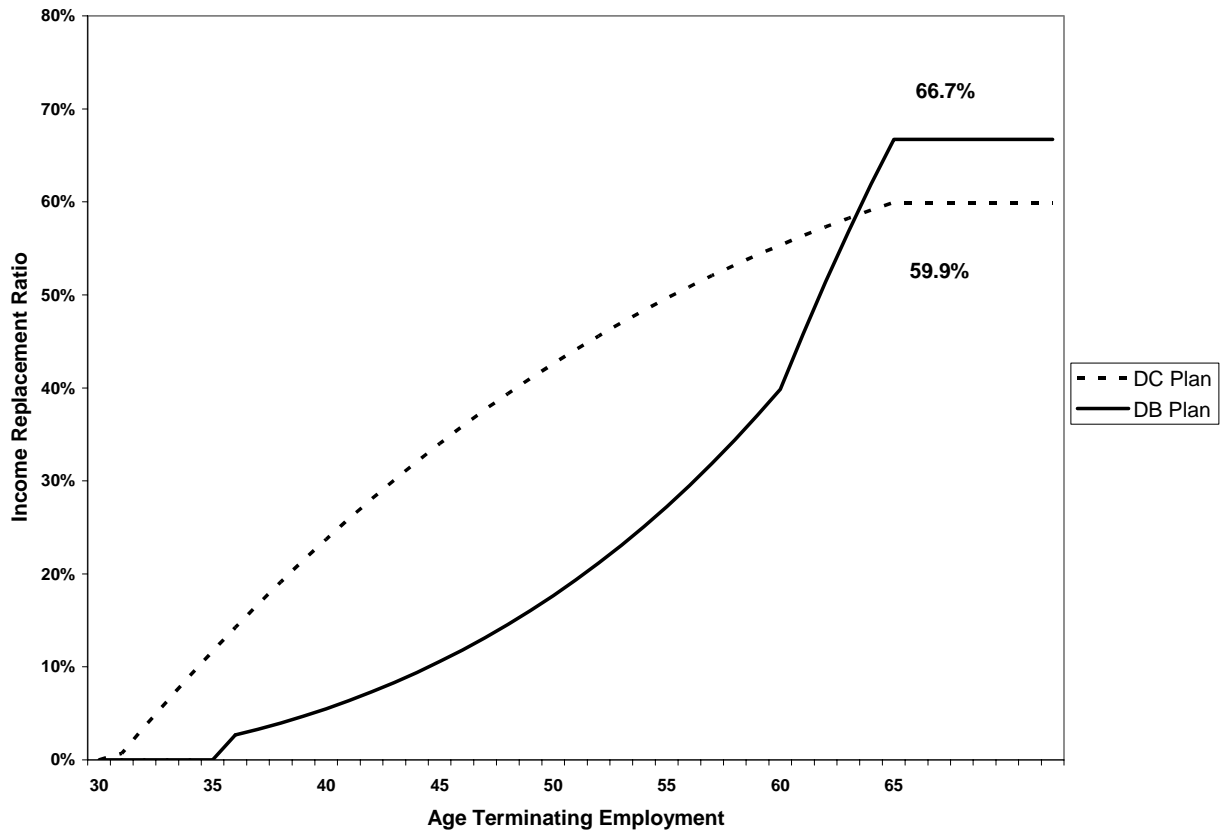
Panel B: Percentage of New Participants Selecting the Technology Fund



Panel A displays the percentage of new contributions allocated to equities by new versus all plan participants. “New” participants are those entering the plan in a given year. The chart was constructed from data provided by the Vanguard Group. Panel B reports the allocations of new participants at a large plan that offers a technology fund. The left axis displays the percentage of new participants allocating some of their contributions to the technology, and the right axis shows the fund’s share price. Data were provided by Hewitt Associates.

FIGURE 4

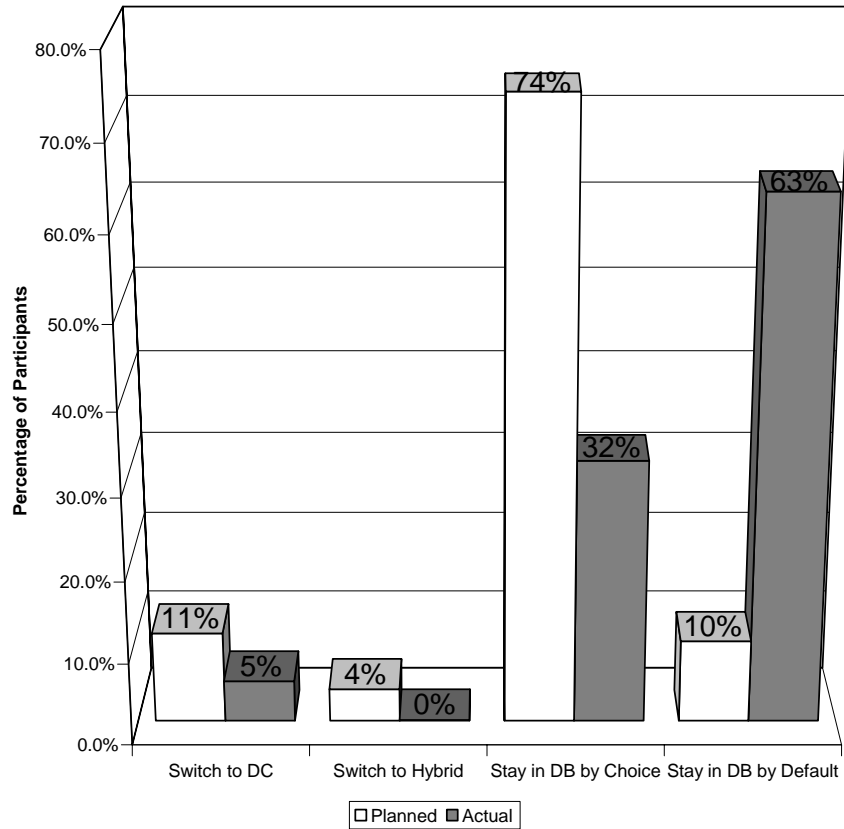
Income Replacement Ratios for a Defined Benefits Plan vs. a Defined Contribution Plan



The above chart displays income replacement ratios for a large employer offering a choice between a defined benefits plan versus a defined contribution plan. The illustration is based on a 30-year-old individual with one year of service credit, and it shows income replacement ratios for the DB versus the DC plan as a function of the age at which the employee terminates employment. The data were provided by the plan actuary.

FIGURE 5

Planned versus Actual Choices between Defined Benefits and Defined Contribution Plans



The above chart summarizes choices made by employees who were offered an opportunity to switch from a defined benefit plan to a defined contribution plan. The employees could transfer service credits earned to date as well as future service credits (i.e., “Switch to DC”), or they could elect to transfer just their future service credits (i.e., “Switch to Hybrid,” in which existing service credits remain in the defined benefit plan). Those who did not make a choice remained in the defined benefit plan by default. The chart displays the frequency of choices participants have planned to make versus the actual choice made. The data are as of Feb. 28, 2003.

TABLE 1

Allocation of Contributions for a Plan Offering a Mix of Lifestyle Funds and Core Funds

	Participants in the Conservative Lifestyle Fund	Participants in the Moderate Lifestyle Fund	Participants in the Aggressive Lifestyle Fund	Participants NOT in any Lifestyle Fund
Core Funds	66%	55%	54%	100%
Conservative Lifestyle Fund	31	1	0	N/A
Moderate Lifestyle Fund	3	42	4	N/A
Aggressive Lifestyle Fund	0	2	42	N/A
Total Equity Exposure	77	80	89	78

The above table displays investment elections made by employees at a large 401(k) plan offering a choice among pre-mixed model portfolios (i.e., the Conservative, Moderate and Aggressive Lifestyle funds) and core funds (for example, an equity index fund). The table describes the average allocations of future contributions among the model portfolios and the core funds. The table also provides the total equity allocations for those investing in the various model portfolios as well as those not investing in any of the model portfolios.