

## How Much Is Investor Autonomy Worth?

SHLOMO BENARTZI and RICHARD H. THALER\*

### ABSTRACT

There is a worldwide trend towards defined contribution savings plans, where investors are often able to select their own portfolios. How much is this freedom of choice worth? We present retirement investors with information about the distribution of outcomes they could expect to obtain from the portfolios they picked for themselves, and the same information for the median portfolio selected by their peers. A majority of our survey participants actually prefer the median portfolio to the one they picked for themselves. We investigate various explanations for these findings and offer some evidence that the results are partly attributable to the fact that investors do not have well-defined preferences.

A major trend in defined contribution savings plans is the expansion in the choices available to participants. A decade ago most plans offered very few choices, often just a money market fund, a bond fund, a stock fund, and stock in the company sponsoring the plan. Now the plans offer an average of 11 funds (Hewitt Associates (1999)), and some plan participants are even permitted to pick individual securities through a direct brokerage account. And, in Sweden, a recent social security reform giving workers the right to direct 2.5 percent of their salary to individual accounts offered a stunning 450 different funds to choose from. Do investors benefit from this ability to choose portfolios for themselves? It is a basic principle of economic theory that expanding the choice set cannot make a consumer worse off (at least ignoring decision-making costs). Here, where the financial stakes are quite high, and choices are made infrequently, many would argue that more choices are unambiguously a good thing.

Still, choice comes at a cost. For example, in discussing various options for a fully or partially privatized social security system, an important design issue is how much choice to offer participants. Diamond (2002) estimates

\*Benartzi is from the Anderson School at UCLA and Thaler is from the University of Chicago. We would like to thank Jeff Maggioncalda, Jason Scott, Bill Sharpe, and Len Sheppard, among others at Financial Engines, for making their products available for our research. Detailed information on Financial Engines is available at [www.financialengines.com](http://www.financialengines.com). We would also like to thank Michael Falk CFA, Carl Londe, and Tony Sabos of ProManage, Inc. (formerly, Strategic Financial Concepts, Inc.) for providing us access to the ProManage *PROgram*<sup>TM</sup>. Information about ProManage is available at [www.promanageplan.com](http://www.promanageplan.com). In addition, we are grateful to Tom Koelbl of SwedishAmerican Health System for letting us conduct surveys at SwedishAmerican Health Systems. We would like to thank Terry Odean, our AFA discussant, for helpful comments. All errors are our own.

that administering individual accounts with even just a limited set of investment choices will cost between \$40 and \$50 per participant per year. With the commonly proposed deferral rate of two percent of income earned, typical individual account balances will be negligible for at least a few years. Consequently, Diamond estimates that the administrative costs will be higher than the investment gains for some time. To minimize administrative costs, some have proposed that individual accounts will initially be invested in a single fund (perhaps a balanced fund that divides money between diversified portfolios of stocks and bonds), with choices only introduced once balances grow.

More generally, adding choices to 401(k) and 403(b) plans also increases the costs of administering these plans. Do participants gain from this expansion of their choice set, and if so, is the increase in utility worth the cost? Surely, the number of choices and utility are not perfectly correlated. For example, in the 2001 Zagat Restaurant Guide for Chicago, diners once again picked Charlie Trotter's as their favorite restaurant in spite of the fact that the restaurant has both the highest prices and the fewest choices in town. Diners at Trotter's are only given a choice between two tasting menus, of which one consists entirely of vegetables, and both are priced over \$100 per person. Apparently, gourmets are happy to let chef Trotter select a portfolio of food for them to consume for dinner.

A recent paper by Iyengar and Lepper (2001) suggests that a limited number of choices may in fact lead to greater happiness. In a clever experiment conducted in an up-scale grocery store, the experimenters alternately set up sampling booths that displayed either 6 or 24 flavors of jam. Predictably, more shoppers were attracted to the booth displaying the 24 flavors. Sixty percent of the passing shoppers stopped at the booth when 24 flavors were on display, versus 40 percent when only 6 were on display. Surprisingly, however, those visiting the extensive-choice booth were far less likely to end up purchasing jam. Only 3 percent of those visiting the extensive-choice booth ended up buying jam, versus 30 percent of those visiting the limited-choice booth.

In this paper, we investigate the role of choice in the domain of investment decisions. We attempt to find out how much, if at all, investors benefit from being able to choose their own retirement portfolios. Note that this is an empirical, rather than philosophical, question. We are only interested in whether investors who form their own portfolios are happier with those choices than they would be with the choices made by (say) average investors. Our methodology includes the following three steps. First, we collected demographic and portfolio information from UCLA plan participants. Second, we projected the range of retirement income each participant could expect if invested in (a) her own portfolio, (b) the average portfolio, and (c) the median portfolio. Last, we went back to the participants and asked them to rate the attractiveness of the three (unlabeled) portfolios based on the projected range of retirement income.

We find that the attractiveness of participants' own portfolios and that of the average portfolio are indistinguishable. Specifically, participants' own

portfolios received an average rating of 3.07 (on a 1 to 5 scale) versus 3.05 for the average portfolio. Since the average portfolio was influenced by a few participants who invested very conservatively (for instance, 100 percent in cash), we also analyzed the median portfolio. Interestingly, the median portfolio received an average rating of 3.86, significantly higher than participants' own portfolios. Therefore, we find no evidence that participants' own portfolios are more attractive than either the average or the median portfolio.

In a follow-up study, we surveyed employees at SwedishAmerican Health Systems, Inc. SwedishAmerican offers a setting that is especially valuable for our research. In particular, each employee is automatically provided an individually selected asset allocation by ProManage (an investment management firm). Those participants who desire to pick funds on their own have to opt out of the automatic allocations. Similar to our previous study, we presented individuals with the range of retirement income they could expect if invested in (a) their own portfolio, (b) the average portfolio, and (c) the ProManage portfolio. We should highlight that we surveyed only individuals who opted out of the ProManage portfolio and selected portfolios on their own. Even for this sample, we found that the average portfolio was as attractive as participants' own portfolios (3.03 versus 2.75). Furthermore, the portfolios designed by ProManage received significantly higher ratings than participants' own portfolios (3.50 versus 2.75). Again, we find that the value of being able to choose one's own portfolio is not great.

We have explored numerous explanations for our results, including lack of diversification and differences in opinion. We find that our results cannot be fully attributed to lack of diversification, because many participants hold well-diversified portfolios.<sup>1</sup> Furthermore, even those who hold well-diversified portfolios tend to prefer the average portfolio to the portfolios they constructed on their own. With respect to differences in opinion, we find that while some people have different opinions about future returns, those differences do not have a large effect on actual portfolio choices. Ruling out diversification issues and differences in opinion (among other explanations we discuss later), we believe that most participants simply do not have the skills and/or information available to pick portfolios that line up with their risk attitudes.

One possible solution to the mismatch between individual preferences and portfolio choices is to help people find the "right" portfolio. Using additional experiments, we document that this solution is extremely challenging, because people's preferences are sometimes confused. In the experiments, we asked individuals to choose among investment programs that offer different ranges of retirement income (for instance, a certain amount of \$900/month versus a 50–50 chance to earn either \$1,100/month or \$800/month). When we presented individuals with three choices ranging from low risk to high

<sup>1</sup> Benartzi (2001) examines retirement saving plans that offer individual securities in the form of company stock (i.e., stocks issued by the employer). In those retirement saving plans, the portfolios were not diversified.

risk, we found a significant tendency to pick the middle choice. For instance, people viewing choices A, B, and C, will often find B more attractive than C. However, those viewing choices B, C, and D, will often argue that C is more attractive than B. Simonson and Tversky (1992) illustrate similar behavior in the context of consumer choice, which they dubbed extremeness aversion.

This paper proceeds as follows. In Section I, we describe the experimental method that we used to assess the attractiveness of participants' own portfolios. We also present the results of our UCLA survey and discuss numerous explanations. In Section II, we present our follow-up survey at SwedishAmerican. In Section III, we explore whether people's risk attitudes are sometimes confused. A summary is provided in Section IV.

## I. UCLA Survey

### A. Method

The basic idea is to see whether investors prefer the portfolios they have constructed themselves when compared with the average or median portfolio for their coworkers. The subjects compare the alternative portfolios using data provided by one of the leading commercial financial information providers, Financial Engines, founded by William Sharpe.

Our sample consists of UCLA staff employees who participate in the University's 403(b) plan. The plan is voluntary and participating employees are offered a menu of investment funds. We used electronic mail to solicit participation in our study in return for \$20 and a \$250 lottery. We received responses from 170 plan participants. Each participant was asked to provide the following information: gender, age, income, account balance, retirement contributions, and portfolio allocations. They were told that we would contact them again later for a follow-up question.

In evaluating the portfolio choices people have made, one could either study the asset allocation of the balances (reflecting past contributions and returns) or their current allocation of new contributions. In forecasting future returns, the former would be more accurate, and in a fully rational world this would reflect the true preferences of the participants who would be frequently rebalancing their portfolios to get them back in line with their risk preferences. However, in practice, 401(k) participants rarely rebalance. Two studies of TIAA-CREF participants make this point. An early study by Samuelson and Zeckhauser (1988) finds that the median participant made *zero* changes to his or her retirement account over the working lifetime! More recently, Ameriks and Zeldes (2000) study a panel of TIAA-CREF participants over a 10-year period. In their sample, 78 percent made no changes to their portfolio over the entire 10-year period. If participants do not rebalance, then their account balances do not reflect their active choices but instead reflect a combination of a single prior choice plus some number of years of accumulations. In light of the evident inertia, we choose to study the current allocation of new contributions (which, of course, is very likely to

be the same allocation picked when joining the plan). For recent employees, this will make little difference, but for the older employees, we think this is more reflective of an actual choice than their account balances, which depend greatly on the returns experienced.

The demographic and portfolio information were fed into the software provided by Financial Engines in order to project the range of retirement income participants could expect. Financial Engine's retirement income figures are presented in before-tax current dollars, and they are based on the participant's current saving behavior. Since we do not know much about other sources of retirement income the participants might have, the projections pertained to the University 403(b) Plan only. Financial Engines does not provide the entire distribution of retirement income but rather the 5th, 50th, and 95th percentiles only.

The retirement income projections were calculated for three different portfolios. First, we used participants' own portfolios, which represent a world with investor autonomy. The average allocations are: 21 percent cash, 7 percent bonds, 44 percent large cap stocks, 7 percent international stocks, and 21 percent small cap stocks. The plan participants exhibit quite a bit of variation in their choices. For instance, the allocation to equities is 97 percent for the top quartile versus 54 percent for the bottom quartile. The second portfolio we used was the average allocation chosen by plan participants. (Since our sample average and the U.S. average, as reported by Financial Engines, are remarkably similar, it did not matter which one of the averages we used.) The mean asset allocation is heavily influenced by extreme portfolios, so we also wanted to offer a comparison based on a type of median portfolio. (We could not locate national statistics on the median allocation, so we used the UCLA median.) Since we had more than two asset classes, defining the median is not trivial. To select a median portfolio, we sorted the portfolios on estimated risk (standard deviation) and then picked the median value. Next, we used Financial Engine's efficient frontier to pick a portfolio that corresponds to the median level of risk. The resulting portfolio has the following allocation: 8 percent cash, 4 percent bonds, 50 percent large cap stocks, 15 percent international stocks, and 23 percent small cap stocks.

We then contacted each subject and asked him or her to compare and evaluate three portfolios based on the distribution of projected income figures that we provided (i.e., 5th, 50th, and 95th percentile values). The three portfolios had generic labels (i.e., A, B, and C) and the participants were not told that their own portfolio was one of those included. Based on the projected retirement income figures, the participants were asked to rate the attractiveness of each portfolio on a one (very unattractive) to five (very attractive) scale. The stimulus is included in Appendix A. Of the initial sample of 170 plan participants, 157 completed the follow-up questionnaire and they were paid about a week later.<sup>2</sup>

<sup>2</sup> Interestingly, many preferred not to be paid and asked that their payments be used for future research on investment choices.

Before we turn to our main results, we provide summary statistics on the sample. The average age is 41, the average income is \$54,236, the average account balance is \$44,701, and the average annual contribution is \$5,355. The expected value of retirement income projected by Financial Engines using the average portfolio ranged between \$9,172 and \$59,578 with a median of \$21,831. These statistics clearly illustrate the wide range of possible outcomes as well as the asymmetric nature of the distribution. When participants' own allocations are replaced with the average allocation, the estimated range was between \$10,571 and \$47,913 with a median of \$22,436. And when the median portfolio is used, the estimated range was between \$10,048 and \$60,235 with a median of \$24,456.

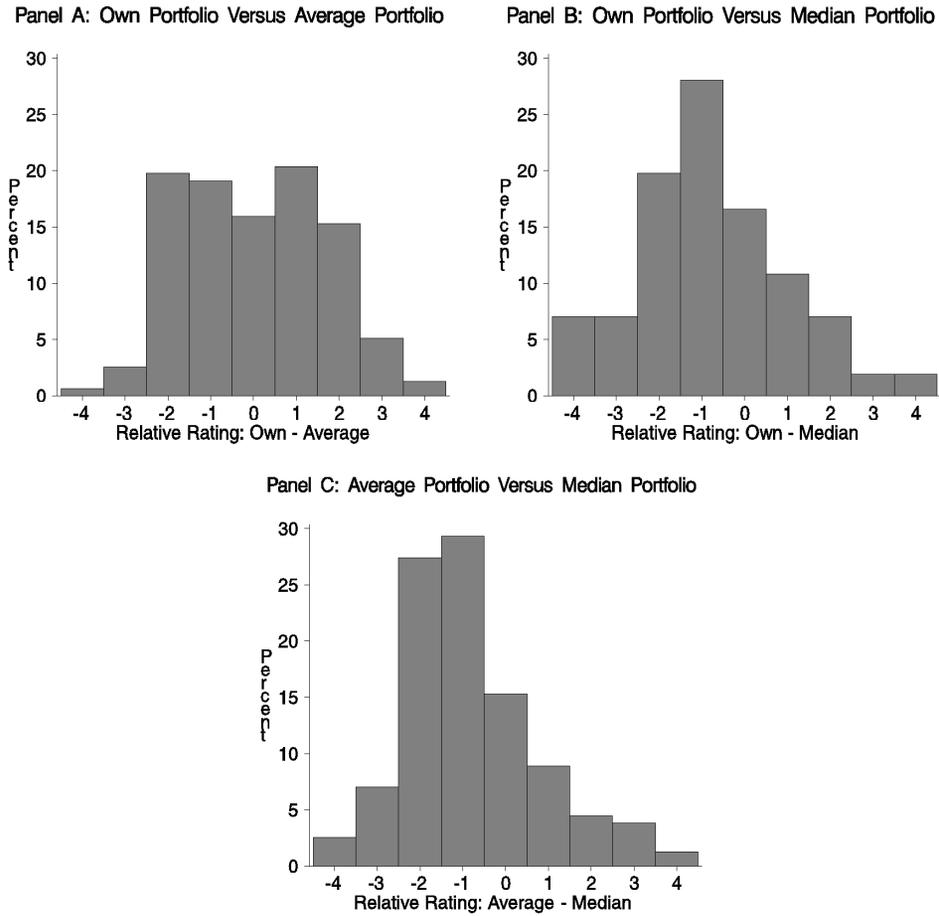
### *B. Results*

Participants rated each portfolio on a 5-point scale with 5 being best. They gave their own portfolio and the average portfolio virtually identical ratings, 3.07 and 3.05, respectively. Forty-two percent of the participants gave their own portfolios a higher score than the average portfolio, and exactly the same percentage preferred the average portfolio, with 16 percent indifferent (see Figure 1). While indifferent between the average portfolio and their own, 62 percent of the participants actually preferred the median portfolio to their own, with only 21 percent preferring their own portfolio. On average, participants gave the median portfolio a rating of 3.87, significantly higher than their rating of their own portfolios ( $t = 5.80$ , see Table I).

The preference for the median portfolio over the one they have picked themselves does not depend on the risk preferences of the participants. We obtain similar results when we divide the sample into three groups according to the portfolio risk. In every group, participants rate the median portfolio better than their own.

Why might participants prefer the median portfolio to their own? One possibility is that the participants have selected a portfolio that is below the Markowitz (1952) efficient frontier. Perhaps the median portfolio is attractive because it is more diversified than individuals' own portfolios. We investigated this possibility in two ways. First, we asked the Financial Engines software to improve the efficiency of each participant's portfolio. For 70 percent of the portfolios, the software indicated that the portfolios were already efficient and could not recommend a better portfolio (holding risk constant). This is not surprising, since participants choose among investment funds rather than individual securities, and almost any array of funds will be close to the frontier. We then redid our analyses using only those participants whose portfolios were considered efficient and obtained similar results. The mean ratings for participants' own portfolios, the average portfolio, and the median portfolio are 3.01, 3.14, and 3.79, respectively. Thus, our results do not seem to be explained by individuals picking inefficient portfolios.

Another possibility is that participants have made good choices based on different assumptions about the future than those used by the Financial



**Figure 1. The relative ratings of participants' own portfolios, the average portfolio, and the median portfolio.** One hundred and fifty-seven UCLA plan participants were presented with the range of retirement income they could expect from their own portfolios, the average portfolio, and the median portfolio. Then, they were asked to rate the attractiveness of the three (unlabeled) portfolios on a one (very unattractive) to five (very attractive) scale. The histograms present the relative ratings of the portfolios. For instance, Panel A indicates that 16 percent of the participants are indifferent between their own portfolio and the average portfolio (i.e., rating of own portfolio minus rating of average portfolio is equal to zero).

Engines software. It is well known that if investors have differences in opinion about future returns, then they will hold different portfolios (e.g., Harris and Raviv (1993)). So, for example, participants who expected gloomy equity returns and selected an all fixed-income portfolio accordingly would still prefer the income projections of a risky portfolio when those are based on the historic equity premium.

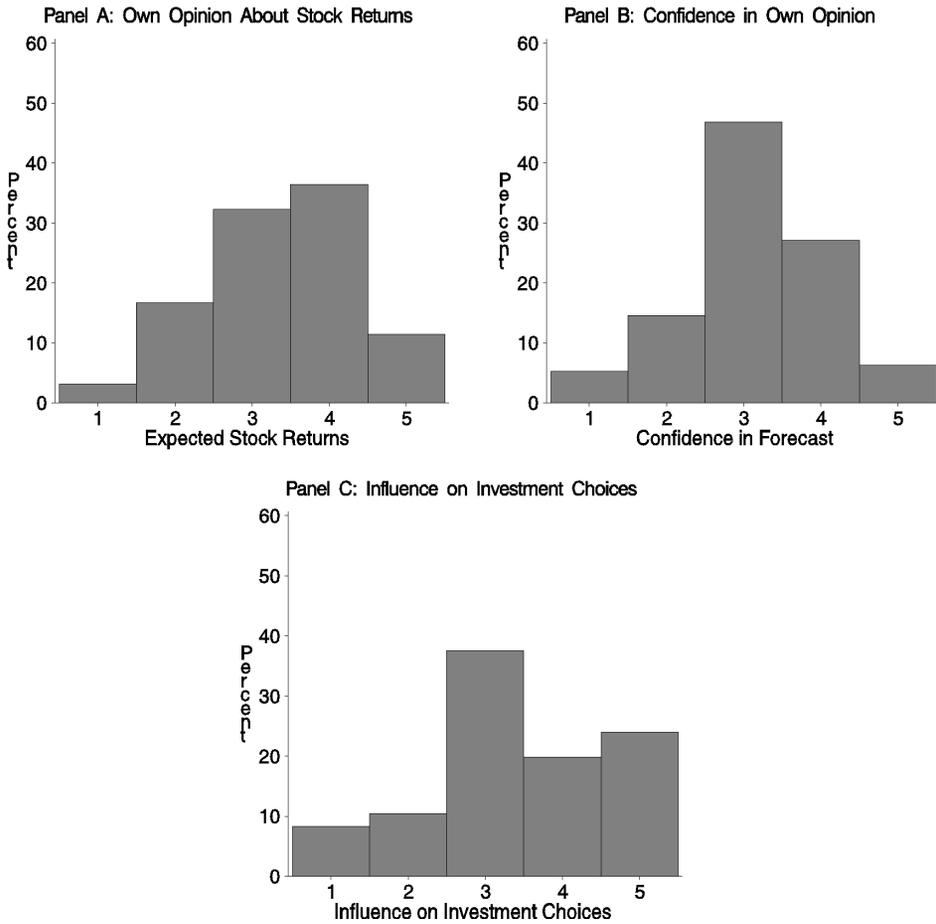
**Table I**  
**Mean Ratings for Participants' Own Portfolios,**  
**the Average Portfolio, and the Median Portfolio**

One hundred and fifty-seven UCLA plan participants were presented with the range of retirement income they could expect from their own portfolios, the average portfolio, and the median portfolio. Then, they were asked to rate the attractiveness of the three (unlabeled) portfolios on a one (very unattractive) to five (very attractive) scale. In Panel A, we provide the mean ratings for the entire sample. In Panel B, we split the sample into three groups based on portfolio risk (defined as standard deviation).

	<i>N</i>	Participants' Own Portfolios	Average Portfolio	Median Portfolio
Panel A: All Participants				
	157	3.07	3.05	3.86
Panel B: By Portfolio Risk				
Low risk	52	2.48	3.60	3.77
Moderate risk	53	3.47	2.81	4.11
High risk	52	3.27	2.75	3.69

We explored this possibility by asking plan participants whether they have an opinion about future stock returns and whether it influenced their investment choices. Of the 157 participants who completed the portfolio-rating task, 113 answered this questionnaire. (The questionnaire is included in Appendix B.) Seventeen participants indicated they have no opinion about stock returns, but the remaining 96 participants answered three questions about the expectations of future returns. First they were asked whether they thought returns over the next decade would be higher or lower than those we have experienced over the past 75 years. Respondents were somewhat bullish: 17 percent of the participants believe that returns on the stock market over the next 10 years will be lower than the past 75 years, while 41 percent expected returns to be higher over the next 10 years (see Figure 2). However, few were very confident in their forecast, and many indicated that their forecasts had a limited effect on their portfolio choices. To further explore whether differences in opinion influence portfolio choices, we ran a regression of the percentage allocated to stocks on participants' own forecast of stock returns. The stock returns variable was measured on a one to five scale (one = "much lower than it has been in the past 75 years," five = "much higher than it has been in the past 75 years"). We find that participants' own opinion explains no more than five percent of the variation in portfolio choices. Since differences in opinion do not have a substantial effect on investor behavior, we believe that they are unlikely to fully explain our results.

The higher ratings given to the median portfolio relative to the average portfolio suggest another explanation based on the assumed equity premium. Since the median portfolio has a higher equity exposure (88 percent versus 72 percent), if the equity premium used by Financial Engines is too high,



**Figure 2. Participants’ own opinion about the future returns on the stock market over the next 10 years.** One hundred and thirteen UCLA plan participants were asked for their own opinion about the future returns on the stock market over the next 10 years. Seventeen of the participants did not have an opinion, and the remaining 96 participants indicated their opinion on a one to five scale (one = “much lower than it has been in the past 75 years,” five = “much higher than it has been in the past 75 years”). The participants were also asked for their confidence (one = “not at all confident,” five = “very confident”) and whether their opinion influenced their investment choices (one = “not at all,” five = “a lot”). The histograms present the frequency of each response. For instance, Panel A indicates that three percent of the participants believe that the future returns on the stock market will be much lower than the past 75 years.

then participants would be lured into preferring the riskier portfolio by optimistic forecasts. Of course, it is not possible to know whether Financial Engines is using the “right” equity premium. Their analyses assume an equity premium, defined as the arithmetic average spread between cash and large

cap, of 5.7 percent. This is similar to the average estimate of pension fund managers (5.6 percent) as reported by Greenwich Associates (1998), and Ivo Welch's survey of finance professors reports an even higher number (Welch (2000)). In contrast, many observers (e.g., Campbell and Shiller (2001) and Fama and French (2001)) are predicting an equity premium that is barely positive over the next 20 years. Still, none of this matters to our analysis of why our participants prefer the median portfolio to their own. What matters is their own forecast, and we know that, if anything, they are more bullish than Financial Engines. Fully 80 percent of the participants believe the returns on the stock market will be at least as high as the past 75 years. Since stock returns averaged 13.3 percent over the 1926 to 1999 period (Ibbotson (2000)) and the yield on T-bills was about 6 percent at the time of our study, the implied equity premium of 7.3 percent is higher than the Engine's equity premium.

One might also argue that we have lured participants into the median portfolio by showing the 5th percentile of the distribution and making the small possibility of extremely large losses invisible. We have actually explored this issue in an earlier paper (Benartzi and Thaler (1999)). In that paper, we asked individuals to allocate their retirement contributions between two unlabeled investment funds (one being stocks and the other being bonds), based on the distribution of outcomes at retirement age. In one version of the experiment, the participants saw a graphic display of the 2nd, 4th, 6th, through the 98th percentile of the distribution, and in another version the 2nd percentile for the stock fund was replaced with the worst outcome out of 10,000 repetitions. We found that individuals were not very sensitive to this variation; the mean allocation to stocks dropped from 83 percent to 81 percent.

One other concern about our analysis is that our use of the current asset allocation as an indicator of the participant's preference might be biased if the participants have changed their preferences (but not their asset allocation) since they joined the plan. To investigate this possibility, we have rerun our analyses using the participants in our data set who have less than the median ratio of plan assets to annual contributions.<sup>3</sup> We find similar results for this subsample. In particular, the mean ratings of participants' own portfolios, the average portfolio, and the median portfolio are 2.91, 2.99, and 3.85, respectively.<sup>4</sup>

To summarize, participants find the asset allocation of the average participant as attractive as the one they have picked for themselves, and they

<sup>3</sup> An alternative would be to use tenure in the system, but we failed to ask this question in our survey, demonstrating that bounded rationality applied to researchers as well as subjects.

<sup>4</sup> The results could also be affected by bad data coming back through the surveys due to participants' confusion. To alleviate this concern, we reran our analysis using participants who indicated that the survey was "very clear." The mean ratings of participants' own portfolios, the average portfolio, and the median portfolio are 2.95, 2.98, and 4.04, respectively.

like the median asset allocation better than their own.<sup>5</sup> We have explored numerous explanations for the phenomena including: (a) the failure to pick efficient portfolios; (b) differences of opinions about future stock returns; (c) an unrealistic equity risk premium assumption in the software; and (d) changes of preferences since the time of enrollment. None of these explanations is satisfactory. We are left with the conclusion that many participants made a mistake in choosing their asset allocation. In other words, they picked the wrong point along the efficient frontier. According to Brennan and Torous (1999), this can be a costly mistake. To illustrate, they considered an individual with a relative risk aversion coefficient of two who, based on their assumptions, ought to be 100 percent in stocks. Then, they calculated the loss of welfare from picking portfolios that do not match the assumed risk preferences. Using a 20-year investment horizon, they found that switching from the optimal allocation of 100 percent stocks to no stocks reduces the expected utility by 37 percent.

## II. SwedishAmerican Survey

The results of the previous experiment suggest that participants typically gain little by forming their own portfolios. However, our sample consisted of participants who were “forced” to choose a portfolio and did not have the option of letting someone else choose a portfolio on their behalf. In this section, we investigate a group of participants who did have the option of letting an investment manager pick a portfolio for them and chose to decline it. We explore whether this group of participants did well constructing their own portfolios.

### A. Method

In the savings plan offered by SwedishAmerican Health Systems Inc., every participant is offered a customized portfolio by ProManage. ProManage’s allocations are based on demographic variables such as age, but ProManage does not attempt to elicit any information about individual risk preferences. Participants are given the choice of accepting this default asset allocation or selecting one on their own. We identified 351 individuals who opted out of the ProManage portfolios, representing 36 percent of the total number of plan participants.<sup>6</sup> The unique setting at SwedishAmerican allows us to survey

<sup>5</sup> We should stress that we do not claim either that there is anything special about the median portfolio, nor are we predicting that in every context a majority of participants will prefer the median portfolio to their own. We only make the weaker claim that the participants we have studied do not display much ability to choose portfolios whose characteristics they like better than some kind of consensus portfolio selected by their peers.

<sup>6</sup> We excluded inactive plan participants (e.g., terminated employees who kept their funds at SwedishAmerican), so our figures understate the total number of participants in the plan. We should also note that inactive participants are more likely to delegate the asset allocation decision to ProManage in comparison to active participants.

individuals who have announced a preference to make their own financial decisions.

Using this sample, we replicate our previous experiment, with some modifications described here. We received demographic and investment data from the plan sponsor directly, so there was no need to rely on self-reported data. We contacted the plan participants by mail and offered an entry in a lottery with a prize of \$500 as an incentive to participate. In the questionnaire, we asked the participants to rate the attractiveness of three (unlabeled) portfolios based on the range of retirement income they could expect (the stimulus is included in Appendix C). The three portfolios were: (1) the individual's own portfolio, (2) the average portfolio of SwedishAmerican participants, and (3) the portfolio that ProManage had picked for this participant.

One difficulty with this subject pool is that there is not a lot of variation in the overall asset allocation. The average allocation to stocks was 86 percent. In the top quartile the average allocation to equities was 100 percent and in the bottom it was 80 percent. These high allocations to equities in part reflect the funds they had to choose from: only 2 of the 10 options are fixed income. In prior work, we have found that participants often choose as if they were dividing their funds roughly equally across the various options (see Benartzi and Thaler (2001)). However, some of the participants made extreme bets on specific segments of the stock market with the most common bet being small cap growth. Hence, lack of diversification might play a bigger role in the SwedishAmerican data than it did in the UCLA study. For comparison purposes, we should note that the portfolios selected by ProManage had, on average, 92 percent in stocks.<sup>7</sup>

The survey participants were also asked to indicate whether they have an opinion about the future performance of the investment funds that are available through the SwedishAmerican plan. And those having an opinion were asked to indicate their opinion on a five-point scale, ranging from "much lower than the S&P 500 index" to "much higher than the S&P 500 index." The subjective future performance estimates should enable us to explore the role of differences in opinion. The specific questions that we presented to the participants and the list of funds in the SwedishAmerican plan are included in Appendix C.

Before we turn to our results, we provide summary statistics on the sample. The average age is 45, the average income is \$50,002, the average account balance is \$75,852, and the average annual contribution is \$4,442. Based on the participants' current allocations and deferral rates, Financial Engines projected retirement incomes with a range between \$7,854 and \$59,879 and a median of \$20,056 (the reported numbers are the means of the projections for individual participants). Again, these statistics illustrate the wide range of possible outcomes. When participants' own allocations are

<sup>7</sup> Note that the customized portfolios were selected by ProManage, whereas income projections were calculated by Financial Engines, ensuring the independence of the advice and the projections.

**Table II**  
**Mean Ratings for Participants' Own Portfolios,**  
**the Average Portfolio, and the ProManage Portfolios**

Fifty-nine SwedishAmerican employees were presented with the range of retirement income they could expect from their own portfolios, the average portfolio, and portfolios constructed by ProManage, a professional investment manager. Then, they were asked to rate the attractiveness of the three (unlabeled) portfolios on a one (very unattractive) to five (very attractive) scale. The table displays the mean ratings of the portfolios.

<i>N</i>	Participants' Own Portfolios	Average Portfolio	ProManage Portfolios
59	2.75	3.03	3.50

replaced with the average allocation, the Engine provides a range between \$8,339 and \$51,877 with a median of \$20,378. When the ProManage portfolio is used, the Engine's range is between \$9,175 and \$48,904 with a median of \$21,102.

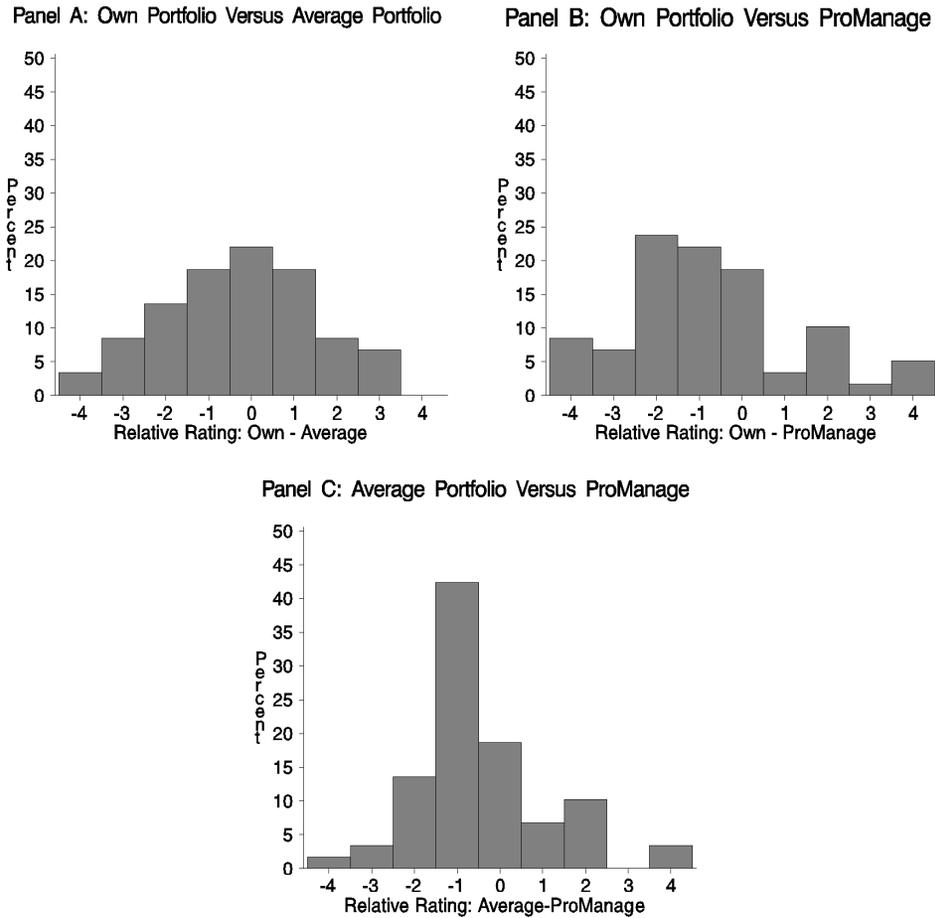
### *B. Results*

Fifty-nine participants completed the survey.<sup>8</sup> The average rating of the participants' own portfolios is 2.75 on a 1 to 5 scale (see Table II). They liked the average portfolio slightly (and insignificantly) more, giving it a mean rating of 3.03 ( $t = 1.25$ ). Forty-four percent of the participants prefer the average portfolio, 22 percent are indifferent, and 34 percent prefer their own portfolios (see Figure 3). Surprisingly, even individuals who specifically elect to form their own portfolios find the average portfolio at least as attractive as their own choices.

We also examined the ratings of the ProManage portfolios and found out that they are more attractive than participants' own portfolios. The ProManage portfolios received an average rating of 3.50, which is significantly higher than the 2.75 average of participants' own portfolios ( $t = 2.84$ ). Similarly, 61 percent of the participants prefer the ProManage portfolios, 19 percent are indifferent, and only 20 percent prefer their own portfolios. We find it noteworthy that most of the participants who opted out of the automatic portfolios actually found those more attractive than their own self-constructed portfolios.

The SwedishAmerican data enables us to revisit the issue of differences in opinion. We find that many of the participants do not have an opinion about the future performance of the investment funds in the plan. Thirty-two percent of the participants have no opinion about any of the funds, 41 percent have an opinion about some (but not all) of the funds, and only 27 percent

<sup>8</sup> We have excluded several participants who indicated that they did not fully understand the questionnaire. Including those participants did not affect our results.



**Figure 3. The relative ratings of participants' own portfolios, the average portfolio, and the ProManage portfolios.** Fifty-nine SwedishAmerican employees were presented with the range of retirement income they could expect from their own portfolios, the average portfolio, and portfolios constructed by ProManage, a professional investment manager. Then, they were asked to rate the attractiveness of the three (unlabeled) portfolios on a 1 (very unattractive) to 5 (very attractive) scale. The histograms present the relative ratings of the portfolios. For instance, Panel A indicates that 22 percent of the participants are indifferent between their own portfolio and the average portfolio (i.e., rating of own portfolio minus rating of average portfolio is equal to zero).

have an opinion about all of the funds. We investigated those who have an opinion and found, very similar to the UCLA study, that the association between fund ratings and allocation choices is weak. Among the stock funds, for instance, the highest rated fund constituted 10 percent of the portfolio and the lowest rated fund constituted 9 percent of the portfolio. Hence, we believe that differences in opinion could not explain much of our results.

In summary, we find that investor autonomy is not worth much. The Swedish-American investors who elected to take charge of their own investment portfolios did not show much skill. Given the complexity of the task, it is not that surprising that people have a hard time constructing a well-diversified portfolio that fits their personal preferences. However, is there a way to help individuals find the “right” portfolio? Can we not simply elicit people’s preferences and then construct suitable portfolios on their behalf? As we illustrate in the next section, this is harder than it might seem because investor preferences are often not well defined.

### **III. Do Investors Have Well-Defined Preferences?**

A possible explanation for the results we have obtained here is that investors do not really have stable, well-defined preferences. There is well-established literature in psychology, beginning with Lichtenstein and Slovic (1971, 1973) showing that people do not have coherent preferences. This is demonstrated by inducing subjects to exhibit preference reversals. The first experiments showed this with gambles. Subjects were shown two bets, one relatively risky, the other safer. Subjects were then asked to choose between the two bets and also to name reservation prices to sell each bet. As predicted by Lichtenstein and Slovic, but surprising to economists, most of the subjects who said they preferred the safe bet announced a higher reservation price for the risky bet. Many psychologists now believe that people do not really have well-formed preferences, but rather construct preferences when choices are elicited. Since the form of the elicitation can affect the choices people make, there is not a single preference ordering that can be clearly identified. (See Tversky and Thaler (1990) for a summary of this literature.)

If investors have incoherent or ill-formed preferences about their investments, then it would not be surprising that they would end up preferring a portfolio someone else has picked for them. Of course, some might argue that in the case of savings for retirement, where the stakes are so much higher than they are in a laboratory experiment, people would think hard and straight. So, in this section of the paper, we investigate whether incoherent preferences are a problem in the domain of saving for retirement.

There are many ways to demonstrate incoherent preferences, if they exist. Here we focus on one type of incoherent preference that seems particularly relevant to portfolio selection. Specifically, we explore the effect of “extremeness aversion” on portfolio choices. Extremeness aversion refers to the tendency for consumers to prefer an option that does not appear to be at the extreme point of some relevant continuum. For example, a wine drinker who exhibits this trait might avoid ordering either the most expensive or the least expensive bottle on the wine list. Simonson and Tversky (1992) provide a nice illustration of how extremeness aversion can produce inconsistent choice. They asked subjects to choose between two cameras costing \$169.99 and \$239.99 and found an even 50–50 split between the two. Then, they asked another group of subjects to choose among three cameras consisting of the

above two cameras and third, more expensive camera costing \$469.99. Traditional economic analysis suggests that the addition of a third option cannot increase the market share of either of the existing cameras. Note, however, that the \$239.99 camera is now the middle choice, and, consistent with extremeness aversion, its market share actually rose to 57 percent. This violates the rationality principle of independence of irrelevant alternatives.

To test extremeness aversion in the context of portfolio choice, we designed an experiment in which the same portfolio is framed as either the middle choice or an extreme choice. Consider, for instance, four portfolios, A, B, C, and D, with an increasing level of risk moving from A to D. When choosing from the set {A, B, C}, portfolio C is framed as an extreme choice. However, when choosing from the set {B, C, D}, portfolio C is framed as the middle choice. If investors' choices depend on their attitudes toward risk and return, rather than on the set of alternatives available, then the preference between B and C should be independent of whether A or D is available. If, instead, people exhibit extremeness aversion, then the attractiveness of portfolio C will be greatest when it is framed as the middle choice.

Our study was quite simple. Subjects were UCLA staff solicited by e-mail to participate in a study on investment decision making. They were asked to compare investment options in the context of a privatized social security system in which individuals select their own portfolios. For each option they were given two equally likely possible pay-outs: a good scenario and a bad scenario. The specific investment choices we used, A, B, C, and D, are displayed at the bottom of Table III. Investment Program A, for instance, provides a certain amount of \$900 per month (pretax in today's dollars). In contrast, the amount of retirement income provided by Programs B, C, and D depends on market conditions between now and retirement. Program B, for instance, has a 50–50 chance of providing either \$1,100/month or \$800/month. Programs C and D involve higher upside potential, but also higher risk. Note, however, that the compensation for assuming greater risk is diminishing as we move from Program A to D, which captures the concavity of the efficient frontier.<sup>9</sup>

Subjects were assigned to one of three conditions randomly. In the first condition, we framed Program C as an extreme option, by having subjects choose among A, B, and C. In the second condition, we framed Program C as neither extreme nor middle choice, by having subjects choose between B and C. And in the third condition, we framed Program C as the middle choice, by choosing among B, C, and D. Extremeness aversion predicts that Program C will be least attractive in the ABC condition and most attractive in the BCD condition. (A sample questionnaire is provided in Appendix D.)

<sup>9</sup> One caveat is that our experimental design provides a joint test of extremeness aversion and the "trade-off contrast" effect (Simonson and Tversky (1992)). Consider, for instance, the ABC condition. Program B offers a 50–50 chance to end up with \$200 more or \$100 less than Program A. Similarly, Program C could result in \$160 more or \$100 less than Program B. Hence, Program B offers a more attractive risk-return trade-off. Note that both extremeness aversion and trade-off comparisons might cause people to choose Program B. Since our goal is to document that preferences are inconsistent, we make no attempt to distinguish between the two explanations.

**Table III**  
**Rankings of Hypothetical Social Security Programs**  
**by UCLA Employees**

Participants' 1st Choice	Participants' 2nd Choice	Participants' 3rd Choice	Frequency (in Percent)
Panel A: Participants Choosing among Programs A, B, and C ( <i>n</i> = 96)			
A	B	C	37.5
A	C	B	5.2
B	A	C	20.8
B	C	A	12.5
C	A	B	2.1
C	B	A	21.9
Program C preferable to Program B			29.2
Panel B: Participants Choosing between Programs B and C ( <i>n</i> = 80)			
B	C	N/A	61.0
C	B	N/A	39.0
Program C preferable to Program B			39.0
Panel C: Participants Choosing among Programs B, C, and D ( <i>n</i> = 100)			
B	C	D	41.2
B	D	C	1.2
C	B	D	23.8
C	D	B	12.5
D	B	C	3.8
D	C	B	17.5
Program C preferable to Program B			53.8

UCLA staff employees were presented with hypothetical social security programs. The monthly retirement income that the various programs provide is as follows:

	Investment Program A	Investment Program B	Investment Program C	Investment Program D
Favorable market conditions (prob. = 0.5)	\$900	\$1,100	\$1,260	\$1,380
Unfavorable market conditions (prob. = 0.5)	\$900	\$ 800	\$ 700	\$ 600

Panel A displays the choices of those viewing Program A, B, and C; Panel B displays the choices of those viewing Program B and C; and Panel C displays the choices of those viewing Program B, C, and D. The table also provides the percentage of participants who prefer Program C to B.

Table III displays participants' first, second, and third choice (condition BC had two choices only). The table provides the frequency of a given choice pattern by condition. For instance, Panel A includes condition ABC, where 20.8 percent of the respondents indicated their first, second, and third choices for Programs B, A, and C, respectively. Note that options B and C are present

in every condition, and rational subjects would not switch between these two choices as other options are varied. We therefore report the relative attractiveness of C compared to B. In condition ABC, where Program C is framed as an extreme choice, 29.2 percent preferred Program C to B. In condition BC, where Program C is neither an extreme nor the middle choice, 39.0 percent preferred Program C to B. And in condition BCD, where Program C is framed as the middle choice, 53.8 percent preferred Program C over B. Consistent with extremeness aversion, Program C is least attractive when framed as an extreme choice and most attractive when framed as the middle choice. All the differences are significant at the 0.05 level.

Our results confirm that investors choosing among portfolios behave much like they do when buying cameras: their choices between alternatives depend on other irrelevant options available. This illustrates that their choices are not rational according to standard economic criteria, and helps us understand why they might end up preferring the portfolio chosen by the median respondent to one they choose on their own.

#### IV. Summary

Defined-contribution savings plans, and individual savings accounts within a social security type system, are said to have many virtues, such as vesting, portability, and the ability to construct a portfolio to match one's tastes. In this paper, we have attempted to quantify the value of this latter feature. Do participants actually gain much in utility by being able to choose their own portfolio? We find that they do not. Most of our participants find the portfolio of the median participant more attractive than the one they have chosen for themselves, and this was even true for those who rejected a portfolio customized for them by experts.

There are similarities between our results and those of the psychologists Iyengar and Lepper (2001) mentioned in the introduction. Recall that Iyengar and Lepper found that people are initially attracted to an extensive menu of choices. We found that 36 percent of the SwedishAmerican plan participants rejected the automatic portfolios and spent the time and effort constructing portfolios on their own. Iyengar and Lepper also found that those who chose chocolates from a set containing many options were less satisfied with their selection, and we find that SwedishAmerican participants find their own portfolios unattractive relative to the automatic portfolios. Is this correspondence surprising? While much more is at stake in forming a retirement portfolio than finding the right candy, which might lead to more care and attention to the choice, it is also true that the portfolio choice problem is much more difficult. Even economists might find picking the best chocolate less daunting than picking the right portfolio.

When choice problems are hard, people often (sensibly) resort to simple rules of thumb to help them cope. In our study, we find that people use the "avoid extremes" heuristic when choosing among portfolios that can naturally be ordered. This result raises major concerns with respect to the design

of model portfolios or “lifestyle funds.” Suppose a plan sponsor offers three model portfolios that are labeled as conservative, moderate, and aggressive. Furthermore, suppose that the equity allocation of the three portfolios is 0 percent, 40 percent, and 80 percent, respectively. In this case, choosing the middle portfolio implies an equity allocation of 40 percent. However, suppose that the equity allocation of the three portfolios is 40 percent, 70 percent, and 100 percent, respectively. In this case, choosing the middle portfolio implies an equity allocation of 70 percent. Depending on what is being perceived as the “middle” choice, individuals might end with different portfolios. Similar concerns apply to leverage. Suppose that individuals saving for retirement were allowed to leverage their portfolios. In particular, suppose that the range of equity allocation was extended so that individuals could have up to 200 percent in equities. In this case, people might view a portfolio that is 100 percent in stocks as a moderate choice.

What are the policy implications of our study? We find several. First, in deciding how many choices to offer participants, there is an implicit cost-benefit analysis involved. There is a presumption that adding more choices will make consumers better off, and surely not worse off. Our research weakens that presumption. Although more work needs to be done to nail this down, we believe that whatever gains there are to be had from giving investors the opportunity to choose their own portfolios, they are likely to reach a near maximum with a small number of options (i.e., not hundreds). Second, extreme care must be taken in selecting which options people choose amongst. As we showed in a previous paper (Benartzi and Thaler (2001)), when a plan is loaded up with equity funds, participants also load up on equity funds. Here we have shown that when there is an array of balanced funds with a range of risk levels, some investors will be attracted to the middle one, simply because of its relative position. This result implies that plan sponsors, when choosing the array of funds, may be implicitly (and unintentionally) “suggesting” particular funds or asset allocations.<sup>10</sup>

We conclude with a note of caution. Our results should not be exaggerated. We do *not* claim that people would always prefer the median choice to the one they have picked for themselves. We often know a lot about our tastes, and know that they are unusual. Consumers who have acquired a taste for unpopular music, be it Gregorian Chants or Polish hip-hop, would probably not be happier with the current best-selling CD. Indeed, even in the domain of portfolio choice, investors might fight to keep the portfolio they had selected for themselves even if confronted with our results. Recall that our subjects did not know they were comparing their own portfolio to other ones. A recent paper by Fellner, Guth, and Maciejovsky (2001) finds that after choosing a portfolio that consisted of a blend of four assets that are logically identical, subjects were willing to pay something to keep that mix rather than switch to another one (with identical expected returns and risk).

<sup>10</sup> See Choi et al. (2002) for many examples of this type.

**Appendix A: Investment Questionnaire**

- (1) Suppose you were offered three different investment programs through the University of California 403(b) Plan. Below you will find the annual retirement income you could expect if you invest in the different investment programs. The estimated retirement income figures are pretax in today's dollars, and they are based on your current saving behavior. Since we do not know much about other sources of retirement income you (or your spouse) might have, the information provided in the table below reflects retirement income from the University of California 403(b) Plan only.

	Investment Program A	Investment Program B	Investment Program C
Upside income	\$60,300	\$81,000	\$95,900
Median income	\$23,800	\$26,800	\$25,600
Downside income	\$ 9,590	\$ 9,270	\$ 7,740

In reviewing the above table, please note that you have a 5 percent chance of having **more** than the upside income, a 50 percent chance of having **more** than the median income, and a 5 percent chance of having **less** than the downside income.

Please rate the three investment programs on a 5-point scale, with 5 being "very attractive" and 1 being "very unattractive."

	Very Unattractive			Very Attractive	
My rating for Investment Program A is:	1	2	3	4	5
My rating for Investment Program B is:	1	2	3	4	5
My rating for Investment Program C is:	1	2	3	4	5

- (2) On a scale of 1 to 5, with 1 being "Not at all clear" and 5 being "Very clear," how clear was this survey?

- 1 Not at all clear  
 2  
 3  
 4  
 5 Very clear

As a thank you for participating, you will receive \$20. In addition, you might win the \$250 lottery. Once the lottery drawing is finalized, I will contact you with payment information.

**Appendix B: Investment Questionnaire**

- (1) Do you have an opinion about the future returns on the stock market over the next 10 years?
- No. (If you check this answer you may skip the rest of the questions.)
  - Yes. It will be much lower than it has been in the past 75 years.
  - Yes. It will be somewhat lower than it has been in the past 75 years.
  - Yes. It will be about the same as it has been in the past 75 years.
  - Yes. It will be somewhat higher than it has been in the past 75 years.
  - Yes. It will be much higher than it has been in the past 75 years.
- (2) How confident are you in your answer to the previous question?
- 1 (Not at all confident)
  - 2
  - 3 (Somewhat confident)
  - 4
  - 5 (Very confident)
- (3) Has your opinion about the future returns on the stock market influenced your investment choices?
- 1 (Not at all)
  - 2
  - 3 (Somewhat)
  - 4
  - 5 (A lot)

**Appendix C: Investment Questionnaire**

- (1) Suppose that you were offered three different investment programs through the SwedishAmerican retirement saving plan. Below you will find the annual retirement income you could expect if you invest in the different investment programs. The estimated retirement income figures are pretax in today's dollars, and they are based on your current saving behavior. Since we do not know anything about other sources of retirement income you (or your spouse) might have, the information provided in the table below reflects retirement income from Swedish-American only.
- The table below shows, for each investment program, three numbers: "downside income," "median income," and "upside income." The interpretation of the three income figures is best illustrated with an example. For instance, if you elect Investment Program A, then you have a 95 percent chance of having an annual retirement income of at least \$9,590, a 50 percent chance of having at least \$23,800, and a 5 percent chance of having at least \$60,300. Similarly, if you elect Investment Program B, then you have a 95 percent chance of having an annual



- (3) On a scale of 1 to 5, with 1 being “Not at all clear” and 5 being “Very clear,” how clear was this survey?

Not at all clear Very clear  
 \_\_\_ 1      \_\_\_ 2      \_\_\_ 3      \_\_\_ 4      \_\_\_ 5

Thank you for participating. If you have any comments, feel free to write them in the space below.

**Appendix D: Investment Questionnaire**

- (1) As you probably know, one of the benefits provided by the social security system is retirement income. You probably also know that you don’t have control over the way your social security taxes are invested. However, suppose that the social security system offered you different investment programs. Below you will find the annual retirement income you could expect if you elect the different investment programs. (The retirement income figures are pretax in today’s dollars.) If you elect Investment Program A, then you will receive \$900/month, regardless of market conditions. However, if you elect Investment Program B, then you have a 50–50 chance of having either \$1,100/month or \$800/month, depending on market conditions between now and retirement. And if you elect Investment Program C, then you have a 50–50 chance of having either \$1,260/month or \$700/month.

Retirement Income per Month (Pretax in Today’s Dollars)	Program A	Program B	Program C
Favorable market conditions	\$900	\$1,100	\$1,260
Unfavorable market conditions	\$900	\$ 800	\$ 700

Based on the above information, please answer the following questions:

My first choice is Investment Program      \_\_\_ A    \_\_\_ B    \_\_\_ C  
 My second choice is Investment Program    \_\_\_ A    \_\_\_ B    \_\_\_ C  
 My third choice is Investment Program      \_\_\_ A    \_\_\_ B    \_\_\_ C

- (2) Are you planning to retire in the next 10 years?  
 \_\_\_ Yes  
 \_\_\_ No
- (3) On a scale of 1 to 5, with 1 being “Not at all clear” and 5 being “Very clear,” how clear was this survey?  
 \_\_\_ 1 Not at all clear  
 \_\_\_ 2  
 \_\_\_ 3  
 \_\_\_ 4  
 \_\_\_ 5 Very clear

Thank you for participating.

## REFERENCES

- Ameriks, John, and Steven P. Zeldes, 2000, How do household portfolio shares vary with age? Working paper, Columbia University.
- Benartzi, Shlomo, 2001, Excessive extrapolation and the allocation of 401(k) accounts to company stock, *The Journal of Finance* 56, 1747–1764.
- Benartzi, Shlomo, and Richard H. Thaler, 1999, Risk aversion or myopia? Choices in repeated gambles and retirement investments, *Management Science* 45, 364–381.
- Benartzi, Shlomo, and Richard H. Thaler, 2001, Naive diversification strategies in defined contribution saving plans, *American Economic Review* 91, 79–98.
- Brennan, Michael J., and Walter N. Torous, 1999, Individual decision-making and investor welfare, Working paper, UCLA.
- Campbell, John Y., and Robert J. Shiller, 2001, Valuation ratios and the long-run stock market outlook: An update, Working paper, Yale University.
- Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick, 2002, Defined contribution pensions: Plan rules, participant decisions, and the path of least resistance, in James M. Poterba, ed.: *Tax Policy and the Economy*, Vol. 16 (MIT Press, Cambridge, MA), forthcoming.
- Diamond, Peter, 2002, Administrative costs and equilibrium charges with individual accounts, in John B. Shoven, ed.: *Administrative Costs and Social Security Privatization*, forthcoming.
- Fama, Eugene F., and Kenneth R. French, 2001, The equity premium, The Center for Research in Security Prices Working Paper No. 522, University of Chicago.
- Fellner, Gerlinde, Werner Guth, and Boris Maciejovsky, 2001, Illusion of expertise in portfolio decisions—An experimental approach, Working paper 01-2001, Max Planck Institute for Research into Economic Systems, Jena, Germany.
- Greenwich Associates, 1998, *What Now? A Report to Fund Professionals* (Greenwich Associates, Greenwich, CT).
- Harris, Milton, and Arthur Raviv, 1993, Differences of opinion make a horse race, *The Review of Financial Studies* 6, 473–506.
- Hewitt Associates, 1999, *Trends & Experience in 401(k) Plans* (Hewitt Associates, Lincolnshire, IL).
- Ibbotson, Roger, 2000, *Stocks, Bonds, Bills and Inflation, 2000 Yearbook* (Ibbotson Associates, Chicago, IL).
- Iyengar, Sheena S., and Mark R. Lepper, 2001, When choice is demotivating: Can one desire too much of a good thing? Working paper, Columbia University.
- Lichtenstein, Sarah, and Paul Slovic, 1971, Reversals of preference between bids and choices in gambling decisions, *Journal of Experimental Psychology* 89, 46–55.
- Lichtenstein, Sarah, and Paul Slovic, 1973, Response-induced reversals of preference in gambling: An extended replication in Las Vegas, *Journal of Experimental Psychology* 101, 16–20.
- Markowitz, Harry M., 1952, Portfolio selection, *Journal of Finance* 7, 77–91.
- Samuelson, William F., and Richard J. Zeckhauser, 1988, Status quo bias in decision making, *Journal of Risk and Uncertainty* 1, 7–59.
- Simonson, Itamar, and Amos Tversky, 1992, Choice in context: Tradeoff contrast and extremeness aversion, *Journal of Marketing Research* 29, 281–295.
- Tversky, Amos, and Richard H. Thaler, 1990, Anomalies: Preference reversals, *The Journal of Economic Perspectives* 4, 201–211.
- Welch, Ivo, 2000, Views of financial economists on the equity premium and on professional controversies, *Journal of Business* 73, 501–537.