Employee Personal Retirement Plan Asset Allocation: The Case For 100% Stocks

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This study used a periodic investing pattern and observed financial asset market history to generate efficient portfolios for periodic investing for retirement. Based on Ibbotson (1997) asset category data, this paper indicates that employees who understand the nature of long-term investing should be willing to invest 100% of their retirement funds in stocks. Data analysis revealed that diversification among Ibbotson asset categories did not reduce shortfall risk for long-term periodic investing of 20 years or more. This study serves as a call for additional employee financial education to help employees understand when stocks are the appropriate choice for retirement accounts.

Introduction

Individual retirement plans are becoming an important aspect of investing. More than 23 million Americans have invested $675 billion into their 401(k)s (Gutner, 1996). When saving for retirement, the most important decision employees make involves choosing the appropriate portfolio allocation. Some workers have become millionaires through investments in stock funds within their 401(k) and other retirement plans (Brown & Frank, 1997). However, many employees lack the expertise to make the right portfolio decisions, and must rely on information provided by plan sponsors and employee education specialists.

According to sources such as Garman and Forgue (1997) and the General Accounting Office (1996), nearly 25% to 50% of retirement plan participants choose low yield Guaranteed Investment Contracts and other conservative investments for personal retirement accounts. Employers may possibly recommend these investments to avoid liability if workers are frightened by market crashes and lose money. Unfortunately, conservative retirement investment choices may lead to some employees failing to meet their retirement income requirements. This paper will demonstrate that workers who understand the nature of long-term investing should be willing to accept the volatility of an all-stock retirement account, because for long-run periodic investing, stocks not only are the best investment on the average, but stocks are also the safest investment in terms of having the best "worst case" outcome.

This study will demonstrate that employees with a long-term investment holding period need not necessarily choose conservative investments for their retirement portfolios, but instead, it may be appropriate for employee personal retirement plans to be completely invested in stocks, even in small stock funds which have traditionally been considered very volatile. This study also serves as a call for additional employee financial education to help employees understand when stocks are the appropriate choice for retirement accounts.

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Method

The choice of a time frame for analysis is of fundamental importance for portfolio allocation analysis. In terms of saving for retirement, a one year time frame is clearly not appropriate for most employees. To cover the possible range of time frames, periodic investing patterns for 10 years to 40 years were considered. It was assumed that an employee contributed the same real dollar amount of money each year to a retirement account. For instance, it was assumed that an employee would contribute $2,000 the first year and that amount plus an increase for inflation the second year.

The real returns of all possible portfolio combinations (with 1% increments) among the six categories of financial assets reported by Ibbotson Associates were compared. The six categories were large company stocks, small company stocks, long-term corporate bonds, long-term government bonds, intermediate government bonds, and Treasury Bills. The real returns were calculated based on the nominal returns and the Consumer Price Index (CPI) as reported by Ibbotson Associates (1997) (See Appendix for description of categories). For each period, the real accumulation (end value) resulting from investing one dollar at the beginning of each year (in constant dollars) was calculated for all possible portfolios. For each portfolio, the mean accumulation and the minimum accumulation for all possible consecutive periods between 1926 and 1996 of that length were recorded. For example, there were 52 consecutive 20 year time periods with 52 end values calculated for each possible portfolio, which were then used to determine the mean and the minimum of the 52 end values.

Efficient Portfolios

A review of the literature indicates that various approaches have been taken to measure risk and returns within asset allocation frameworks. Many researchers have explored risks in terms of volatility, including a focus on the possibility of a shortfall in consumption or in some other arbitrary goals (Butler & Domian, 1991; Cohen, Maier, Schwartz, & Whitcomb, 1979; Jeffery, 1984; Leibowitz & Langetieg, 1989; Leibowitz & Kogelman, 1991). In this study, instead of using volatility as the measurement of risk, a shortfall measurement was employed using the minimum accumulation of a portfolio based on historical records. For a particular investment horizon, the efficient portfolio was defined as the one having the highest minimum end accumulation value for any given mean return.

The method used in this research was similar to traditional mean variance analysis, with the minimum or worst case accumulation replacing the variance or standard deviation for the risk measure. This method offers ordinary investors useful intuitive information that is not available with the usual measure of risk -- the standard deviation of returns. For instance, some investments may have high returns and high volatility, yet, if the distribution of returns is above the distribution of returns for a less volatile investment, the high volatility investment may be superior to the less volatile investment even for very risk-averse employees. This method was used to select efficient portfolios from a pool of 100 million possible portfolios among the six financial assets categories for each investment time period.

Simulation Results

All possible portfolios were sorted from highest mean return to lowest for every investment horizon between 5 and 40 years. Any portfolio with a lower minimum return, compared to the portfolio with the next highest mean return, was eliminated as inefficient.

Investment Horizon -- 20 Years and Over

For periodic investment horizons of 20 years and over, the portfolio containing only small stocks dominated all other portfolios composed of the six Ibbotson asset categories. A 100% small stock portfolio provided higher mean end accumulation and higher minimum end value than any other possible portfolio. For all consecutive 20 year periods from 1946 to 1996, investing $2,000 per year in a small stock portfolio had a mean accumulation of $137,106 and a minimum accumulation of $43,900, compared to a mean of $86,109 and a minimum of $37,289 for a large stock portfolio (Table 1). It was determined that there would be no value in terms of return or risk

reduction to diversify with other Ibbotson financial assets. All other possible portfolios resulted in lower mean and lower minimum accumulation.

The superiority of a 100% small stock portfolio over other portfolios was substantial and became larger as the time frame became larger. For a 30 year time period, the mean accumulation from $2,000 annual contributions for a 100% small stock portfolio was $321,949, and the minimum accumulation was $186,687, compared to a mean of $147,446 and a minimum of $92,347 for a large stock portfolio. For a 30 year time frame, a $2,000 annual contribution to a corporate bond fund had a mean accumulation of $71,073, less than half of the minimum accumulation for small stocks. Other types of bonds would have performed about the same. Diversification across different asset categories did not reduce the shortfall risk for long-term periodic investing.

Table 1
Mean and Minimum Real Accumulation and Annualized Rates of Return for efficient portfolios, 100% Small Stocks, from investing $2000 per year over 5 to 40 year time periods, based on Ibbotson data, 1946-1996.

# of years	Mean for Small Stocks	Mean for Large Stocks	Worst Case for Small Stocks	Worst Case for Large Stocks
5	14,351	13,093	5,088	6,119
10	38,717	32,615	10,555	12,428
15	77,015	57,753	22,616	21,885
20	137,106	86,109	43,900	37,289
25	196,679	112,258	85,140	56,891
30	321,949	147,446	186,687	92,347
35	567,618	213,998	340,271	168,380
40	893,362	353,671	594,530	304,256

Investment Horizons Between 5 and 19 Years

Stocks, especially small stocks, were not found to be too volatile of an investment for time periods of less than 20 years. This was true even for the time frames of 10 to 19 years with periodic contributions leading to automatic dollar cost averaging. It was determined that that risk-tolerant employees should consider investing in small stocks, even if they think they might need the money in 10 to 15 years, as the upside potential is so great. A $2,000 annual contribution to a small stock fund would have, on the average, grown to $77,015 in constant dollar terms. This accumulation was much better than the safest investment (i.e., government intermediate bonds), which, on the average, would have grown to $33,983. Mixed portfolios would have produced lower average returns than small stock portfolios for time periods under 20 years, but mixed asset allocations had somewhat better minimum accumulations (Hanna & Chen, 1996a; 1996b).

Discussion

For horizons of 20 years and over, a portfolio containing only small stocks offered a higher minimum end value than any other possible portfolio. For investment horizons of less than 20 years but more than 10 years, employees would have to evaluate the risks versus returns of various portfolios, with only those efficient portfolios being considered.

If a young employee plans to invest for retirement, and is reasonably sure of not needing the funds for 20 years or more, the best portfolio consists of 100% small stocks (preferably broadly diversified in an index mutual fund). Based on all possible consecutive 20 to 40 year periods since 1946, someone investing the same amount each year in constant dollars would have, in the worst case, done better with a 100% small stock portfolio than with any other possible portfolio. For a 25 year old worker planning to retire in 40 years, the superiority of a 100% small stock portfolio is particularly striking. The worst case for this type of portfolio is almost twice as good as the worst case for a large stock portfolio, and over six times as good as the worst case for a corporate bond portfolio. The superiority of small stocks over other types of financial assets results from the dollar cost averaging aspect of investing for retirement -- the higher volatility of small stocks results in the employee acquiring more stocks when the market is depressed.

A pessimistic employee could use the numbers of minimum accumulations presented in Table 1 to decide how much to contribute each year. For instance, if retirement is 40 years away and an

employee wanted to have $1,000,000 (in terms of today's dollars) the employee should invest totally in small stocks. An alternative rule might be to use mean accumulation values to decide how much to invest each year. Using this strategy, the first year's contribution would be $1,533, indicating that even a low paid worker could plausibly become a retirement plan millionaire.

Conclusion

In terms of retirement planning, portfolio allocation is the single most important decision for individual investors. This study used a periodic investing pattern and observed financial asset market history to generate efficient portfolios for periodic investing for retirement. The results suggest that portfolios implied by modern portfolio theory would be more conservative than needed to reduce shortfall risk. The shortfall risk measurement used in this article, minimum accumulation, not only makes more intuitive sense than volatility, but also proved to be a more effective risk measurement for long-term periodic investing.

For young workers investing for retirement, if they are reasonably sure that funds will not be needed for 20 years or more, the best portfolio consists of 100% small stocks (diversified in an index mutual fund). For investment horizons between 10 and 20 years, employees need to consider their goals and risk tolerances to choose the appropriate portfolio. For employees with moderate or high risk tolerance, the most aggressive portfolio (i.e., 100% small stocks) might be the best choice for an investment horizon between 10 and 20 years. With a small risk of lower return than a portfolio with a much lower mean return, employees would be much better off, on average, with a 100% small stock portfolio. The results also showed that to prudently take full advantage of the high returns of small stocks in retirement planning, one should start to save at least 20 years before retirement.

It is important to inform employees about the volatility of stock investments, especially small stock investments, as successful investing for retirement depends on continuing to contribute to stock funds even when the market has dropped substantially. It is also important to point out to employees that if they might need funds in less than 10 years, an all stock portfolio may be too volatile, despite the high accumulations that are likely based on past record.

The results presented in this paper depend crucially upon the assumption that the future will be similar to the past. The difference between this research and the results based on modern portfolio theory was that the distribution of one year returns were not used to project theoretical long run returns. It was simply assumed that, for instance, the worst possible outcome for the next 20 years would be no worse than the worst possible consecutive years since 1946. Clearly, this is a matter of speculation and academic debate. It would be accurate, however, to present to a 25 year old worker planning to retire in 30 years that *if* the next 30 years are no worse than the worst 30 year period for small stocks since 1926, a portfolio matching the Ibbotson small stock category will be sure to outperform any other possible Ibbotson financial portfolio.

Based on the analysis in this article, diversification between Ibbotson asset categories does not reduce shortfall risk for long-term periodic investing for 20 years or more. For these asset categories, there was no trade-off between risk and return for periodic investing of 20 years or more. Although the persistence of this "free lunch" in the future might be questioned, it is at least plausible that it might persist, because those with accumulated portfolios and shorter investment horizons might not be willing to accept the greater volatility of small stocks. Even for those engaged in long-term periodic investing, the prospect of substantial downside volatility might be too uncomfortable. However, findings from this analysis do suggest that one way personal finance employee educators can help employees meet their retirement income objectives is to continually educate employees on the benefits of stock investing within retirement plan accounts.

Further research should include an analysis of monthly returns rather than annual returns. Exploration of transition strategies might also be useful. The research presented in this article assumes that once a worker commits to a pattern of contributions, that pattern is adhered to until the

end. There is no rebalancing or shifting of contributions as retirement approaches. This of course helps increase the mean returns of the all small stock portfolios, and makes some of the minimum accumulations somewhat low. However, given the substantial dominance of an all small stock portfolio over other portfolios for periods of over 20 years, additional research is unlikely to contradict the main finding of this article.

Appendix
How To Invest In The Ibbotson (1997) Financial Assets

Large stocks:
Choose Index Mutual Fund that matches the S&P 500 stock index.

Small stocks:
Choose Index mutual fund that matches performance of bottom 20% of NYSE in terms of capitalization ($ size) and stocks traded on other exchanges of similar size.

Corporate Bonds:
Choose Index mutual fund that matches Salomon Brothers Long-Term High Grade Corporate Bond Index

Long-Term Government Bonds:
20 year U.S. Bonds, or mutual fund composed of those bonds.

Intermediate-Term Government Bonds:
Choose mutual fund composed of Government Bonds with 5 year maturities

U.S. Treasury Bills:
Choose mutual fund composed of 30 day treasury bills.

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Determinants Of Retirement Savings Plan Participation: A Discriminant Analysis[1]

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The purpose of this paper is to report on the similarities and differences in the determinants of defined contribution and IRA plan participation among a sample of employees from a major southeastern research university (N = 1,031). It was determined that participation in defined contribution plans can be described as a function of income, occupation, education, and investment knowledge. IRA participation can be defined by a function of income, investment knowledge, risk preference, and age. Income explained the most participation variation in both plans. Personal finance employee educators can help increase retirement plan participation by increasing employee knowledge of retirement planning investment options.

Introduction

As employers continue to replace defined benefit plans with defined contribution plans, fears among employees about their future economic security have increased. Groups of workers, "primarily those with low incomes and less education, are at risk of receiving little or no pension income," because they lack the knowledge and awareness of how changes in retirement planning will ultimately affect them (Government Accounting Office, 1996).

The average American retiree can expect retirement income from six sources: (a) Social Security, (b) defined benefit plans, (c) defined contribution plans, (d) personal savings, (e) post-retirement employment, and (f) private inter-generational transfers (Committee for Economic Development, 1995). The importance of defined contribution and personal saving plans has eclipsed all other forms of retirement income sources for most Americans. Currently, there are five times as many defined contribution plans in the U.S. as defined benefit plans (Committee for Economic Development), and next to 401(k) and 403(b) plans, Individual Retirement Accounts (IRAs) constitute the bulk of personal contributions for retirement savings today in the United States.

Thirty-five percent of the U.S. work force is eligible to participate in a defined contribution plan, and 100% are eligible to contribute to an IRA. Of those who are eligible, 71% contribute to a defined contribution plan, while only 16% contribute to an IRA (Poterba, Venti, & Wise, 1995). Taken together, contributions to 401(k)s, 403(b)s, 457s, IRAs, and Keoghs account for almost 53% of total retirement savings (Poterba et al.). The importance of these plans as sources of retirement income are anticipated to grow in the future as the result of declines in defined benefit plans.

The literature concerning the determinants of retirement plan participation is abundant. However, literature comparing the determinants of defined contribution plan participation to non-employer sponsored plan (e.g., IRA) participation is scarce. In many ways, one might expect that the demographic and socio-economic

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characteristics of those who contribute to a defined contribution plan to be similar to those who contribute to IRAs, but as Poterba and his associates (1995) pointed out, "standard assumptions about the determinants of saving behavior leave important aspects of actual saving unexplained, and thus encourage us to look more broadly for explanations of savings behavior" (p. 28).

The purpose of this paper is to report the findings of a descriptive discriminant analysis to examine the similarities and differences in the determinants of retirement plan savings participation. Specifically, participation in a defined contribution plan was compared to participation in an IRA to assess which demographic and socio-economic factors can be used to differentiate between the two types of plans.

Review of Literature

Employees who participate in defined contribution plans and IRAs are responsible for determining the level of their retirement income. The ultimate determination of retirement income from these savings plans is derived from two sources: (a) the amount contributed to a retirement savings account, and (b) the amount earned on contributions within an account. Employees who do not contribute to their own retirement accounts run the greatest risk of a deteriorating level of living during retirement. According to the Government Accounting Office (GAO) (1996), low-income elderly Americans are more likely to rely solely on Social Security benefits, primarily because low-income retirees have no other source of retirement income, such as a defined contribution (e.g., 401k or 403b) or IRA saving plan.

Several demographic and socio-economic factors have been identified by researchers as influencing retirement savings plan participation. Yuh and DeVaney (1996) determined that an employee's age, gender, occupation, income, marital status, and attitudes affect the amount individuals and couples contribute to defined contribution accounts. In general, other researchers have also found that demographic characteristics such as income (Committee for Economic Development, 1995; Poterba et al., 1995; Xiao, 1995), education (GAO, 1996), occupation (U.S. Department of Labor, 1992), and gender (GAO) influence retirement plan participation.

Attitudes and financial knowledge have also been found to affect retirement plan participation. Yuh and DeVaney (1996) and Yuh and Olson (1997) concluded that risk tolerance is an important aspect of retirement planning. Knowledge of financial risk and investments was found by Grable and Joo (1997) to be a significant factor in determining an individual's risk preference, and as such, a potentially significant factor in differentiating between levels of retirement savings plan participation.

Methodology

Data

Data were obtained from a 1997 survey of employees from a major southeastern United States research university. Employees chosen for inclusion in the sample were randomly selected from a listing of all faculty and staff. A modified Dillman (1978) method was used to direct the management of the survey. Specifically, one-half of all employees (approximately 2,000) received a financial and risk assessment questionnaire. A reminder card was mailed two weeks after the first questionnaire was sent. A duplicate questionnaire was then mailed one week later. Through October 1, 1997, the cutoff date for responses to the survey for use in this paper, 1,129 questionnaires had been returned. Seven questionnaires were non-deliverable, while 98 were unusable do to missing responses. Therefore, the adjusted response rate, with adjustments for undeliverable and unusable questionnaires, was 57%. This resulted in 1,031 respondents for this analysis.

Variables

Dependent variables. Respondents were asked whether or not they "currently contribute to an IRA or other type of personally funded retirement savings plan?" Respondents were also asked whether or not they "voluntarily have contributions withheld from your earnings to fund a tax-deferred retirement plan-a 403(b)-offered through the University?" Responses to

these two questions were coded dichotomously (i.e., 1 = yes; 0 = no).

Independent variables. The following independent variables were used to measure the demographic and socio-economic characteristics of the respondents: (a) gender, (b) age, (c) employment classification, (d) income, (e) marital status, (f) educational level, (g) knowledge of investments, (h) economic expectations, and (i) investor risk preference. Table 1 indicates how these variables were coded for use as interval level variables.

Table 1
Independent Variable Coding

Variable	Coding
Gender	1 = male 0 = female
Age	respondents' actual age
Employment Classification	1 = faculty (professional) 0 = staff (non-professional)
Income	1 = less than $20,000 2 = $20,000 - $29,999 3 = $30,000 - $39,999 4 = $40,000 - $49,999 5 = $50,000 - $59,999 6 = $60,000 - $69,999 7 = $70,000 - $79,999 8 = $80,000 - $89,999 9 = $90,000 and above
Marital Status	1 = married 0 = not married
Education	1 = 4 year college degree or higher 0 = less than college
Knowledge of Investment	1 = none 2 = vague 3 = some 4 = substantial
Economic Expectations	1 = better 0 = about the same or worse
Risk Preference	continuous score 19 - 66

Analysis

Descriptive discriminant analysis was used to determine which demographic and socio-economic characteristics best differentiated between participation and non-participation in the university's defined contribution plan (i.e., 403b) or other available IRA savings plans. For the purposes of this study, participation was defined as making a current contribution to a retirement savings plan. Discriminant analysis was chosen as the method of analysis in this study because the procedure accounts for possible interactions among independent variables. Discriminant analysis works to maximize interactions among variables by analyzing both within-group variability and between-group variability. The result of this type of analysis is a rank ordering of independent variables which account for (i.e., explain) the most variance in differences within the dependent variable.

Findings

Sample Characteristics

More women (55%) than men (45%) responded to the survey. Seventy-two percent of the sample were married, with 28% being either never married, separated, divorced and presently unmarried, or widowed. Respondent ages ranged from a low of 20 years to a high of 75 years, with an average of 43.46 years and a standard deviation of 10.34 years. Twenty-two percent of respondents had incomes less than $30,000, while 48% had incomes between $30,000 and $69,999. Thirty percent indicated having incomes greater than $70,000. Respondents who were employed in a staff position (i.e., non-professional) outnumbered members of the faculty (61% and 39%, respectively). The majority of respondents possessed a four year college degree or higher (63%), while the remainder (37%) had an Associate degree, high school diploma, or less than high school education.

Seven percent of respondents had no knowledge about investment concepts, which was less than half the percentage that considered themselves very knowledge (16%). The remainder of the sample (77%) indicated having either a somewhat vague or moderate knowledge of investments. Approximately 77% of sample respondents indicated that they expected future economic conditions over the next five years to

be about the same or worse. Only 23% of respondents thought that economic conditions would be better over the next five years. Finally, approximately 27% of respondents were classified as having low risk preferences. The majority of respondents (60%) were classified as having moderate risk preferences, with 13% being classified as having high risk preferences.

Forty percent of respondents failed to participate in either the defined contribution plan or an IRA plan, while 34% of respondents participated in both types of plans. IRA participation, holding other factors constant, matched the national average (16%) (Poterba et al., 1995). However, less than 10% of respondents participated only in the defined contribution plan.

Discriminant Analysis Results

The equality of group means of the independent variables was tested using univariate significance tests. Each independent variable, except economic expectations in the defined contribution analysis, was found to be univariate significant at the .01 level. In effect, these univariate calculations were similar to analysis-of-variance (ANOVA) significance tests for the equality of group means for each variable. The univariate statistics indicated that differences between participation and non-participation in both the defined contribution plan and IRA plans was significant. Thus, it was determined that the demographic factors used in this research worked as determinants of participation for both types of plans. However, univariate statistics indicated only that group means were different, not necessarily where these differences existed. Pooled within-group correlation canonical coefficients were calculated to determine which variables explained the most variance in participation and non-participation in the two types of plans.

Pooled within-group correlations between discriminating variables and canonical discriminant function coefficients are provided in Table 2. These coefficients indicate the relative importance of each variable, taking into account interactions between and among the independent variables, in determining retirement plan participation. For ease of interpretation, the coefficients presented in Table 2 can be interpreted similarly to beta weights in multiple regression or scores in factor analysis. For example, as a determinant of defined contribution and IRA participation, income, with coefficients of .75 and .76, respectively, was the most significant differentiating factor between participation and non-participation for both types of retirement saving plans.

Gender, marital status, and economic expectations offered very low differentiating power between participation and non-participation in both the defined contribution plan and IRA plans. Risk preference and age loaded highly on IRA participation, but not on participation in the defined contribution plan. Conversely, occupation and education loaded highly on defined contribution plan participation, but not as highly on IRA participation.

Table 2
Pooled Within-Group Correlations Between Discriminating Variables and Canonical Discriminant Functions

Variable	Defined Contribution Coefficient	IRA Coefficient
Income	.7543	.7598
Occupation	.6808	.4897
Education	.6018	.4797
Investment Knowledge	.5840	.6601
Risk Preference	.4882	.5549
Age	.4757	.5216
Gender	.2928	.2435
Marital Status	.2297	.2796
Economic Expectations	.0846	.1930

According to Huberty (1994), "the idea behind the use of structured coefficients is that the variables that share the most variation with a given construct should define what attribute the construct represents" (p. 209). Thus, defined contribution plan participation can be explained most effectively by the variables income, occupation, education, and investment knowledge, with coefficients of .75, .68, .60, and .58, respectively. IRA participation, on the other hand, can be explained best by the variables income, investment knowledge, risk preference,

and age, with coefficient of .76, .66, .55, and .52, respectively.

Discussion

Participation in the defined contribution plan used by respondents in this study can be described as a function of income, occupation, education, and investment knowledge, with income explaining the most variation. IRA participation can be defined by a function of income, investment knowledge, risk preference, and age, with income also explaining the most variation in IRA participation.

Determinants of participation in the defined contribution plan and IRA plans were similar in the following respects. Income was the most significant determinant of participation in both the defined contribution plan and IRA plans. This research confirmed previous findings from other researchers who concluded that retirement plan participation increases with income (e.g., Committee for Economic Development, 1995; Poterba et al., 1995). Another similarity between the two types of retirement savings plans was a respondent's knowledge of investments. Respondents who were more knowledgeable were proportionately more likely to participate in both types of plans. This research confirmed assertions made by Grable and Joo (1997) who suggested that an investor's increased knowledge of investments, including risks and returns, was a significant factor in determining portfolio asset allocations, and as such, someone's likelihood of participating in a retirement plan.

Equally important to note are the demographic and socio-economic characteristics that loaded inconsistently between the discriminant functions that described participation in both the defined contribution plan and IRA plans. Occupational status (i.e., professional and non-professional) and educational level played an important role in explaining participation in the defined contribution plan, with respondents who were employed professionally and those with higher attained educational levels more likely to be participants in the 403(b) plan. However, these same variables explained much less variance in IRA participation. Instead, risk preference and age explained a larger proportion of variance in IRA participation, with increasing levels of risk preference and age being associated with participation in an IRA.

Implications

Income and investment knowledge were the two determinants of retirement savings plan participation common to both 403(b)s and IRAs. Occupation, education, risk preference, and age were not consistent factors of retirement savings plan participation between the two plans. Gender, marital status, and economic expectations were not found to be reliable determinants of either type of plan participation.

Personal finance employee educators and researchers are encouraged to apply these findings in the following ways. First, as Chang and Hanna (1994) suggested, the best way to increase participation in both defined contribution and IRA plans is to increase employee incomes. A second way to increase participation in both types of plans is to increase employee knowledge of investments. This is an important implication, because, for the most part, educators, administrators, and researchers are not in a position to change employee incomes in the short-run, but these professionals are in an ideal position to dramatically influence levels of employee knowledge.

Additionally, when designing promotional campaigns to increase plan participation, administrators should consider the effects that occupational status and education have in determining defined contribution plan participation levels. Similarly, IRA administrators should take into account the effects of risk preference and age in determining participation rates. Specifically, promotional materials should be user-friendly, easy to read, and non-intimidating. More importantly, the materials should be applicable to employees who are most at risk of not participating in retirement plans (i.e., younger, less educated, lower income workers who have minimal levels of investment knowledge). User-friendly promotions that work to increase employee knowledge of retirement plan options may be one way to decrease fear among employees regarding their economic

security by increasing participation in retirement savings plans.

In conclusion, educators and researchers should keep in mind that some demographic and socio-economic characteristics work better than others as determinants of retirement savings plan participation. Variables such as gender, marital status, and expectations should be used cautiously when describing and evaluating retirement savings plan participation and when developing retirement plan promotions. Rather, other variables, most notably income and knowledge of investments, should be used both in the promotion of retirement plans and in the management of such plans.

Lastly, it is important to keep in mind that while similar, the determinants of defined contribution and IRA participation do differ. What works when predicting participation in one plan may not work as well when making predictions to other types of plans. More research is needed to clarify and understand why determinants of retirement savings plans differ.

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