



# Determinants Of Retirement Savings Plan Participation: A Discriminant Analysis<sup>1</sup>

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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.*

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## 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 due 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 knowledgeable (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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