

Determinants of Defined Contribution Plan Employee Participation: A 403(b) Perspective

Discriminant analysis was used to both differentiate between and to classify sample respondents into distinct 403(b) participation groups. Data were obtained from a survey of employees from a southeastern research university ($N = 1,075$). 403(b) participation was best described by a function of respondents' income, occupation, education, investment knowledge, and risk preference. A classification rule was developed that offered a better than by chance classification success rate of 71%.

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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, p. 2).

Currently 35% of the U.S. work force is eligible to participate in a defined contribution plan. Of those who are eligible, 71% contribute to a defined contribution plan (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 (Foster, 1998; Poterba et al.). The importance of these plans as sources of retirement income is anticipated to grow in the future as the result of reductions in defined benefit plans.

The literature concerning the determinants of retirement plan participation is abundant. However, literature reporting which demographic, socioeconomic, and attitudinal determinants affect defined contribution plan participation, and which are most effective for use in classifying employees into participating and non-participating groups, is scarce. 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 discriminant analysis that used selected demographic, socioeconomic, and attitudinal characteristics to both differentiate between 403(b) participation levels and classify sample respondents into distinct 403(b) participation groups.

Background Review

Employees who participate in defined contribution plans, including 403(b) plans, are responsible for determining the level of their retirement income. The ultimate determination of retirement income from 403(b) savings plans is derived from two sources: (a) the amount contributed to the employee 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.

Demographic, socioeconomic, and attitudinal factors have been found to affect savings behaviors. Hogarth (1991) concluded that the determinants of differences between individuals who actively took steps to save for future goals and those who did not included age, education, gender, income, marital status, and other factors. Li, Montalto, and Geistfeld (1996) determined that a person's income and age was important when predicting who would be more likely to plan for retirement. Zhong (1994) also found that socioeconomic factors such as income, education, age, and gender play an important role in explaining the differences in savings behaviors and asset allocation decisions.

Dolan (1991) reported similar findings regarding women's participation in employer-sponsored pension funds. She found that pension participation for women differed based on income, occupation (e.g., professional more likely to participate), and economic expectations, but not on marital status. In a related study of flexible spending accounts, Hampton, Kitt, and Greninger (1990) investigated factors that influenced the decision to participate in a flexible spending account. Participants in the plan were more likely to be better educated, male, older, married, and to have higher incomes than non-participants.

Davis (1993) examined the determinants of holdings of IRAs, Keoghs, CDs, bonds, money market mutual funds, money market deposit accounts, and stocks. She concluded that higher levels of education and income, among other factors, were significant in increasing savings, and that being married specifically increased participation in a pension plan. However, gender was not a significant factor in determining participation in any type of savings program. Malroux and Xiao (1995), using data from the 1989 Survey of Consumer Finances, determined that age, education, and employment status, among other socioeconomic factors, influenced financial preparation of preretirees for future retirement. In general, Malroux and Xiao found that older workers with higher educational levels were more likely to voluntarily participate in a retirement plan, while younger married individuals were not.

After analyzing results from a survey of nonfarm self-employed workers, DeVaney, Su, Kratzer, and Sharpe (1997) concluded that respondents who were older, married, and high income earners were more likely to have larger total retirement savings. Other researchers also have concluded that demographic, socioeconomic, and attitudinal factors influence retirement savings plan participation decisions by employees. 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. Li et al. (1996), Poterba et al. (1995), and Xiao (1995) concluded that increased levels of income lead to heightened pension plan participation. The GAO (1996) found that increased educational attainment and being male were associated with increased pension plan participation. Finally, greater occupation status (e.g., being professionally employed) was found by Grable and Lytton (1997) and the U.S. Department of Labor (1992) to be a significant factor affecting pension plan participation.

Attitudes and financial knowledge also have been found to affect retirement plan participation. Sung and Hanna (1996), Yuh and DeVaney (1996), and Yuh and Olson (1997) concluded that risk tolerance is an important factor that impacts retirement planning decisions, with individuals who have higher levels of risk tolerance being more likely to save for retirement. Zhong (1994) concluded that expectations about future economic events, including income growth, were significant determinants of retirement plan participation.

Knowledge of financial risk and investments also has been found to influence retirement plan participation (Grable & Joo, 1997; Grable & Lytton, 1997). Myer and Haldeman (1991) suggested that increasing employee understanding of money management issues, including risk analysis and investment planning, led to increased levels of employee knowledge, confidence, and savings. In general, increased levels of risk tolerance, positive future economic expectations, and increased knowledge of investments have been found to increase participation in all types of savings programs, including defined contribution (e.g., 403b) plans.

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 (i.e., 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. The useable response rate was 54%, resulting in 1,075 respondents for this analysis.

Variables

Dependent Variable. Respondents were 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 this question were coded dichotomously (i.e., 1 = yes; 0 = no).

Independent Variables. The following independent variables were used to profile the demographic, socioeconomic, and attitudinal 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 for the next five years, and (i) financial risk preference, which was measured as respondents' preference for financial volatility. (Risk-preference scores were developed from an expanded risk assessment instrument as presented by Grable and Joo (1997). The reliability of the instrument was .78.)

Analysis

Discriminant analysis was used to determine which demographic, socioeconomic, and attitudinal characteristics best differentiated between participation and non-participation in the university's defined contribution plan (i.e., 403b). For the purposes of this study, participation was defined as making a current contribution to the retirement savings plan. Discriminant analysis was chosen as the method of analysis, 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) a rank ordering of independent variables which account for (i.e., explain) the most variance in differences within the dependent variable, and (b) a classification equation that can be used to predict group membership.

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 20 years to 75 years, with an average of 43.52 years and a standard deviation of 10.34 years. Twenty-two percent of respondents reported 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 (62% and 38%, 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.

Fifteen percent of respondents considered themselves very knowledgeable about investment concepts, which was almost twice the percentage that had no investment knowledge (8%). The remainder of the sample (77%) indicated having either a somewhat vague or moderate knowledge of investments. Approximately 78% of sample respondents indicated that they expected future economic conditions over the next five years to be about the same or worse. Only 22% of respondents thought that economic conditions would be better over the next five years. Nearly 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. Finally, 44% of respondents indicated participating in the university sponsored 403(b) plan, while 56% did not.

Discriminant Analysis Results

Table 1 provides the independent variable means, standard deviations, and measures of statistical significance for the independent variables. F-tests indicated that all of the variables, except economic expectations, were univariate significant at the .01 level.

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 plan participation, income, with a coefficient of .76 was the most significant differentiating factor between participation and non-participation in the 403(b) retirement savings plan. Using all of the variables, the value of Wilk's lambda was .7935. The discriminant function thus accounted for approximately 20% of the variance.

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, participation in the 403(b) plan can be explained most effectively by the variables income, occupation, education, investment knowledge, and risk preference with coefficients of .76, .68, .62, .58, and .51, respectively. Age, gender, marital status, and economic expectations offered very low differentiating power between participation and non-participation in the defined contribution plan.

Table 1
Group Means, Standard Deviations, and Statistical Significance of the Independent Variables

Variable	403(b) Participation		Non-Participation		Wilk's Lambda	F	Sig.
	Means & Percents	SD	Means & Percents	SD			
% Men	54	50	39	49	.9776	24.5844	.0001
Avg. Age	46.30	10.05	41.36	10.05	.9438	63.8657	.0001
% Married	78	42	68	47	.9887	12.2736	.0005
% Employed as Faculty	56	50	24	43	.8926	129.0438	.0001
Avg. Income	\$60,500	\$25,000	\$42,000	\$22,700	.8690	161.7906	.0001
% With 4 Year Degree or More	79	40	50	50	.9097	106.4698	.0001
Avg. Investment Knowledge	2.9469	.7575	2.4735	.8151	.9187	94.9490	.0001
Avg. Risk Preference	38.6295	6.3099	35.3907	6.1767	.9376	71.3979	.0001
% With Positive Economic Expectations	25	43	20	40	.9974	2.7852	.0954

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

Variable	Defined Contribution Coefficient
Income	.7613
Occupation	.6799
Education	.6176
Investment Knowledge	.5832
Risk Preference	.5057
Age	.4783
Gender	.2968
Marital Status	.2097
Economic Expectations	.0999

Predicting 403(b) plan participation. The final step in the analysis involved testing the effectiveness of the independent variables as predictors of 403(b) plan participation. The overall percentage of respondents who were classified correctly, using all of the factors simultaneously, was 71%. It was concluded that this classification success rate was better than by chance classification.

Conclusions

Participation in the defined contribution plan used by respondents in this study was best described as a function of income, occupation, education, investment knowledge, and risk preference, with income explaining the most variation. Specifically, this research confirmed results from previous studies that suggested that retirement plan participation increases with income (e.g., Committee for Economic Development, 1995; Poterba et al., 1995). It also was determined that being employed in a professional position (i.e., faculty) led to proportionately higher participation in the 403(b) plan. Respondents with higher levels of attained education also were more likely to participate in the plan than respondents with lower educational attainment.

A high level of knowledge concerning investments was found to be an effective determinant of 403(b) plan participation. Respondents with the least knowledge of investments were proportionately more likely not to participate in the defined contribution plan. It also was determined that risk preference, as an attitude related to accepting financial volatility, was positively related to 403(b) plan participation, with respondents who scored higher on the risk preference assessment more likely to participate in the plan. 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, socioeconomic, and attitudinal characteristics that were less effective in explaining variations in 403(b) plan participation. Future economic expectations were not a significant factor in differentiating between participation groups. Even though age, gender, and marital status were univariate significant, these three variables, both individually and collectively, explained little variation in 403(b) plan participation.

Implications

The results of this research suggest that the best way to increase participation in a retirement savings plan is to increase employee incomes. A second way to increase participation in a retirement plan is to increase employee knowledge of investments. This is an important implication, because educators, administrators, and researchers are usually 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. In addition to increasing an employee's income and knowledge of investments, 403(b) plan participation can be heightened by a change in an employee's occupational status from non-professional to professional, increasing an employee's attained educational level, and increasing someone's financial risk preference.

These findings can be incorporated into the design and promotion of 403(b) plans. For example, promotions should be targeted toward employees who face the greatest threat to financial security in retirement, namely, employees with low levels of income, low attained educational levels, lower status occupations, and those with low levels of investment knowledge and risk preference, because these employees are proportionately more likely not to participate in a defined contribution plan.

When designing promotional materials to increase 403(b) participation rates, plan administrators should develop user-friendly, easy to read, and non-intimidating materials that will appeal to lower income, less educated, and less investment savvy employees. Promotional materials designed for more sophisticated audiences may fall on a deaf ear, because employees in higher ranking occupations who earn more income, have higher attained educational levels, and more investment experience are already more likely to participate in a plan, regardless of promotions by pension administrators to increase participation rates.

Additionally, pension administrators and educators need to take a more proactive approach when increasing the awareness and knowledge of their employee base. Research has shown that employees with low levels of income and education often have poor personal finance skills (Garman, Leech, and Grable, 1996), which often leads to underutilization of pension plan alternatives, and ultimately, an increased level of financial insecurity. Pension administrators and educators can help reverse this apparent lack of security by providing employees with basic budgeting and personal finance education. As this research suggests, this type of education will lead to an increased level of retirement savings via defined contribution plans.

Further, pension plan administrators and operating managers have a responsibility to provide employees with (a) adequate, accurate, and useable information about retirement plan options; (b) broad based personal finance educational programs; (c) retirement savings options that meet the needs of all employees, regardless of risk preferences, knowledge, education, occupational status, or income; and (d) ongoing education regarding investing and personal finances that will continue to increase employee awareness of pension plan alternatives. It is acknowledged that the scope of these responsibilities may require an increased availability of benefits staff persons and an increase in appropriate products and services. If administrators and managers hope to increase participation in retirement plans, and thus reduce their long-term fiduciary responsibilities, these steps need to be taken today.

In conclusion, employers no longer give employees a gold watch the day they retire. Employees' future retirement security is increasingly reverting back to the employee, and both employers and employees must recognize the need for more self management of retirement savings on the part of employees. This will require an increased level of education and training on the part of employers. To this end, the results from this study can assist educators and researchers when developing pension plan promotions.

References

- Chang, Y. R., & Hanna, S. D. (1994). Factors related to household saving. *Consumer Interest Annual*, 40, 148-155.
- Committee for Economic Development. (1995). *Who will pay for your retirement?* New York: Author.

- Davis, A M. (1993). Determinants of holdings of types of savings. Proceedings of the American Council on Consumer Interests, 39, 223-227.
- DeVaney, S. A., Su, Y., Kratzer, C., & Sharpe, D. L. (1997). Retirement savings of nonfarm self-employed workers: An exploratory study. Consumer Interests Annual, 43, 58-63.
- Dillman, D. A. (1978). Mail and telephone surveys. New York: Wiley.
- Dolan, E. M. (1991). Women's participation in an employer-sponsored pension fund. Proceedings of the American Council on Consumer Interests, 37, 234.
- Foster, A. C. (1998, Spring). Employee benefits in the United States, 1994-95. Compensation and Working Conditions, 56-51.
- Garman, E. T., Leech, I. E., & Grable, J. E. (1996). The negative impact of employee poor personal financial behaviors on employers. Financial Counseling and Planning, 7, 157-168.
- General Accounting Office. (1996). 401(k) pension plans (GAO/HEHS Publication No. 96-176). Washington, DC: Author.
- Grable, J. E., & Joo, S. H. (1997). Determinants of risk preference: Implications for family and consumer science professionals. Family Economics and Resource Management Biennial, 2, 19-24.
- Grable, J. E., & Lytton, R. H. (1997). Determinants of retirement savings plan participation: A discriminant analysis. Manuscript submitted for publication.
- Hampton, V. L., Kitt, K. A., & Greninger, S. A. (1990). Flexible spending accounts: Economic and non-economic participation factors. Proceedings of the American Council on Consumer Interests, 36, 254-258.
- Hogarth, J. M. (1991). Asset management and retired households: Savers, dissavers and alternators. Financial Counseling and Planning, 2, 97-122.
- Huberty, C. J. (1994). Applied discriminant analysis. New York: Wiley.
- Li, J., Montalto, C. P., & Geistfeld, L. V. (1996). Determinants of financial adequacy for retirement. Financial Counseling and Planning, 7, 39-48.
- Malroux, Y. L., & Xiao, J. J. (1995). Financial preparation for retirement. Consumer Interests Annual, 41, 49-54.
- Myer, P. A., & Haldeman, V. A. (1991). Money management education ... it works. Proceedings of the American Council on Consumer Interests, 37, 233.
- Poterba, J. M., Venti, S. F., & Wise, D. A. (1995). Do 401(k) contributions crowd out other personal saving? Journal of Public Economics, 58, 1-32.
- Sung, J., & Hanna, S. (1996). Factors related to risk tolerance. Financial Counseling and Planning, 7, 11-20.
- U. S. Department of Labor. (1992). Trends in pensions 1992. Washington, DC: Pension and Welfare Benefits Administration.
- Xiao, J. J. (1995). Patterns of household financial asset ownership. Financial Counseling and Planning, 6, 99-106.
- Yuh, Y., & DeVaney, S. A. (1996). Determinants of couples' defined contribution retirement funds. Financial Counseling and Planning, 7, 31-38.
- Yuh, Y., & Olson, P. (1997). Factors affecting the retirement fund levels of self-employed households and wage and salary households. Family Economics and Resource Management Biennial, 2, 25-31.
- Zhong, L. X. (1994). Factors associated with bond and stock holdings. Consumer Interests Annual, 40, 359-360.

Endnotes

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