

The Spouse Effect On Participation And Investment Decisions For Retirement Funds

Jaimie Sung¹ and Sherman Hanna²

Worker decisions on retirement account participation and their investment choices for retirement accounts play an important role in post-retirement income. The interaction between the decisions of husbands and wives was investigated by using a bivariate probit model with a spouse effect. There were a positive spouse effects on the two decisions in households where both spouses were working. When marital status and working status were controlled, no significant gender difference in the decisions was found. Risk tolerance and the expected time horizon until retirement are important factors in the investment decision as expected.

Key Words: *Stock investments, Retirement planning, Risk tolerance, Survey of Consumer Finances, Gender differences*

While Social Security is typically the major source of retirement income for retirees^a, it is not adequate to provide most retirees sufficient income to maintain their level of living after retirement. Also, the structure of the Social Security program has not sufficiently adjusted for changes in family life over the last few decades. The current laws related to the Social Security give more benefits to one-earner married couples than unmarried single workers or two-earner married couples (*Economic Report of the President*, 1997, p. 114). For example, the combined replacement rate for two-earner retired couples is 41%, which drops to 21% when one spouse dies. The comparable rates for one-earner retired couples are 62% and 41% (Schobel, 1993).

Since the Employment Retirement Income Security Act (ERISA) of 1974 was passed, there has been a substantial change in the structure of private pension plans, shifting from Defined Benefit plans to Defined Contribution plans (*Economic Report of the President*, 1999, p. 158). Defined Contribution plans and Individual Retirement Accounts have emerged as attractive and important vehicles of financial resources for retirement. Under Defined Contribution plans, employees as well as employers regularly contribute to pension accounts. Benefit levels depend not only on the stream of contributions but also on the rates of return from the investment in these accounts.

With retirement funds (DC plans and IRAs), each individual has to make two decisions: participation and investment. The investment decision has important implications for the rate of return on retirement funds. For example, two individuals who contribute the same amount to retirement funds over the same period might have very different levels of financial resources for retirement if their investment choices differ. Some studies on the rate of return suggest that asset allocation to stocks is a better choice than asset allocation to bonds and investing most retirement funds in stocks is more efficient strategy than splitting funds into stocks and bonds (Shoven & Wise, 1996; Hanna & Chen, 1996). Investment in stocks should be related to an individual's risk tolerance. Risk tolerance is related to individual and household characteristics as well as individual preference (Sung & Hanna, 1996; Hawley & Fujii, 1993). Another important factor determining allocation of total financial assets is human wealth. Since a large fraction of young investors' wealth is in the form of human capital (Lee & Hanna, 1995), young investors should invest more in stocks (Bodie, 1990; Hanna & Chen, 1997).

Most previous studies on pension choices using individuals as a unit of analysis have found that participation varies by gender. Thus women, who are more risk averse, invest their resources more conservatively than men (Bajtelsmit & Bernasek, 1996; Embrey & Fox, 1997). However, decisions made by married individuals differ from decisions made by

¹Jaimie Sung, Postdoctoral Associate, Community Development and Applied Economics Department, University of Vermont, 205d Morrill Hall, Burlington, VT 05405, Phone: (802) 656-4565. Email: jsung@zoo.uvm.edu

²Sherman Hanna, Professor, Consumer and Textile Sciences Department, The Ohio State University, 1787 Neil Ave., Columbus, OH 43210-1295. Phone: (614) 292-4584. Fax: (614) 292-7536. E-mail: hanna.1@osu.edu

unmarried individuals, as some empirical studies have reported that there is a significant spouse effect on the decision to participate in retirement plans (GAO, 1996; Even & Macpherson, 1994; Hersch & Reagan, 1993). In a married couple household, presumably both the husband and the wife make decisions to participate in retirement plans and to invest retirement funds by considering each spouse's current pension status and investment type as well as one's own characteristics. The decision of one spouse would be related to the decisions of the other in order to prepare for an adequate level of retirement income at the household level.

The spouse effect on the joint decision of participation and investment decisions of two-earner married couples has been ignored in policy as well as in empirical studies. Under ERISA, employers should provide employees with information on pension plans and the U.S. Department of Labor is responsible for regulating the plans as well as providing information (Beam & McFadden, 1988, p. 291). The materials cover what the plan provides and how it operates (i.e., each investment option, risk and return characteristics, and survivor benefits).

The main purpose of this study is to examine whether or not the spouse effect on the two decisions is significant, in other words, whether a spouse's participation and investment decisions significantly affect and are significantly affected by the other spouse's decisions. Unlike previous studies, this study also includes overall financial characteristics common to both spouses in married couple households. Risk tolerance and the time horizon are included as essential determinants of investing retirement funds in stocks. Another important contribution of this study is to estimate the participation decision and the investment decision together using a bivariate probit model in order to avoid the potential selectivity bias due to estimation of investment decision only with plan participants.

Literature Review

Participation Decision

Retirement plans in this study consist of IRAs (plus Keogh plans) and the Defined Contribution Plans. With demographic, income and financial characteristics of the household, the marginal tax rate is an important variable since funds contributed to these retirement plans provide tax-incentives subject to various restrictions. Other important elements affecting the participation decisions are related to the main characteristics of the two types of retirement funds. IRAs are provided by workers themselves, while the Defined Contribution plans are

provided by employers. Therefore, the decision to participate in an IRA or Keogh is subject only to each worker's willingness to participate while the decision to participate in the Defined Contribution plans is subject to an employer's offer of a plan and an employee's eligibility for the plan, in addition to an employee's willingness to participate. The employer's offer rate depends on job characteristics such as the firm size, industry, and occupation.

Long (1990), Feenberg and Skinner (1989), and O'Neil and Thompson (1987) found that the marginal tax rate and joint filing had a positive effect on IRA contributions. Those who were able to obtain a large tax shield were significantly more likely to contribute to an IRA while single taxpayers were less likely to open an IRA. Being a manager, college education, income, the ratio of current earnings to permanent income and age have been found to have positive effects on the probability of having an IRA while the number of children under age 18 has been found to have a negative effect on the probability of contributing to an IRA (Collins & Wyckoff, 1988; Hubbard, 1984). Venti and Wise (1986, 1988, 1990) found that income, being unmarried, amount of liquid assets, and family size had negative effects on the proportion allocated to IRAs while age had a positive effect on the proportion allocated to IRAs. Gale and Scholz (1994) found that IRA contributions were positively correlated with income, education, participation in pension plans, and debt. When other variables were controlled, predicted IRA contributions increased to age 47, then decreased.

Previous studies on the participation in Defined Contribution plans have focused on characteristics of the firm. To identify the characteristics of firm, the presence of the union, the firm size, and industry have been used as proxies in previous studies (Bellar & Lawrence, 1992; Gustman & Steinmeier, 1992; Ippolito, 1995). In general, firms that offer defined contribution plans are large, have unions, and belong to the finance, insurance, and real estate sectors. For identifying eligibility, work status and the number of years at the current job have been used in empirical studies (Hersch & Reagan, 1993).

Andrews (1992) found that unionized workers were less likely to have 401(k) plan coverage while workers with longer tenure on the job were somewhat more likely to have 401(k) plans, holding other variables constant. Age was an important determinant of participation even after accounting for differences in wages and income. In

addition, eligible employees owning or buying their own homes were more likely to become plan participants.

Investment Decision

Retirement funds can be invested in stocks or other types on investments. Some have argued that individuals must be prevented from investing too conservatively and earning low returns over their accumulation period, while others have argued that individuals should be protected from recklessly investing their retirement assets (Poterba & Wise, 1996). Conservative investment choices such as guaranteed investment contracts no longer offer the attractive interest rates they initially provided (Andrew, 1992; Samwick & Skinner, 1993; Mitchell & Rappaport, 1993). Shoven and Wise's simulation (1996, Table 6, pp. 17-18) illustrated wealth accumulation at various ages according to alternative assets allocation and found that asset allocations to S&P 500 funds were better than asset allocation to bonds at any ages.

Stocks are considered as riskier than other investment vehicles. Three factors have been discussed in theoretical and empirical studies related to portfolio decisions -- time horizon, the effect of human capital, and risk tolerance. For long horizons, stocks not only have a higher rate of return than bonds, but stocks are safer in terms of having higher real accumulations (Fischer, 1983; Bodie, 1990, Hanna & Chen, 1996; Shoven & Wise, 1996). Since human capital is a large proportion of the total wealth (human capital plus other financial wealth), if it is optimal to hold a constant proportion of total wealth in stocks, stocks as a proportion of non-human wealth must then decline as human capital declines over the life cycle (Bodie, 1990).

Another important element affecting the investment pattern is the attitude toward financial risks. Petersen (1996) suggested that asset allocation in a defined contribution pension plan should represent the underlying risk tolerance of the employees. Several empirical studies on risk tolerance found that factors related to financial risks vary systematically with demographic and financial characteristics of households, implying that financial risk was a reflection of factors of a respondent's characteristics as well as subjective factors (Hawley & Fujii, 1993; Sung & Hanna, 1996). Hanna and Chen (1997) suggested, however, that objective factors such as the horizon and the ratio of financial assets to total wealth should be more important than subjective risk tolerance in optimal portfolio choices.

Schultz (1992) reported that three-fourths of all workers with self-directed plans had no investment in stocks, and less than 5% of workers had more than half of their assets in stocks. Using data from 1987 IRS Form 5500 filings, Papke, Petersen and Poterba (1993) reported that 30% of participants invested their total assets in equity mutual funds, 29% invested in Guaranteed Investment Contracts, and 22% invested in company stocks. Petersen (1996) compared the asset allocation of defined contribution and defined benefit plans and reported that about 20% of DC retirement funds were in cash type instruments, 34% in bonds, and another quarter in equities. Using the 1992 Survey of Consumer Finances, Poterba and Wise (1996) found that approximately half of the assets in each of these accounts (IRA, 401(k), and other traditional defined contribution plans) were held in corporate equities. Overall, participants aged between 45 and 54, and those with incomes over \$100,000 invested a higher proportion of retirement funds in stocks (including mutual fund).

A General Accounting Office (GAO) study (1996) analyzed the 1992 Survey of Consumer Finances (SCF) and the Health and Retirement Survey (HRS), and found that about 25% of 401(k) participants invested their 401(k) funds in conservative investments, such as bonds, another 25% invested primarily in stocks, and the rest split their investments between stocks and bonds. The GAO study reported that different demographic groups exhibited distinct investment patterns. Women tended to invest their funds more conservatively than men did and were likely to invest mostly in bonds. Highly educated workers and higher-income workers were more likely to invest in stocks than less educated workers and low-income workers. Workers with a spouse who had pension coverage were more likely to invest mostly in stocks and were less likely to invest mostly in bonds than workers with no spouse or a spouse with no pension coverage.

Purpose

This study focuses on married couple households' joint decisions to participate in retirement plans and to invest retirement funds in stocks. The specific retirement plans are Individual Retirement Account and Defined Contribution plans. These two retirement plans have common characteristics as well as different characteristics. Each individual is responsible for participating in retirement plans and choosing investment types. However, eligibility differs for the two retirement plans and an IRA has a broader range of investment types than DC plans. This study focuses on whether workers

invest most of their retirement funds in stocks, which have the highest rate of return of all major categories of financial investments.

Methods

Data and Sample

The dataset for this study is the 1992 Survey of Consumer Finances (SCF). The SCF, which surveys the financial characteristics of households, is sponsored by the Federal Reserve Board and supported by other federal agencies, including the Statistics of Income Division of the Internal Revenue Service (Kennickell & Starr-McCluer, 1994). The SCF provides the most detailed information on the financial characteristics of U.S. households such as assets, liabilities, and pension rights, as well as information on employment history, other demographic characteristics, and attitudinal data.

The sample for this study consists of 1,215 married couple households where both husband and wife were between age 16 and 70 and were working. In the analysis, only married couple households are included because this study mainly focuses on the spouse effect on decisions to participate in retirement plans and to invest most retirement funds in stocks. In order to deal with the five imputations, parameters, their variances, and their significance levels are estimated by applying the Rubin's procedure (Rubin, 1987; Montalto & Sung, 1996). Since all the five imputations are used in this study, the sample size is 6,075 husbands and wives, which is five times the actual number of respondents. For more information on the methods, see Sung (1997).

Dependent Variables

There are two decisions related to retirement funds: the decision to participate in retirement plans and the decision to invest most retirement funds in stocks. The 1992 SCF questionnaire provides information on participation in retirement plans and the amounts^b in retirement funds as well as information on the use of investment vehicles by retirement plans.^c Since this study focuses on whether individuals participate in retirement plans and whether they invest most retirement funds in stocks, two binary variables as explained below are used as dependent variables representing the two decisions.

Participation in Retirement Plans For each husband and wife, a binary dependent variable representing participation in retirement plans is separately created from two questions in the Survey: participation in IRAs and participation in DC plans such as thrift or savings,

401(k)/403(b)/SRA, profit sharing, stock purchase, ESOP, deferred compensation, SEP, defined-contribution plan; TIAA-CREF, money purchase plan and tax-deferred annuities. Individuals are considered as participants in retirement plans if they participate in either IRAs or DC pension plans. Of 6,075 observations, 3,532 husbands (49.3%) and 3,076 wives (42.2%) are participants. Of husbands with nonparticipating wives, only 19.7% are participants and, of wives with nonparticipating husbands, only 12.6% are participants.

Investment in Stocks For each of husband and wife, a binary dependent variable representing investment of most retirement funds in stocks is separately created from two questions in the survey. One asks for the choice of investing retirement funds on IRAs:

"How is the money in (this/all of your family's) IRA invested? Is most of it in CD's or other bank account, most of it in bonds or similar assets, or what?"

1. CD's/bank account;
2. stocks;
3. bonds;
4. combination of 1,2 and 3;
5. combination of 2 and 3;
6. combination of 1 and 2;
7. life insurance;
8. real estate;
9. Other.

The other asks for the choice of investing retirement funds on DC pension plans:

"How is the money in defined contribution invested? Is it mostly in stocks, mostly in interest-earning assets, is it split between these, or what?"

1. mostly or all stock;
2. mostly or all interest earning;
3. split;
4. real estate;
5. Other.

The binary variable of investing most retirement funds in stocks is defined as 1 if individuals only with IRAs chose only stocks, individuals only with DC pension plans chose mostly or all stocks, or individuals with both IRAs and DC pension plans chose only stocks and mostly or all stocks, and as 0 otherwise. Among those who participate in retirement plans, 25.2% of husbands and 25.8% of wives invest most retirement funds in stocks; 41.8% of husbands and 39.2% of wives split retirement funds between stocks and other investment vehicles; and 33.0% of husbands and 35.0% of wives invest most retirement funds in other investment vehicles.

Empirical Models

This study employs three empirical models; first two separately estimate probit models of the participation and investment decisions; and the third estimates a bivariate probit model with partial observability, which considers the participation and investment decisions together.^d To examine whether one spouse's decisions affect and are affected by the other spouse's decisions, the current participation and investment choices are used in the analyses.^e

To explain each spouse's participation decision, demographic and job characteristics as well as financial characteristics common to both spouses are employed in addition to the marginal tax rate^f, yearly earnings, and participation in defined benefit plan. The demographic characteristics include age, race, education, and health status. The job characteristics include a dummy variable for new hire, firm size, the union membership, the status of self-employment, white-collar job, and seven industry dummy variables. The financial characteristics include seven components of household assets: liquid assets, non-liquid assets excluding directly-held stocks and mutual funds, the amount of directly-held stocks, the amount of directly-held mutual funds, non-financial assets, total debt outstanding, and a dummy of home ownership.

To explain the husband's and the wife's decisions to invest most retirement funds in stocks, demographic, job characteristics, and financial characteristics are employed. The demographic and job characteristics include risk tolerance, the number of years to expected retirement, education, tenure at the current job, the status of self-employment, and white collar job. Definition of variables, its measurement, and their sample statistics are shown in Appendix Table A-1.

Participation Decision: The empirical model of each spouse's participation decision has the form of

$$y_h^* = y_w a_{oh} + X_h a_h + A g_h + e_h,$$

$$y_w^* = y_h a_{ow} + X_w a_w + A g_w + e_w,$$

where y_w (y_h) is the state of wife's (husband's) participation in retirement plans affecting husband's (wife's) participation decision, (a_{oh} , a_{ow}) are the coefficients for the spouse effect to be estimated, and (e_h , e_w) are the error terms in husband's and wife's participation decisions. With the observations (y_j , X_j , A) and the normality assumption of the error term e_j , the estimates of coefficient vectors (a_{oh} , a_h , g_h) and (a_{ow} , a_w , g_w) in the participation decisions are obtained by maximizing the likelihood function of the probit model.

Investment Decision The empirical model for each spouse's investment decision has the form of

$$s_h^* = s_w b_{oh} + Z_h b_h + A d_h + h_h,$$

$$s_w^* = s_h b_{ow} + Z_w b_w + A d_w + h_w,$$

where s_w (s_h) is the state of the wife's (husband's) investment of retirement funds affecting husband's (wife's) investment decision, (b_{oh} , b_{ow}) are the coefficients for the spouse effect to be estimated, and (h_h , h_w) are the error terms in the husband's and wife's investment decisions. With the observations (s_j , Z_j , A) and the normality assumption of the error term h_j , the estimates of coefficient vectors (b_{oh} , b_j , d_j) are obtained by maximizing the likelihood function of the probit model.

Bivariate Probit Analysis with Partial Observability The participation decision can be estimated separately since it is completely observed. However, when only those who participate in retirement plans are used in estimating their investment decisions, estimates might suffer from a selectivity bias due to ignoring their participation decisions. Unless the true correlation coefficient equals zero, the separate estimation of the participation decision gives an inefficient estimate and the separate estimation of the investment decision gives a biased estimate due to selectivity bias. Therefore, both decisions are jointly estimated by maximizing the likelihood function, which is given by Meng and Schmidt (1985). The likelihood ratio test procedure is used to test which specification, one with financial characteristics and another without them, is more appropriate for explaining the decisions. Since financial characteristics appeared to have no significant contribution in estimating the investment decision, the bivariate probit model of the two decisions is estimated by including financial characteristics in the participation decision but not in the investment decision. The model can be described as

$$y_h^* = y_w a_{oh} + X_h a_h + A g_h + e_h,$$

$$s_h^* = s_w b_{oh} + Z_h b_h + h_h,$$

$$y_w^* = y_h a_{ow} + X_w a_w + A g_w + e_w,$$

$$s_w^* = s_h b_{ow} + Z_w b_w + h_w,$$

where (e , h) follows a bivariate normal distribution with the correlation coefficient r .

Results and Discussion

Participation Decision

Table 1 presents estimates of the participation decision. In a probit model of the participation decision with effect of spouse's decision and the financial characteristics, the spouse effect, self-employed, having defined benefit pension plans, non-liquid assets, and industry dummies for manufacturing, construction, and personal service, are associated with the probability of participating in

retirement plans for the husband's decision. The pattern slightly differs for the wife's decision. For the wife's decision, new hire and trade industry are significantly associated with the probability of participating in retirement plans, while industry dummy for manufacturing and construction is not significant.

Table 1
 Probit Analysis on Participation Decision

	Husband	Wife
	Coeff.	Coeff.
Spouse's participation decision	0.632 ‡	0.612 ‡
Education (vs. less than high school)		
High school graduate	0.133	0.146
College drop-out	0.227	0.201
College graduate and more	0.301	0.311
Age	0.003	0.006
Non-Hispanic white	0.269	-0.045
Excellent health status	0.074	0.090
Self-employed	-0.566 ‡	-0.503 ‡
New hire	-0.205	-0.485 ‡
Firm size (500 or more workers)	0.231	0.167
Covered by union	-0.064	0.081
Industry (vs. Services)		
Agriculture	-0.250	-0.024
Manufacturing/construction	-0.385 *	-0.223
Trade	-0.138	-0.458 †
Finance	-0.301	-0.265
Personal service	-0.392 *	-0.333 *
Public administration	-0.230	0.074
White collar job	0.064	0.148
Marginal tax rate	0.007	0.006
Have defined benefit plans	-0.500 ‡	-0.239 *
Earnings (log value)	0.244	0.090
Liquid assets (log value)	0.008	-0.017
Non-liquid financial assets (log value)	0.241 ‡	0.173 ‡
Directly-held stocks (log value)	0.004	0.009
Directly-held mutual fund (log value)	0.005	-0.001
Non-financial assets (log value)	-0.025	-0.010
Total debt (log value)	-0.008	0.005
No home-ownership	-0.152	-0.095
Constant	-4.857 †	-2.997 *
Correct prediction rate	82.5%	74.8%

Source: the 1992 SCF. All five imputations are used in this study.

Sample: Married households in which both husband and wife are working and aged between 16 and 70.

‡ p<0.001, † p<0.01, * p<0.05.

Investment Decision

Table 2 presents estimates of the investment decision. In a probit model of the investment decision with the exogenous spouse effect, the spouse effect, risk tolerance, and tenure at the current job are significantly associated with the probability of investing most retirement funds in stocks for husband's decision. For the wife's decision, the spouse effect, years to retirement, self-employed, and tenure at the current job are significantly associated with the probability of investing most retirement funds in stocks. In this study, education and total family income are not significant. This is not consistent with previous studies. Perhaps risk tolerance

varies systematically with economic and demographic characteristics of households.

Table 2
Probit Analysis on Investment Decision

	Husband	Wife
	Coeff.	Coeff.
Spouse' investment in stocks	1.711 ‡	2.042 ‡
Education (vs. less than high school)		
High school graduate	0.398	0.370
College drop-out	0.550	0.220
College graduate and more	0.512	0.481
Risk tolerance (vs. taking average risks)		
Taking substantial risks	0.835 †	0.035
Taking above average risks	0.430 †	0.197
Taking no risks	-0.415 *	0.130
Number of years until expected retirement (vs. 5-14)		
Years to retire in 4	0.081	-0.352
Years to retire in 15-24	-0.069	-0.423
Years to retire in 25-34	-0.249	-0.551 *
Years to retire in 35 & over	-0.310	-0.299
Self-employed	0.249	0.395 *
Tenure at the current job	-0.018 *	-0.023 *
White collar job	-0.272	-0.236
Total family income (log value)	0.051	0.010
Liquid assets (log value)	-0.052	-0.066
Non-liquid financial assets (log value)	-0.035 *	0.014
Directly-held stocks (log value)	-0.002	-0.007
Directly-held mutual fund (log value)	-0.009	0.033
Non-financial assets (log value)	-0.017	-0.006
Total debt (log value)	0.021	-0.015
No home-ownership	-0.171	0.367
Constant	-0.845	-0.413
Correct prediction rate	81.8%	85.0%

Source: the 1992 SCF. All five imputations are used in this study.
Sample: Husbands or wives who participate in retirement plans are used among married households in which both husband and wife are working and aged between 16 and 70.

‡ p<0.001, † p<0.01, * p<0.05.

The positive and significant coefficient estimate for the spouse effect suggests that, when one spouse invests most retirement funds in stocks, another is more likely to invest most retirement funds in stocks. In addition, the spouse effect on the wife's investment decision is higher than on the husband's investment decision, which supports the argument that husbands are more self-centered while wives are more member-centered.

As expected, the level of risk tolerance has a significant positive effect on the husband's investment decision. However, it has an insignificant effect on the wife's investment decision. Compared with husbands who are willing to take average financial risks, when other things are equal, those who are willing to take above average financial risks or substantial financial risks are significantly more likely to invest most retirement funds

in stocks while those who are willing to take no financial risks are significantly less likely to do. Hanna and Chen (1996) suggested that the investment horizon should have a positive effect on the optimal portion of stocks in the portfolio. This means that, when individuals expect to retire in a later period, they have a longer time horizon for investment and, therefore, they are more likely to choose the stock option for investment yielding a higher rate of return with relatively lower risks than expected. However, the coefficient estimates for the number of years until expected retirement, which are used as a proxy for the investment time horizon, show quite a different result. Compared with those who expect to retire within 5 and 14 years, those who expect to retire within 25-34 are less likely to invest most retirement funds in stocks. The finding from this model suggests that, other things being equal, the choice of return and risks corresponds to the medium investment time horizon rather than a longer horizon. The estimated coefficient for self-employed is positive and it is significant for wives while it is not significant for husbands. This implies that, when other things are equal, self-employed wives are significantly more likely to invest most retirement funds in stocks while self-employed husbands have a slightly higher tendency. The coefficient estimate for tenure at the current job is significant and negative, which implies that those working at the current job for a long period are less likely to invest most retirement funds in stocks.

Bivariate Probit Analysis with Partial Observability

Table 3 presents estimates of the bivariate probit model with partial observability. The error terms in the two decisions are significantly positively correlated. In this case, separate estimation of the two decisions results in biased estimates of the investment decision and inefficient estimates of the participation decision.

The spouse effects on the two decisions are significant and positive for husbands and wives. For the participation decision, non-Hispanic white, large firm, liquid assets, non-liquid assets, and directly-held stocks show significant positive effects while the dummy for self-employment, the newly-hired, and participants in defined benefit plans show significant negative effects. For the investment decision, risk tolerance has a significant positive effect on the husband's decision but not on the wife's decision, while the years to retirement has a significant effect on the wife's decision but not on the husband's decision.

The results from the bivariate probit model are slightly different from the results from separate probit models of participation and investment. Some of variables are statistically significant in separate probit model but not in the bivariate probit model (e.g., tenure at current job for investment decision) while some of them are statistically not significant in separate probit model but statistically significant in the bivariate probit model (e.g., liquid asset, and directly-held stocks for investment).

Conclusion and Implications

This study focuses on the participation and the investment decisions for retirement funds in households with both spouses working, emphasizing the effects of the spouse's decisions and financial characteristics common to both spouses on the two decisions. The unique feature of this study is that the participation and the investment decisions are considered together. The retirement plans in this study are composed of IRA and DC pension plans, which are subject to each individual's decision.

A sample of two-earner families reveals that the proportion of wives who participate in retirement plans is similar to that of husbands. In addition, between husbands and wives, no significant difference is found in the proportion investing most retirement funds in stocks. Unlike previous studies on the difference in decision making between men and women, these findings imply that there is no significant gender difference in investment choice as well as in participation decision when the marital status and working status are considered.

This study examines the existence of the spouse effect on the husband's and wife's decisions to participate in retirement plans and to invest most retirement funds in stocks, considering financial characteristics common to both spouses. One spouse's participation in retirement plans significantly positively affects the other spouse's decision to participate in retirement plans and one spouse's investment of most retirement funds in stocks significantly positively affects the other spouse's decision to invest most retirement funds in stocks. The positive spouse effect on the investment decision implies that one spouse's decision influences the other spouse's decision by sharing information on investment choices and by considering the marginal tax rate.

Risk tolerance and the number of years until retirement are two important factors in the investment decision because they define on individual's response to the

expected risks related to asset allocation and the investment horizon. Estimates of the bivariate probit model, which considers the participation decision and the investment decision together to avoid sample selectivity bias, show that risk tolerance has a significant positive effect on the husband's investment decision but an insignificant effect on the wife's, while the number of years until retirement has a significant effect on the wife's investment decision but an insignificant effect on the husband's.

Implications for Policy Directions

There are several policies or legislative environments which affect the decisions to participate in retirement plans: the tax incentive, the offer rate of employer-provided pension plans, the eligibility of workers, the matching rate provided by employers, and penalty for early withdrawal. In general, policies should encourage workers, especially those who do not have enough income or assets before and after retirement, to participate in retirement plans. When the tax-incentive is higher and there are fewer restrictions, more workers can be encouraged to participate in retirement plans. Descriptive studies have shown that the offer rates differ among industries. As more firms offer employer-provided pension plans, more workers have chances to participate in these plans. Furthermore, eligibility constraints, such as tenure longer than one year and working hours, should be relaxed to induce more workers to participate in retirement plans. Additionally, a lower penalty related to early withdrawal from retirement funds encourages workers, especially those with insufficient income or assets for emergency funds, to participate in retirement plans.

Implications for Financial Planners and Educators

Related to the investment choices, individual investors should be provided more information about the long run rates of returns and related financial risks of various types of financial assets. Financial planners should stress the importance of the time horizon of the investment until expected retirement, especially for younger participants. Since this study finds significant differences in the short-sighted time horizon group (time horizons with 15-34 years), information on whether individual workers can borrow against retirement plans, how much they can borrow, and whether they can withdraw some of the funds from the retirement plans, and what penalty they have to pay, can be used to help individual investors choose their investment types. Unlike expected gender differences in investment decisions, two-earner married couple households have a positive spouse effect by

sharing the information on the investment decision. This result suggests the importance of education directed at both spouses rather than just the worker for one employer.

Implications for Research

This study uses current status of spouse's participation in retirement funds and investment in stocks to estimate the spouse effect. Because of data limitations^g, this study does not consider whether one spouse's decision has been made earlier than the other spouse's decision. With information on the length of participation in retirement plans, the spouse effect can be estimated more precisely. This study has a focus on whether individuals invest most retirement funds in stocks or not. While the results suggest that risk tolerance and time horizon until expected retirement are the most important factors, it was not possible to measure the exact share of total retirement funds invested in stocks. Hopefully, future datasets will permit more precise identification of the portfolio shares of different types of investment assets, and allow for a more definitive conclusion as to the relationship between the investment time horizon and the stock share in the portfolio.

Table 3
Bivariate Probit Analysis with Partial Observability on the Participation and Investment Decisions

	Husband		Wife	
	Participation	Investment	Participation	Investment
Spouse's participation	1.012 ‡		0.977 ‡	
Spouse's investment		1.659 ‡		1.795 ‡
Education (vs. less than high school)				
High school graduate	0.148	0.455	0.139	0.336
College drop-out	0.186	0.639	0.288	0.231
College graduate and more	0.345	0.624	0.404	0.546
Age	0.008		0.010	
Non-Hispanic white	0.291 *		-0.027	
Excellent health status	0.073		0.106	
Risk tolerance (vs. Taking average risks)				
Taking substantial risks		0.655 †		0.072
Taking above average risks		0.371 †		0.139
Taking no risks		-0.416 *		0.016
The number of years until expected retirement (vs. Years to retire in 5-14)				
Years to retire in 4		0.014		-0.261
Years to retire in 15-24		-0.039		-0.430 *
Years to retire in 25-34		-0.253		-0.500 *
Years to retire in 35 & over		-0.388		-0.407
Self-employed	-0.568 ‡	0.047	-0.479 ‡	0.232
New hire	-0.267 *		-0.523 ‡	
Tenure at the current job		-0.014		-0.014
Firm size (500 workers or more)	0.283 †		0.222 *	
Covered by union	-0.071		0.027	
Industry (vs. Services)				
Agriculture	-0.142		0.068	
Manufacturing/construction	-0.247		-0.126	
Trade	-0.119		-0.402 *	

FINANCIAL COUNSELING AND PLANNING, VOLUME 9(2), 1998

Finance	-0.198		-0.220	
Personal service	-0.311 *		-0.328 *	
Public administration	-0.237		-0.039	
White collar job	0.113	-0.171	0.108	-0.112
Marginal tax rate	0.011		0.014	
Have defined benefit plans	-0.450 ‡		-0.255 *	
Earnings (log value)	0.263		0.121	
Total family income (log value)		0.048		0.046
Liquid assets (log value)	0.055 *		0.025	
Non-liquid financial assets (log value)	0.034 †		0.014	
Directly-held stocks (log value)	0.032 †		0.024 *	
Directly-held mutual fund (log value)	0.022		0.004	
Non-financial assets (log value)	0.027		0.013	
Total debt (log value)	-0.014		0.008	
No home-ownership	-0.147		-0.176	
Constant	-4.706 ‡	-2.018 †	-3.046 *	-1.942 *
Correlation Coefficient (r)		0.789 ‡		0.871 ‡

Source: the 1992 SCF. All five imputations are used in this study.

Sample: Married households in which both husband and wife are working and aged between 16 and 70.

‡ p<0.001, † p<0.01, * p<0.05.

Appendix

Table A-1
Definitions and Sample Means of Independent Variables

Variables	Definition	Entire sample		Participants	
		Husband	Wife	Husband	Wife
<i>Demographic Characteristics</i>		Percent or Means (standard deviations)			
Age	Age in years	41.0 (10.7)	38.6 (10.2)	42.8 (9.6)	40.7 (8.7)
Education (%)					
Less than high school	Reference category	9.6	7.4	4.4	3.3
High school graduate	1 if yes; 0 otherwise	30.8	33.8	23.7	26.2
Some college	1 if yes; 0 otherwise	22.1	28.4	22.7	27.9
Bachelor's degree and more	1 if yes; 0 otherwise	37.5	30.4	49.2	42.6
Non-Hispanic white (%)	1 if yes; 0 otherwise	83.0	83.0	88.6	85.9
Health status (%)	1 if excellent; 0 otherwise	49.1	48.3	54.6	54.5
<i>Attitudinal Characteristics</i>					
Risk tolerance (%)					
Taking substantial risks	1 if yes; 0 otherwise	2.4	2.4	3.1	2.5
Taking above average risks	1 if yes; 0 otherwise	16.2	16.2	19.2	19.2
Taking average risks	Reference category	46.4	46.4	51.1	52.8
Taking no risks	1 if yes; 0 otherwise	35.0	35.0	26.6	25.5
Years until retirement (%)					
Less than 5 years	1 if yes; 0 otherwise	3.4	8.4	4.0	8.2
5-14 years	Reference category	17.5	17.7	21.1	19.2
15-24 years	1 if yes; 0 otherwise	25.9	25.0	27.6	27.2
25-34 years	1 if yes; 0 otherwise	30.3	25.5	31.0	29.6
35 and over	1 if yes; 0 otherwise	22.9	23.4	16.3	15.8
<i>Job Characteristics</i>					
Firm size ≥ 500 workers (%)	1 if yes; 0 otherwise	41.9	39.9	49.6	48.7
Covered by union (%)	1 if yes; 0 otherwise	20.7	16.5	20.0	18.7
Self-employed (%)	1 if yes; 0 otherwise	17.2	13.1	14.9	11.1
Industry (%)					
Agriculture	1 if yes; 0 otherwise	2.7	0.8	1.6	0.4
Services	Reference category	8.1	1.1	5.8	1.6
Manufacturing/Construction	1 if yes; 0 otherwise	35.5	18.2	38.0	20.1
Trade	1 if yes; 0 otherwise	15.1	16.0	13.8	11.8
Finance	1 if yes; 0 otherwise	13.4	14.1	15.2	15.1
Personal service	1 if yes; 0 otherwise	18.5	45.1	18.7	45.2
Public administration	1 if yes; 0 otherwise	6.7	4.7	6.9	5.8
New hire (%)	1 if working at current job ≤ 1 year	18.2	22.3	12.5	13.4
Tenure at the current job	Number of years working at current job	9.6 (9.0)	7.0 (7.0)	10.5 (9.1)	8.3 (7.3)
<i>Financial Characteristics</i>					
Have defined benefit plans (%)	1 if yes; 0 otherwise	31.4	26.7	31.5	28.6
Marginal tax rate (%)	15%	63.1	63.2	51.4	50.3
	28%	28.7	29.0	36.4	37.2
	31%	7.7	7.4	12.2	12.5
Earning	Annualized expected income	32.1 (13.5)	22.7 (9.9)	36.5 (14.3)	25.5 (10.5)
Total family income (\$1000)	Total annual family income in 1994 before tax	57.8 (64.3)		71.5 (81.8)	72.8 (78.9)
Liquid assets (\$1000)	Transaction accounts in \$1000s	10.8 (45.0)		16.8 (61.5)	17.1 (63.3)
Non-liquid financial assets (\$1000)	Financial assets minus liquid assets excluding directly held stocks and mutual fund	20.5 (178.6)		33.4 (248.7)	31.6 (195.0)
Directly-held stocks (\$1000)	Directly held stocks	8.4 (95.2)		14.5 (132.1)	15.0 (140.8)
Directly-held mutual fund (\$1000)	Directly held mutual fund	5.2 (45.8)		9.6 (64.3)	8.5 (49.8)
Non-financial assets (\$1000)	Non-financial assets excluding directly held stocks and mutual fund	206.1 (772.0)		275.7 (903.7)	288.9 (249.6)
Number of observation	from 5 imputations	6,075		3,532	3,076

Source: the 1992 SCF. All five imputations are used in this study. All figures reported are weighted.

Sample: Married households in which both husband and wife are working and aged between 16 and 70.

Endnotes

- a. For 38% of elderly households, Social Security benefits amount to 80% or more of household income.
- b. The amount of retirement funds can be estimated with Tobit model while the annual contribution to retirement funds, which is more appropriate concept, cannot be estimated because there is no information on the number of years in IRAs.
- c. The Survey provides categorical information on choice of investment vehicles while it does not provide the exact amount. Therefore, it is possible to analyze the fraction of retirement funds invested in stocks. However, some categories combine very different types of investment vehicles, which might make a measurement dubious.
- d. LIMDEP (1995) Version 7.0 is used for estimation.
- e. The spouse effect can be treated as endogenous or exogenous. Estimation results of a structural probit model with the endogenous spouse effect are not reported in this paper.
- f. The marginal tax rate is measured with four levels (0%, 15%, 28%, and 31%). For calculating the marginal tax rate, three assumptions are made: 1. The standard deduction is applied for all husbands and wives in the sample according to the 1992 tax rate schedule. The standard deduction for joint filing was \$6,000 and that for separate filing was \$3,000; 2. The number of dependent is assumed to be the sum of the two spouse and the number of children; 3. For the 1992 tax year, the deduction for personal exemption is phased out when the adjusted gross income exceeds a threshold amount of \$78,950. A personal exemption of \$2,300 is used for all husbands and wives regardless of their Adjusted Gross Income (AGI).
- g. In the 1992 SCF, there is a question asking the length of participation in defined contribution plans. However, there is no question asking the length of holding the IRA. Therefore, it is not possible to identify which spouse started retirement plans earlier. Therefore, this study treated spouse effect as exogenous and endogenous. But only exogenous spouse effect reported in the paper.

References

- Andrews, E. S. (1992). The growth and distribution of 401(k) plans. in *Trends in Pensions 1992*. Edited by Turner, J.A. & Beller, D. J. Washington: U.S. Department of Labor. 149-176.
- Bajtelsmit, V. L. & Bernasek, A. (1996). Why do women invest differently than men? *Financial Counseling and Planning*, 7, 1-10.
- Beam, B. T., Jr. & McFadden, J. J. (1988) *Employee Benefits* Homewood, IL: Irwin.
- Beller, D. J. & Lawrence, H. H. (1992). Trends in private pension plan coverage. Edited by Turner, J.A. & Beller, D. J. *Trends in Pensions 1992*. Washington: U.S. department of Labor. 59-64.
- Bodie, Z. (1990). Managing pension and retirement assets: An international perspective. *Journal of Financial Services Research*, 4. 419-460.
- Collins, J. H. & Wyckoff, J. H. (1988). Estimates of tax-deferred retirement savings behavior. *National Tax Journal*, 41(4). 561-572.
- Economic Report of the President*. (1997). Washington, DC: U.S. Government Printing Office.
- Economic Report of the President*. (1999). Washington, DC: U.S. Government Printing Office.
- Embrey, L. C. & Fox, J. J. (1997). Gender differences in the investment decision-making process. *Financial Counseling and Planning*, 8(2), 33-40.
- Even, W. E. & Macpherson, D. A. (1994). *Trends in individual and family pension coverage*. Mimeograph.
- Feenberg, D. & Skinner, J. (1989). Sources of IRA saving. *Tax Policy and the Economy* 3. Edited by Summers, L. H. Cambridge: The MIT Press and NBER.
- Fischer, S. (1983). Investing for the short and the long term. Edited by Bodie, Z. & Shoven, J. B. *Financial Aspects of the United States Pension System*. Chicago: University of Chicago Press. 153- 176.
- Gale, W. & Scholz, J. K. (1994). IRAs and household saving. *The American Economic Review*, 84(5). 1233-1260.
- Gustman, A. L. & Steinmeier, T. L. (1992). The stampede toward defined contribution pension plans: Fact or Fiction? *Industrial Relations*, 31(2). 361-368.
- Hanna, S & Chen, P (1996). Efficient portfolios for saving for college. *Financial Counseling and Planning*, 7, 115-122.
- Hanna, S. & Chen, P. (1997). Subjective and objective risk tolerance: Implications for optimal portfolios. *Financial Counseling and Planning*, 8(2), 17-26.
- Hawley, C. B. & Fujii, E. T. (1993). An empirical analysis of preferences for financial risk: further evidence on the Friedman-Savage model. *Journal of Post Keynesian Economics*, 16(2). 197-204.
- Hersch, J & Reagan, P (1993). *Family Pension Coverage*. Mimeograph, Department of Economics, Ohio State University.
- Hubbard, R. G. (1984). Do IRAs and Keoghs increase saving? *National Tax Journal*, 37(1). 43-54.
- Ippolito, R. A. (1995). Toward explaining the growth of defined contribution plans. *Industrial Relations*, 34(1). 1-20.
- Kennickell, A. B. & Starr-McCluer, M. (1994). Changes in family finances from 1989 to 1992: Evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin*, 80(10). 861-882.
- Lee, H. & Hanna, S. (1995). Investment portfolios and human wealth, *Financial Counseling and Planning*, 6, 147-152.
- Limdep (1995). *User's Manual Version 7.0*. by William H. Greene. New York: Econometric Software, Inc.
- Long, J. E. (1990). Marginal tax rates and IRA contributions. *National Tax Journal*, 43(2). 143-153.

- Meng, C. & Schmidt, P. (1985). On the cost of partial observability in the bivariate probit model. *International Economic Review*. 26(1). 71-85.
- Mitchell, O. S. & Rappaport, A. M. (1993). Innovations and trends in pension plan coverage, type, and design. Edited by Schmitt, R. *The Future of Pensions in the United States*. Philadelphia: University of Pennsylvania Press.
- Montalto, C. P. & Sung, J. (1996). Multiple imputation in the 1992 Survey of Consumer Finances. *Financial Counseling and Planning*. 7. 133-146.
- O'Neil, C. J. & Thompson, G. R. (1987). Participation in individual retirement accounts: An empirical investigation. *National Tax Journal*. 40(4). 617-624.
- Papke, L. E., Petersen, M. & Poterba, J. M. (1993). Did 401(k) plans replace other employer provided pensions? Edited by Wise, D. A. *Studies in the Economics of Aging*. Chicago: The University of Chicago Press. 105-142.
- Petersen, M. A. (1996). Allocation assets and Discounting cash flows: Pension plan finance. Edited by Fernandez, P. A., Turner, J. A. and Hinz, R. P. *Pensions, Savings, and Capital Markets*. U.S. Department of Labor, Pension and Welfare Benefits Administration.
- Poterba, J. M. & Wise, D. A. (1996). Individual financial decisions in retirement saving plans and the provision of resources for retirement. *National Bureau of Economic Research*. Working Paper. No. 5762.
- Rubin, P. H. & Paul, C. W. (1979). An evolutionary model of tastes for risk. *Economic Inquiry*. 17(4). 585-596.
- Samwick, A. A. & Skinner, J. (1993). *How will defined contribution pension plans affect retirement income?* Working Paper. Dartmouth, N.H.: Dartmouth College.
- Schulz, E. E. (1992, July 7) Passing the buck: in new pension plans, companies are putting the onus on workers; but few employees manage retirement funds well; some tell horror stories tips from investment pros. *Wall Street Journal*. Section A, P.1.
- Schobel, B. D. (1993). Comments: Gaps in retirement income adequacy. Edited by Schmitt, R. *The Future of Pensions in the United States*. Philadelphia: University of Pennsylvania Press.
- Shoven, J. B. & Wise, D. A. (1996). The taxation of pensions: A shelter can become a trap. *National Bureau of Economic Research*. Working paper No. 5815.
- Sung, J. (1997). A structural analysis of retirement funds in a family context: participation and investment in stocks. Unpublished doctoral dissertation, The Ohio State University.
- Sung, J. & Hanna, S. (1996). Factors related to risk tolerance. *Financial Counseling and Planning*. 7. 11-20.
- Venti, S. F. & Wise, D. A. (1986). Tax deferred accounts, constrained choice and estimation of individual saving. *Review of Economic Studies*. 53(4), 579-601.
- Venti, S. F. & Wise, D. A. (1988). The determinants of IRA contributions and the effect of limit changes. Edited by Bodie, Z., Shoven, J. B. & Wise, D. A. *Pensions in the U. S. Economy*. Chicago, IL: University of Chicago Press. 9-47.
- Venti, S. F. & Wise, D. A. (1990). Have IRAs increased U. S. saving?: Evidence from consumer expenditure surveys. *The Quarterly Journal of Economics*. 105(3). 661-698.
- U.S. General Accounting Office. (1996). *401(k) pension plans; Many take advantage of opportunity to ensure adequate retirement income*. GAO/HEHS-96-176. Washington: General Accounting Office.