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Which individuals make active investment decisions in the new Swedish pension system?

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Abstract

This paper provides a detailed examination of individuals' active participation in a new public and mandatory defined contribution pension system. The new pension system was launched in the fall of 2000 and entitles Sweden's workforce of 4.4 million individuals to invest part of their individual pension account in mutual funds. Our findings show that the system is associated with a reversed investment behavior compared with studies of 401(k) plans; that is, individuals tend to make their own investment decisions. Contrary to US studies, we also find that women and younger individuals are more likely than men and older individuals to make an active investment decision.

1 Introduction

Policymakers in many countries today are involved in reform plans for current pension systems. A common task is to strengthen the link between individuals' payroll contributions and benefits in order to create a pension system that is less sensitive to demographic changes. The central question in this process, therefore, is: How should these new pension systems be designed? While there is no simple answer to this question, empirical evidence from alternative pension systems can be used to shed light on their strengths and weaknesses.

One type of pension system that has received significant attention in many countries is a system that relies on individual accounts. In fact, many governments are now evaluating an introduction of individual accounts as a part of the public pension system. In Sweden, the public pension system has recently been reformed and the new

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defined contribution pension system (the premium pension system) is based on individual accounts. This paper adds new evidence to the literature by presenting a detailed examination of individuals' investment decisions in the new Swedish pension system.

The Swedish system encourages individuals to take an active interest in investing their own public pension account for retirement. However, some individuals lack the necessary ability to make their own investment decisions, which highlights the importance of providing an alternative investment vehicle for these individuals. Consequently, policymakers need to have a thorough understanding of individuals' interest and ability to make investment decisions in order to be able to design an appropriate investment vehicle (the default alternative) for passive individuals. Recent research has shown that the design of pension systems has important implications for individuals' participation. For instance, Madrian and Shea (2001) show that the participation rate in a 401(k) plan is much higher under automatic enrollment. They also show that participation suffers from inertia, i.e., individuals tend to perceive the default alternative as investment advice. This suggests that the design of the default alternative is crucial. In addition, Madrian and Shea (2001) study the relation between individuals' characteristics and their participation. Their findings suggest that some groups of individuals are more likely to make an active investment decision, which can also have implications for the design of the default alternative. Available research provides important insights for current pension system reforms, though it consists mainly of evaluations of US occupational pension plans, i.e., 401(k) plans. These studies can only provide limited guidelines and evidence of individuals' investment decisions, since 401(k) plans are voluntary and workers covered by these plans differ from the population in general. Hence, the literature suffers from lack of evidence from broader and alternative pension systems that cover a country's entire population.

The design of the Swedish system differs significantly from 401(k) plans. First, it is public and mandatory, i.e., the entire workforce (4.4 million individuals) is covered. In contrast, 401(k) plans typically include individuals employed at a specific company. Second, the number of investment opportunities in the Swedish system is significantly larger compared with most defined contribution systems. Individuals can choose between one and five funds from some 460 equity, fixed-income and mixed funds. In addition, the government provides a publicly managed mutual fund that serves as a default alternative for individuals who do not make an active investment decision. Compared with many 401(k) plans, the Swedish default alternative is associated with a high risk since it mainly consists of equity holdings. In contrast, the default alternative in 401(k) plans typically consists of fixed-income holdings.

In this study, we provide the first evidence of individuals' active participation in an individual account plan that covers a whole working population. Hence, our data are not contaminated with any biases since they include broad investor groups. Also, this study offers out-of-sample evidence by performing a thorough examination of individuals that took an active interest in investing pension assets in the Swedish system. Another valuable feature of this study is the access we have to detailed register-based information about each individual, e.g., level of education, employment, country of birth, family status, income, financial wealth and other private

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pension savings. This allows us to test various hypotheses and shed light on how the new pension system attracts different groups of individuals. Specifically, we use several proxies to explore how prior experience of financial markets affects individuals' active participation. We also examine the relation between personal characteristics and active investment decisions.

We find some evidence that contradicts previous US evidence. Based on the empirical evidence in studies of 401(k) plans (see, e.g., Madrian and Shea, 2001 and Choi *et al*., 2002), we would expect individuals in the Swedish system to invest in the default alternative (the publicly managed fund). Similar predictions could be made based on the behavioral literature on the status quo effect (see, e.g., Samuelsson and Zeckhauser, 1988), which in this context would suggest that it is rational for investors to stick to the default alternative due to the cost of becoming informed. However, significantly more individuals than expected were interested in making an active investment decision in the new Swedish pension system; 67% (2.9 million) of the 4.4 million individuals involved did not choose the default alternative. Thus, compared with findings of US studies, we find a reversed investment behavior. Our results also suggest a significant familiarity and learning bias in individuals' decision-making. Individuals with previous experience of the financial markets made an active investment decision to a larger extent than other individuals. Hence, this supports the findings in Huberman (2001) that familiarity breeds investments. Interestingly, our results also show, contrary to previous evidence, that women are more likely than men to make an active investment decision. This highlights the possible biased-sample problem in US studies. In addition, our results show that younger individuals are more likely to make an active investment decision than older individuals.

The rest of the paper is organized as follows. Section 2 gives an overview of the reformed Swedish pension system. In Section 3, we present our hypotheses and previous empirical evidence. Section 4 presents a detailed description of the data that are used and Section 5 presents our findings on the relation between active investment decisions and individuals' characteristics. Finally, in Section 6, we offer our conclusions.

2 The public pension system in Sweden

In 1960, Sweden introduced a public and mandatory defined benefit (DB) pension system, which subsequently proved to be financially unstable. The pressure from an aging Swedish population forced a reform of the pension system and a new public pension system was launched 1999. The new system consists of two parts: a notional defined contribution pay-as-you-go system (NDC PAYG) and an advance-funded defined contribution system (DC). The former DB system is gradually being phased out. This implies that the new system only partly covers individuals born between 1938 and 1953, while it fully covers all individuals born thereafter.

In the new pension system, employers and employees pay a total contribution of 18.5% on earnings: 16% to the NDC PAYG system and 2.5% to the DC system. Both systems are autonomous from the state budget and self-financing. However, general revenues from the state budget finance a minimum guarantee benefit for

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low-income earners and for lifetime poor. Additional contributions are transferred from the state budget to the autonomous pension system to cover, e.g., non-contributory child-care rights, individuals on sick insurance, unemployment benefits, parental leave, further education, disability pension, and military service.

2.1 The notional defined contribution pay-as-you-go system

The notional defined contribution pay-as-you-go system has the characteristics of a defined contribution system, but in a pay-as-you-go setting. One such feature is the full link between contributions and benefits, i.e., benefits are projected from contributions paid on all earnings during a lifetime. However, contributions are only recorded in individual accounts and the real contributions are financing payments to today's pensioners, as in any pay-as-you-go setting. Contributions in the individual account represent a promise of future pension and are indexed by average wage growth. There are limitations on earnings in the pension system. Contributions paid on earnings above the ceiling of about SEK 290,000 (about USD 29,000) per year do not qualify for pension rights. A second feature of the NDC PAYG system is that the annual benefit level is calculated by dividing the total contributions in the individual account by age-specific and unisex life expectancy, which also includes an expected real rate of return of 1.6% per year. Palmer (2001) provides a more detailed description of the NDC-system in particular and the Swedish pension system in general. However, this paper focuses on the advance-funded defined contribution system, which is described below.

2.2 The advance-funded defined contribution system

The contributions to the financial account system in the public and mandatory DC system (the premium pension system) are paid to an individual account once a year. These contributions are invested in the mutual funds selected by the individual. This implies that pension assets will grow at the rate of return of the chosen funds and based on annual contributions.

The accumulated capital in the individual account cannot be withdrawn until retirement age, which is flexible from the age of 61. The annuity is calculated by dividing the individual account value by unisex and age-specific life expectancy at retirement day. During the years of retirement, individuals can choose a fixed or a flexible annuity rate: fixed, by moving the assets to the state annuity provider which includes a minimum annual return of 3%; flexible, by keeping the assets in the fund reflecting the market rate of return.

The launch of the new defined contribution system in the fall of 2000 entitled the Swedish workforce, more than 4.4 million individuals, to invest pension assets in mutual funds. At this time, accumulated contributions from 1995 to 1998 were invested, or about SEK 56 billion (the price of one USD was about SEK 10). Individuals could choose to invest in one to five different mutual funds from 460 funds available in the system. This means that the Swedish system has greater latitude for choice than US 401(k) plans, which typically include fewer funds. For individuals who do not make an active investment decision, the government provides a publicly

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managed mutual fund. After the initial investment decision, all individuals may change funds free of charge.

The Swedish system is run on a clearing house model and an authority was started for this purpose, the Premium Pension Authority (PPM). This authority conducts the actual trading of the funds, aggregating all individual trades per day to one gross transaction *vis-à-vis* the fund. This implies that the fund managers are unaware of the identity of individuals investing in their fund. One advantage of this clearing house model is the possibility to negotiate the size of management fees. Fund managers that participate in the pension system are obliged to give a discount on purchased fund shares, which is distributed back to the pension savers. The discount is related to the size of invested capital undertaken by PPM in the mutual fund. This implies lower costs for the pension savers compared with direct investments in mutual funds in the traditional market. In 2002, the average net fee paid by individuals that invested in non-government owned funds was 0.55%. This is, *per se*, a low fee for individual investors, but it is remarkably low since it mainly refers to equity mutual funds.

The Premium Pension Authority prepared the individuals for their initial investment decision by collecting and providing information on all available funds in a catalog. The catalog was sent to all entitled individuals and contained information on the 460 participating mutual funds; of these, 312 were classified as equity funds, 85 as mixed funds and life-cycle funds, and 63 as fixed-income funds. The information on the funds included fees, returns for the past five years, standard deviation of returns, and the fund family. About half, or 51%, of the mutual funds, were based in Sweden. The average gross fee (before discounts) was 1.11% for equity funds, 0.70% for mixed and life-cycle funds and 0.60% for fixed-income funds. These fees are somewhat lower compared with the average fee in the Swedish mutual fund industry. Engström and Westerberg (2003) provide a more detailed description of the mutual funds that are available in the pension system.

In addition, a new publicly managed mixed fund, Premiesparfonden, was set up to invest contributions of individuals who did not make an active investment decision (the default alternative). The politically set target for this fund is to achieve an average return that will at least correspond to the average return of all other mutual funds in the system during a five-year period. In addition, the fund must be associated with lower risk than the average fund in the system. Initially, 90% of the portfolio consisted of stocks, 25% of which were Swedish and 65% foreign stocks, and the remaining 10% consisted of Swedish bonds. The Swedish default fund is therefore associated with significantly higher risk compared with many default fund alternatives in US 401(k) plans, which typically invest less in equities. The risky investment profile can have severe implications for future pension levels especially for individuals with only a few years left to retirement. On the other hand, future pensions of younger individuals who did not make an active investment decision may benefit more from Premiesparfonden than those of the same age that took an active investment decision since the gross fee for this fund is lower than that of other mixed funds in the system (0.48% compared with 0.82%). In 2002, the realized fee, after discount, paid by individuals that invested in the default alternative was remarkably low – only 0.17%.

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The new pension system will have a significant effect on the Swedish mutual fund industry. For instance, before the new system was introduced, every second Swede owned a share in a mutual fund, but by 2001 85% of all Swedes had become shareholders as a result of participation in the premium pension system. The system will also ensure high inflows of about SEK 20–30 billion in the coming years.

3 Hypotheses and previous evidence

One important feature of the new pension system in Sweden is that it allows individuals to decide how their public pension account should be invested. Investing pension assets is not an easy task for many individuals, since it is associated with a significant amount of uncertainty. Hence, the transaction costs in terms of gathering and evaluating the information can be significant.

Madrian and Shea (2001) study of a US 401(k) plan shows that uncertainty affects individuals' investment decisions. They conclude that individuals tend to perceive the default alternative as investment advice. Moreover, Choi *et al.* (2002) find that individuals follow the path of least resistance and the easiest thing to do is often nothing. In other words, individuals tend to make passive decisions. These results receive support from earlier studies of individuals' behavior. Samuelsson and Zeckhauser (1988) argue that it may be rational to stick to the status quo when transaction costs are involved. That is, the short-run benefits from an active investment decision are offset by the indirect transaction costs in terms of gathering and evaluating information on the funds. In addition, other studies, e.g., Tversky and Shafir (1992), have found that increasing complexity of a decision-making task leads to procrastination. This implies that individuals' investment decisions suffer from inertia.

Based on the results in Madrian and Shea (2001) and Choi *et al.* (2002), one would expect most individuals in the Swedish Premium Pension system to perceive the default alternative, Premiesparfonden, as investment advice. In addition, the Swedish system is more complex and includes many more investment alternatives than typical 401(k) plans. This suggests that individuals would procrastinate, and that even fewer individuals would make an active investment decision. However, this was not the case as 67% of the individuals did make an active investment decision and only 33% of the individuals ended up in the default alternative. The corresponding results in Madrian and Shea (2001) are the opposite: 29% were active investors and 71% invested in the default alternative. One possible explanation for why so many individuals made an active investment decision in Sweden could be that the government reached out to individuals in a comprehensive information campaign. Also, the new defined contribution pension system received a lot of media attention and many fund companies also very actively marketed their mutual funds during the investment period. These actions might have reduced the costs for individuals of becoming informed. Moreover, the risky default alternative is associated with a lower risk than the portfolio of the average active premium pension investor. Hence, the high risk associated with default alternative cannot explain the high participation rate.

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In this context, we examine which individuals made an active investment decision in the new Swedish pension system and why. This system allows us to examine an entire population, made up of millions of individuals with varying experiences of making investment decisions. We also have access to more detailed information about each individual, which allows us – unlike previous studies – to examine a number of new issues. Specifically, we will explore how prior experience of financial markets affects individuals' active participation. We also want to shed light on the relation between active participation and a number of personal characteristics.

3.1 Familiarity and learning

Investor behavior has become a popular topic for academic research. One important finding in this literature is that familiarity breeds investments, that is, investors have a strong preference for familiar assets (see, e.g., Coval and Moskowitz, 1999 and Huberman, 2001). When investors make investment decisions, the sense of security that comes with being familiar with certain assets is more important than the theoretical knowledge that certain assets are considered optimal. One important finding in this literature is the home bias puzzle, i.e., the fact that investors tend to hold a larger share of their wealth in domestic assets than theory suggests. Hence, the crucial point is not that the assets are geographically close to the investors, but that the investors have a cumulative information advantage of geographically close assets. Naturally, information generates a sense of security for the investor, which can explain investment behavior. Additional support can be found in the Merton (1987) model, in which rational investors prefer assets that they are better informed about.

The new pension system enabled individuals to actively select which mutual funds they would like to invest in. Many of these individuals had no prior experience of financial markets or mutual funds. Based on previous evidence, it would be reasonable to expect that familiarity and learning are also important when investors choose to enter a specific market, in this case the fund market. Hence, insecurity due to unfamiliarity might imply that some individuals refrain from making an active investment decision, while individuals with prior experience of – and therefore familiarity with – financial markets are more likely to make an active investment decision. We test this hypothesis by using five different proxies for individuals whose characteristics we believe make them more likely to be familiar with financial markets.

Our first proxy is financial wealth. We believe that individuals with greater financial wealth have more experience of financial markets, i.e., wealthier individuals are more familiar with financial markets than poorer individuals. Consequently, we can expect that wealthier individuals are more likely to make an active investment decision than others.

The second proxy for prior experience of financial markets is level of education. Individuals attending various levels of schooling in Sweden are exposed to information concerning financial markets. The implication is twofold: First, higher/longer education implies more exposure to information about financial markets. Second, there is a selection bias that implies that more successful students gain a higher/longer

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education. Hence, individuals with a higher level of education are more likely to be more familiar with financial markets than individuals with less education. For this reason, we believe that individuals with higher education make an active investment decision to a larger extent than individuals with less education. The evidence in Bayer, Bernheim, and Scholz (2002) supports this hypothesis and shows that financial education leads to higher participation rates and higher contributions to voluntary 401(k) plans, especially if the financial education is provided often and to non-highly paid employees.

Our third measure of prior experience of financial markets is employment. Specifically we examine two groups of individuals: those employed in the financial sector and those who work in the local government sector. Individuals employed in the financial sector are exposed to a significant amount of information concerning financial markets in their day-to-day work. This implies that these individuals are generally more familiar with financial markets than individuals who do not work in the financial sector and hence, more likely to make an active investment decision. The second group, employees in the local government sector were exposed to more information on mutual funds than other groups in Sweden since they received additional information to help them make a similar investment decision regarding their second pillar occupational pension scheme just a few weeks before the premium pension system was launched. The occupational pension scheme is also a DC system based on individual accounts. We believe that there is a learning bias from the first pension investment decision that will affect the investment decision in the premium pension system.

We also use income as a proxy for familiarity. Individuals with a higher income also have a greater propensity to actively save money. High-income earners, therefore, are more likely to become involved in and familiar with financial markets than low-income earners, and more inclined to make an investment decision. Interestingly, the correlation between income and financial wealth is only 0.16.

Our final proxy for familiarity is tax deductible private pension savings. Individuals in Sweden are entitled to deduct pension savings (up to SEK 18,300) from their income. Individuals who have private pension savings are more likely to care about their future pension, and also generally have prior experience of financial markets. This dummy for private pension savings therefore serves as a proxy for individuals that are more familiar with financial markets and are more likely to make an active investment decision.

3.2 Personal characteristics

Another important area of research examines the relation between investment behavior and personal characteristics. The evidence in many studies suggests that there exist behavioral differences between individuals. Based on these findings, we can expect that some personal characteristics are important when explaining individuals' active investment decisions in pension systems. Below, we present our hypotheses related to different personal characteristics. Specifically, we examine the impact of gender, family situation, age and country of birth on individuals' active investment decision-making.

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Our first hypothesis concerns how gender is related to the investment decision. Previous literature suggests that the investment behavior of men and women differs. Barber and Odean (2001), for example, show that men generally believe they possess superior investment ability and that they can beat the market. Their findings suggest that men's overconfidence leads to excessive trading which causes inferior performance. Moreover, Madrian and Shea (2001) show that 60% of men and 74% of women in a 401(k) plan chose the default alternative conditional on participation. Hence, based on these results, we could expect men to take the opportunity to influence the return on their pension account by trying to make a superior investment decision. The results in Sundén and Surette (1998) support this hypothesis and show that women are less likely than men to have DC plans in a 401(k) plan. However, occupational choice and part-time work may explain the lower participation rate found among women in that study.

The second hypothesis is related to family situation. Individuals who are inclined to think about and plan for the future naturally have a greater interest in their future pension. This means that these forward-looking individuals are more likely to make an active investment decision in the new pension system. We believe that forward-looking behavior is associated with different stages of life. Marriage is one such stage, since it often involves planning for the future with another individual. Consequently, we use marriage to characterize forward-looking individuals. Another important stage in life is parenthood, which demands a significant amount of responsibility for a child's well-being. We therefore also use parenthood as a proxy for forward-looking behavior.

Another aspect of forward-looking and planning behavior is that it typically comes with age. This would imply that young individuals would be less concerned about their future pension than older individuals. Hence, we can expect young individuals to be less likely to actively invest their pension account in funds, which is the case in Madrian and Shea (2001).

Finally, another personal characteristic that may have some bearing on participation is country of birth. Most of the information concerning the new pension system and mutual funds in Sweden is given in Swedish. This can create a language barrier and result in individuals who do not speak Swedish not participating to the same extent as other individuals.

4 Data description

This study is based on a rich dataset of the individuals who where entitled to participate in the new pension system. The data are obtained from the LINDA database, created by Statistics Sweden, the National Social Insurance Board, and the Department of Economics at Uppsala University. The LINDA database contains a representative sample of the Swedish population and includes detailed register-based information concerning characteristics of the individuals. Hence, our analysis of the 4.4 million individuals who were entitled to participate in the pension system will be based on a sample of 147,216 individuals obtained from LINDA. The characteristics refer to the information on these individuals as of December 1998. In addition, data

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concerning participation by individuals in the pension system are provided by the National Social Insurance Board and the Premium Pension Authority. Some variables contain missing values, but not more than 1% of any variable is missing.

The LINDA database includes a number of characteristics that can be classified into two groups: characteristics that provide information about the individuals' prior experience of financial markets and personal characteristics. The characteristics related to prior experience of financial market will be used to test the hypotheses related to familiarity and learning, and are:

(i) *Education*. We distinguish between four levels of education. The first level consists of individuals with a compulsory school education, the second level consists of individuals with an upper secondary school education, the third level comprises individuals that have attended university, and the fourth level is composed of individuals with a university degree.
(ii) *Employment*. We divide individuals into three groups: individuals that work in the financial sector, local government sector and others.
(iii) *Income*. We have data on individuals' taxable income in 1998.
(iv) *Financial Wealth*. We use detailed information on individuals' financial wealth in 1999. Financial wealth includes bank deposits, stock holdings, fixed-income securities, and mutual funds.
(v) *Savings*. This is a dummy variable, where 1 represents individuals that have tax deductible private pension savings in 1998 and 0 represents individuals that do not have other pension savings in 1998.

The personal characteristics are:

(i) *Age*. The individuals in the sample range in age from 18 to 62.
(ii) *Gender*. We distinguish between men and women in the analysis. The variable is a dummy, where women are equal to 1 and men are equal to 0.
(iii) *Family*. We have two dummy variables for family. The first captures if the individuals have children; individuals that have children are equal to 1 and individuals that have no children are equal to 0. The second dummy captures if the individuals are married; married individuals are equal to 1 and unmarried individuals are equal to 0.
(iv) *Country of Birth*. We distinguish between individuals born in Sweden, in the other Nordic countries, and elsewhere.

Correlation between these characteristics is generally low (about 0.1). We observe the highest correlation coefficient (0.37) for age and marital status. This implies that multicollinearity does not significantly affect our estimated coefficients.

We present the distribution of the individuals' characteristics in our representative sample of the Swedish workforce in Table 1. The table shows that there were almost as many women as men in the population, which reflects the relatively high participation among women in the Swedish labor force. About 47% of the population is married, and more than 35% have children less than 17 years of age. A large proportion of people in Swedish workforce is born in Sweden (about 88%). The table

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Table 1. *Distribution of individuals' characteristics*

	Age									
Category	18–22	23–27	28–32	33–37	38–42	43–47	48–52	53–57	58–62	All
Women	0.9	4.8	6.1	6.8	6.1	6.1	6.3	6.6	4.8	48.5
Men	1.1	5.0	6.6	7.3	6.3	6.4	6.6	7.1	5.1	51.5
Child	0.0	0.6	3.5	7.3	8.0	7.8	5.3	2.4	0.5	35.4
No child	2.0	9.2	9.3	6.8	4.4	4.7	7.6	11.3	9.3	64.6
Married	0.0	0.8	3.4	5.8	6.3	7.2	8.1	8.9	6.7	47.2
Unmarried	2.0	9.0	9.4	8.3	6.0	5.3	4.8	4.8	3.2	52.8
Born in Sweden	1.9	9.1	11.4	12.3	10.6	10.7	11.2	12.4	8.8	88.4
Other Nord. count.	0.0	0.1	0.3	0.4	0.5	0.6	0.7	0.7	0.5	3.8
Born elsewhere	0.1	0.6	1.1	1.3	1.3	1.2	1.0	0.7	0.5	7.8
Compulsory school	0.5	1.0	1.6	1.9	2.1	2.6	2.9	4.0	3.6	20.2
Upper secondary sch.	1.5	6.6	7.2	7.9	6.5	5.8	6.0	5.9	4.0	51.4
University	0.0	1.8	2.6	2.5	2.1	2.1	1.9	1.6	1.0	15.6
University degree	0.0	0.4	1.4	1.7	1.7	1.9	2.1	2.3	1.3	12.8
Financial sector	0.0	0.1	0.2	0.3	0.2	0.2	0.3	0.3	0.2	1.8
Local govern, sector	0.3	1.9	2.4	3.0	3.3	3.6	3.8	3.8	2.6	24.7
Other sectors	1.7	7.9	10.1	10.8	8.9	8.7	8.8	9.6	7.0	73.5
Income, SEK 000s										
0–120	1.7	4.6	3.2	2.7	2.1	1.6	1.5	1.5	1.1	20.0
120–166	0.2	2.2	3.0	3.2	2.7	2.3	2.2	2.3	1.9	20.0
166–203	0.1	1.6	2.7	2.8	2.5	2.7	2.7	2.8	2.1	20.0
203–253	0.0	1.0	2.4	2.9	2.5	2.8	3.0	3.2	2.2	20.0
253–	0.0	0.3	1.5	2.6	2.7	3.0	3.5	3.9	2.5	20.0
Financial wealth	1.2	5.6	7.5	8.4	7.6	8.0	8.9	10.3	7.8	65.3
No financial wealth	0.8	4.2	5.2	5.7	4.8	4.5	4.0	3.4	2.1	34.7
Private pens. saving	0.1	1.6	3.8	5.1	4.7	5.0	5.3	5.8	3.9	35.3
No private pens. sav.	1.9	8.2	9.0	9.0	7.7	7.5	7.6	7.9	5.9	64.7

Notes: The table shows the distribution of characteristics of individuals entitled to participate in the pension system in 2000. Each characteristic is divided by age categories. The characteristics are: gender, children, marital status, country of birth, education, employment in financial sector, employment in local government sector, income, financial wealth, private pension savings, and age (see definitions in section 4).

also shows that Swedes are relatively highly educated; about 28 % of the population has a university education.

5 Empirical results

In this section, we present evidence on the interest that the individuals showed in taking responsibility for investing their own pension assets. We begin with an examination of the binary relation between individuals' characteristics and an active investment decision. Then, we evaluate the relation in a multiple setting and relate the results to our empirical hypotheses.

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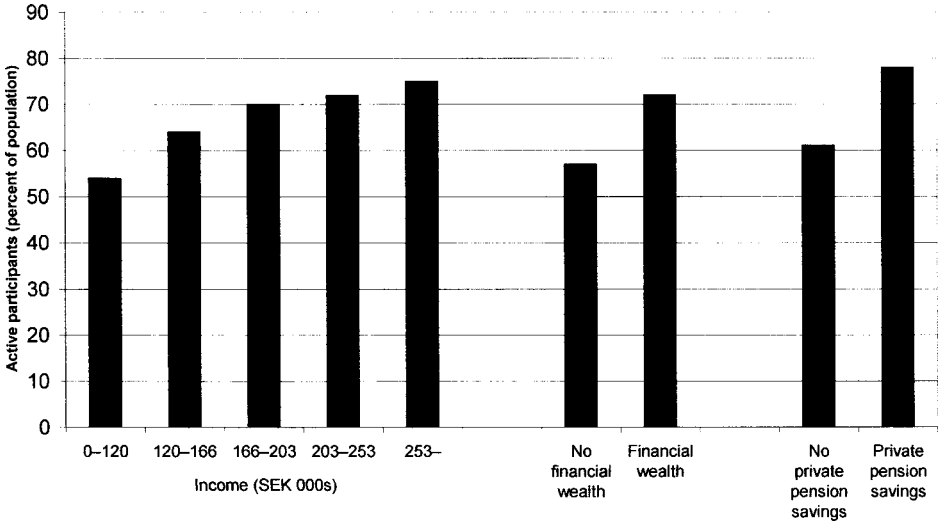

Figure 1. Active participation, income, financial wealth, and private pension savings
Notes: This figure shows how the share of individuals that made an active investment decision is related to income, financial wealth, and private pension savings. Income levels are divided into quintiles and are expressed in thousands of SEK per year.

5.1 Descriptive statistics

Figures 1 and 2 show how the share of individuals that made an active investment decision is related to various proxies for knowledge of or familiarity with mutual funds. In Figure 1, we see that on average 72% of the individuals with financial wealth were active, compared with 57% of individuals with no financial wealth. The same figure also shows that 75% of the individuals in the top income quintile made an active investment decision, whereas only 54% of the individuals in the lowest income quintile did so. Hence, there is a clear positive relation between income and an active investment decision. Figure 1 also show that individuals that have prior pension savings are more likely than others to make an active investment decision, and that 78% of individuals with private pension savings made an active investment decision, while the corresponding figure for individuals without private pension savings is 61%. In Figure 2, we see that more education increases the likelihood of individuals making an active investment decision. About 60% of the individuals with a compulsory school education made an active investment decision, whereas the corresponding participation rate for individuals with a university degree is 72%. We can also see that employment has some implications for individuals' decision-making, especially for individuals who work in the financial sector. About 84% financial sector employees made an active investment decision, while the corresponding figure for individuals employed outside the financial sector was 67%. Individuals employed in the local government sector were also more active than others, 68% compared with 66%. These results are consistent with our hypothesis that individuals with previous experience of financial markets made an active investment decision to a larger extent than others.

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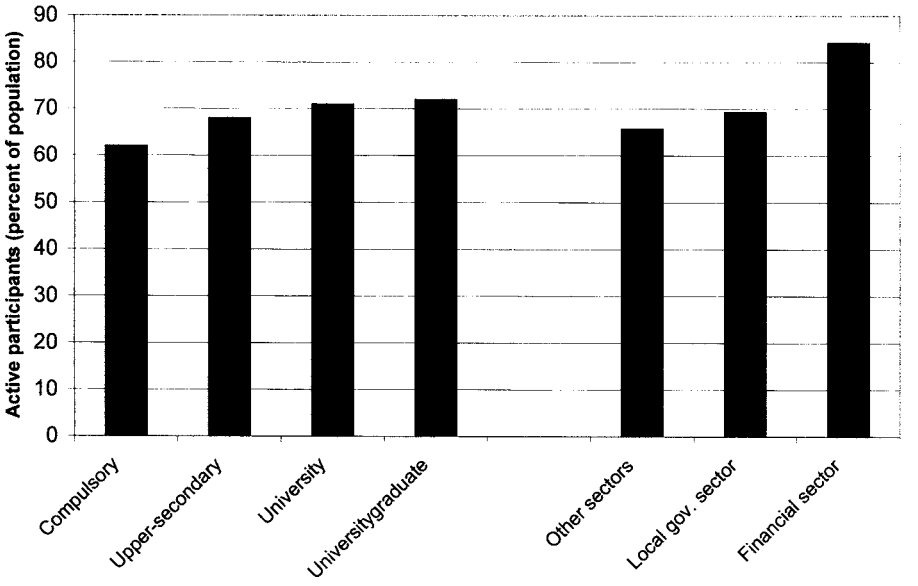

Figure 2. Active participation, education, and employment
Notes: This figure shows how the share of individuals that made an active investment decision is related to education, employment in financial sector, and employment in local government sector.

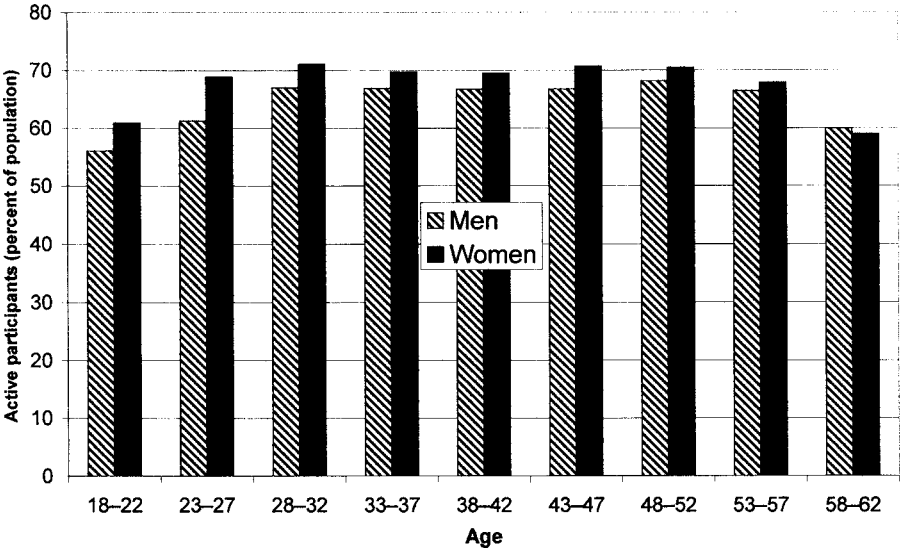

Figure 3. Age, gender, and active participation
Notes: This figure shows how the share of individuals that made an active investment decision is related to age and gender.

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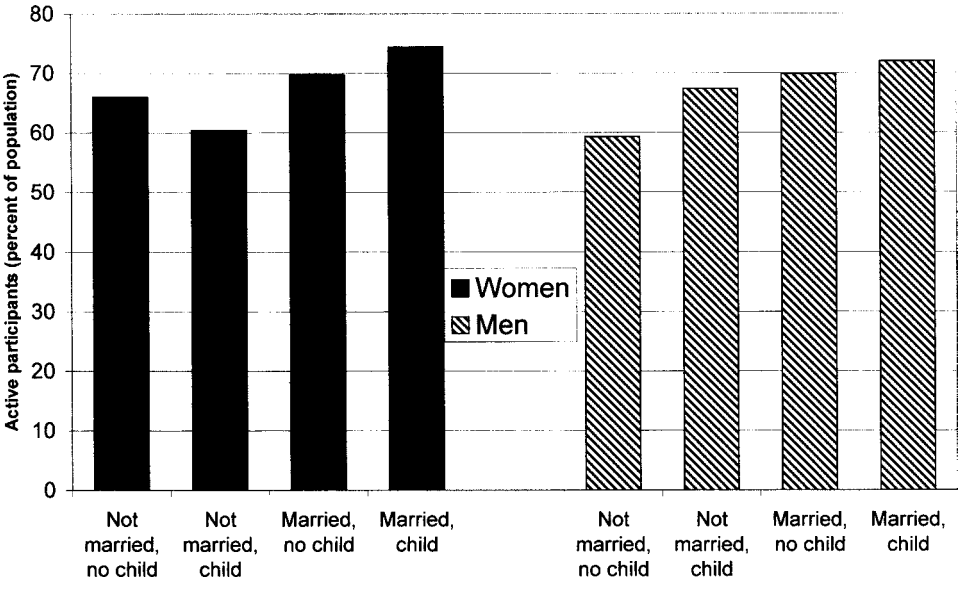

Figure 4. Active participation and family situation
Notes: This figure shows how the share of individuals that made an active investment decision is related to family situation, i.e., if they are married and have children.

Figures 3–5 show how the share of active decision-making is related to various personal characteristics. On average, about 68 % of all women made an active investment decision, compared with 66 % for men. Figure 3 shows that women in general were more active than men in almost all age categories. We also see that the youngest and the oldest age categories were less likely to make an active investment decision compared with other cohorts. Furthermore, Figure 4 shows the impact that marriage and children have on the tendency to make an active investment decision; 72 % of married men with children made an active investment decision compared with 74 % of married women with children. Unmarried men with children were much more likely to make an active investment decision than unmarried men without children: 67 % compared with 59 %. The pattern, however, is not the same for unmarried women; 66 % of the unmarried women without children made an investment decision, while the corresponding figure for unmarried women with children is 60 %. Finally, Figure 5 shows how country of birth is related to active investment decision-making. We see that 69 % of the individuals born in Sweden made an active investment decision, compared with 61 % of individuals born in the other Nordic countries and 49 % for those born elsewhere.

5.2 Multiple regressions

Our descriptive statistics indicate that we can find evidence to support our hypotheses of individuals' investment behavior. However, we present a more thorough evaluation of our hypotheses in the following sections. This evaluation is done by

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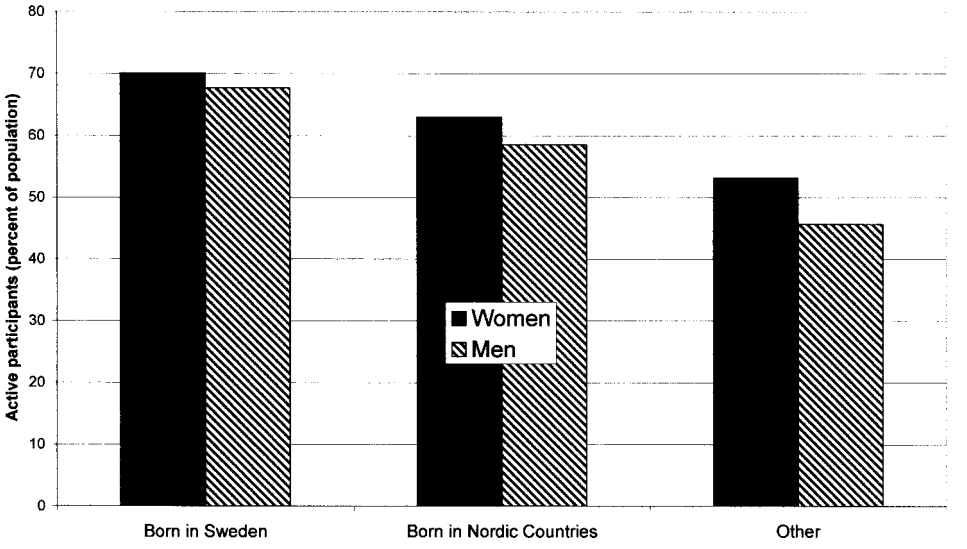

Figure 5. Active participation, gender and country of birth
Notes: This figure shows how the share of individuals that made an active investment decision is related to gender and country of birth.

employing a binary choice logit model, where an active decision is 1 and a passive decision is 0. That is, we analyze the relation between individuals' investment decisions and individuals' characteristics in a multiple setting. The model used is

$$y^* = \mathbf{x}'\beta + \varepsilon \qquad \text{where } y = 1 \text{ if } y^* > 0,\ y = 0 \text{ otherwise} \tag{1}$$

The model describes the probability of making an active investment decision, where the value of the latent variable y^* is dependent upon the individuals' characteristics, $\mathbf{x}'$ a vector of individuals' characteristics and β is a vector of the estimated sensitivity to each characteristic, respectively. The model is also dependent upon unobserved characteristics, ε which is assumed to have a logistic distribution.

In order to estimate the impact of individuals' characteristics on the investment decision we compute odds ratios. The odds ratio is defined as the relation between odds, and odds describe the probability of belonging to category 1 compared to the probability of belonging to category 2. Consequently, an odds equal to 1 means that the probability of belonging to each category is equal.

5.2.1 Familiarity and learning

Several studies have showed that familiarity breeds investments, and hence affects investment decisions. That is, investors tend to invest in financial assets that they know well. Our results from the evaluation of the binary relation between investment decision and individuals' characteristics support previous findings, since we find a strong relation between individuals' past experience and their interest in making an active investment decision. This section extends this analysis through an examination

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Table 2. *Active participation in a multiple setting*

Category	No. obs.	Odds ratio	Std error
Financial wealth	146716	1.0173	0.0033
Financial wealth (sq.)	146716	0.99996	0.0000
Upper secondary sch.	145596	1.2216	0.0185
University	145596	1.2656	0.0260
University degree	145596	1.1152	0.0275
Employment, financial sec.	147216	1.9164	0.1078
Employment, local gover.	147216	1.0553	0.0157
Income	147216	1.2172	0.0173
Pension savings	147216	1.8320	0.0255
Gender	147216	1.1889	0.0197
Marital status	147216	1.5744	0.0287
Child	147216	1.0203	0.0152
Gender*Marital status	147216	0.9167	0.0218
Age, 18–22	147216	1.1926	0.0532
Age, 23–27	147216	1.2986	0.0351
Age, 28–32	147216	1.2734	0.0307
Age, 33–37	147216	1.0780	0.0245
Age, 43–47	147216	0.9735	0.0228
Age, 48–52	147216	0.9446	0.0225
Age, 53–57	147216	0.8149	0.0200
Age, 58–62	147216	0.5914	0.0160
Born in other Nordic count.	146323	0.8270	0.0242
Born elsewhere	146323	0.5404	0.0120

Notes: The table shows the results from multiple logit regression of participation-dummy on individuals' characteristics. We report number of observations, odds ratios, and standard error of the odds ratio. The characteristics are: financial wealth, education (compulsory school education is reference group), employment in financial sector, employment in local government sector, income, private pension savings, gender, marital status, children, age in five-year categories (38–42 years is reference group), and country of birth (individuals born in Sweden is reference group) (see definitions in section 4). The number of observations in the multiple regression analysis is 145,474 individuals.

of the impact that past experience has on investment decisions by controlling for a number of other characteristics (the results are presented in Table 2).

Our first proxy for individuals' experience of financial markets is financial wealth. The result of the multiple regression analysis shows a positive relation between individuals' financial wealth and an active investment decision. The odds of individuals with financial wealth making an active investment decision are 1.02 times greater than for individuals with no financial wealth. There is also a small but negative sign on squared financial wealth, which indicates that the wealthiest individuals were less likely to make an active investment decision.

Education is the second proxy for individuals' experience of financial markets. The odds ratios in Table 2 show that individuals with higher education have a higher propensity to make an active investment decision. For instance, for individuals

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that have attended university the odds of making an active investment decision are 1.27 times higher than for individuals with only a compulsory school education. However, compared with the evaluation of the binary relation (see Figure 2), the multiple regression results show that university graduates are less likely to make an active investment decision than individuals who have attended university but are not graduates. Hence, factors other than education explain why individuals with a university degree make more active investment decisions than individuals without a degree.

Our third proxy for individuals' experience of financial markets is employment. Specifically, we examine individuals employed in the financial sector or in the local government sector. We find a significant difference in the willingness of individuals to make an active investment decision when we examine individuals that are employed in the financial sector. These individuals are more likely to make an active investment decision than individuals employed in other sectors; the odds are 1.92 times higher than for individuals employed in other sectors. Moreover, the local government sector employees are more active investors than other individuals. The odds of individuals employed in the local government sector making an active investment decision are 1.06 times greater than in other sectors. This suggests that the experience that these individuals gained from the very similar occupational pension investment decision that took place only weeks before the premium pension system was launched increased their knowledge of investing in mutual funds and hence the likelihood of their making an active investment decision.

Income is our fourth proxy for individuals' prior experience of financial markets. The result in Table 2 shows a positive relation between income and an active investment decision, i.e., high-income earners are more active than low-income earners. The odds of high-income earners making an active investment decision are 1.22 times greater than for low-income earners. This result is consistent with the evidence that we presented in the descriptive statistics.

Our fifth proxy for individuals' experience of financial markets is private pension savings. This dummy variable indicates if the individuals have tax-deferred pension savings in third-pillar private pension schemes. About 35% of the individuals who were entitled to participate in the new pension system had tax-deferred pension savings and clearly these individuals have experience of financial markets. Our results show that past experience of financial markets in terms of private pension savings also increased the probability of an active investment decision when it is evaluated in a multiple setting. The odds are 1.83 times higher for individuals with tax-deferred pension savings making an active investment decision compared with others.

5.2.2 Personal characteristics

Today there exist a number of studies that examine the relation between personal characteristics and investment behavior. One significant drawback of these studies is that the empirical results obtained suffer from selection bias, since the samples in these studies differ from the population in general. For instance, if some individuals

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are more engaged in financial savings the empirical results will not be representative of the entire population. Hence, it is therefore important to know which individuals enter the financial markets when examining investment behavior of individuals that are active in the financial markets. This section extends the results, which were presented in the descriptive statistics, on how personal characteristics can explain investment behavior by controlling for a number of other characteristics.

One important characteristic often examined in studies of individuals' investment behavior is gender. For instance, Sundén and Surette (1998) studied 4,299 households in 1995 and showed that 40.1% of men and 32.2% of women have DC plans. The higher participation among men is probably an effect of coverage and eligibility criteria of 401(k) plans. Moreover, Madrian and Shea (2001) show that the default rate, i.e., investing in the default alternative, is larger for women than men in a 401(k) plan (74% and 60%, respectively). In contrast, we find that women were more active decision-makers than men in the Swedish pension system. In the descriptive statistics, we showed that about 68% of all women made an active investment decision compared with 66% of men. Moreover, Table 2 shows that women are more likely than men to make an active investment decision when we evaluate it in a multiple setting. The odds are 1.19 times higher for women of making an active investment decision. Hence, this difference between men and women cannot be explained by other characteristics of the individuals such as income, wealth, age, etc.

Another characteristic that has shown to be important is marital status. Several studies examining gender differences also find that these differences tend to be less significant for married individuals, due to influential impact. For instance, Barber and Odean (2001) examine risk preferences for single and married women and men and find that single women are the most risk-averse group, single men are the most risk-loving group, and married couples' risk preference lies somewhere between that of the single groups. However, Sundén and Surette (1998) find contradictory evidence. Their results show that married women are less likely than both single women and men to have DC plans in a 401(k) plan. Our findings show that marriage has a significant impact on individuals' interest in making an active investment decision in the new pension system. The odds of married individuals taking an active investment decision are 1.57 times greater than unmarried individuals. However, we do not find significant evidence to suggest that individuals who have children are more active than others, which the results presented in the descriptive statistics indicated.

Another commonly examined personal characteristic is age. For instance, Madrian and Shea (2001) find a strong relation between individuals' age and their investment decision. Their results indicate that younger individuals tend to perceive the default alternative as investment advice to a much greater extent than older individuals when they examine a US 401(k) plan. This default rate conditional on participation is 90.6% for the youngest group, but only 43.2% for the oldest group. Basset, Fleming, and Rodrigues (1998) also show that participation in US 401(k) plans increases with age. In contrast to these studies, we find that younger individuals were more active than older individuals when we evaluate the individuals' investment decision

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in a multiple setting. Table 2 shows a clear negative relation between age and an active investment decision, which offers a different picture than the results presented in the descriptive statistics. Odds ratios are generally greater for younger individuals. For instance, the odds of individuals aged 23–27 taking an active investment decision are 1.30 times higher than for 38–42 year olds. The oldest individuals, aged 58–62, are significantly less likely to make an active investment decision. This may be explained by the fact that the oldest individuals only had a small share of their contributions to invest, due to the rules of transition from the former to the new pension system. Hence, our result is similar to the findings of Munnell, Sundén, and Taylor (2000), which show that individuals with a planning period of less than two years are less likely to participate in a 401(k) plan than individuals with a longer planning period.

The final personal characteristic we examine is country of birth, which has not been as extensively studied in the literature as the other personal characteristics. Similar to the results presented in the descriptive statistics, the multiple regression shows that individuals born in Sweden made an active investment decision to a larger extent than individuals born in the other Nordic countries. The odds of individuals born in the other Nordic countries making an active investment decision are 0.83 to 1 compared with individuals born in Sweden. Lowest participation is found among individuals born outside the Nordic countries, for whom the corresponding odds are 0.54. Our results suggest the presence of a language bias, i.e., language barriers might explain why some individuals did not make an active investment decision. A similar language bias among Finnish investors has been found by Grinblatt and Keloharju (2001), who show a strong relation between the language in which Finnish firms report in and the investors these firms attract. More specifically, they find that investors prefer to hold Finnish companies that report in their native tongue.

6 Conclusions

This paper examines the defined contribution pension system recently introduced in Sweden. Specifically, we study individuals' active pension investment decisions. Our examination is based on a representative sample (150,000 individuals) of the Swedish workforce and the results both contradict and confirm some of the results of similar US studies. One potential explanation for the different findings in this study is that US studies are based on samples which are not representative of the entire workforce.

Our findings suggest that learning and familiarity significantly affect individuals' decision-making. Individuals who have prior experience and are more familiar with financial markets, e.g., individuals with financial wealth, a higher education, higher income, individuals who work in the financial sector or in the local government sector or have private pension savings are more likely to make an active investment decision than other individuals. Hence, our overall result is consistent with the psychology literature that has previously showed that increasing complexity in decision-making leads to procrastination. It is important therefore that policymakers provide individuals with financial education when they give them the responsibility of making their own investment decisions that will affect their future pension. Moreover, the

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massive information campaign financed by the PPM, and marketing efforts by fund companies, in combination with extensive media attention implied lower information costs to the individual. As a result, decision-making was more active than findings of US studies predicted. In addition, the information campaign reduced the cost to Swedish-speaking individuals of becoming informed more than to other individuals since more information was available in Swedish. This might explain our findings of a negative impact of country of birth on active participation rate. That is, individuals born in Sweden are more likely to make an active investment decision than individuals born in the other Nordic countries, who are more likely to make an active investment decision than individuals of other nationalities. This suggests that a language barrier is present, which might be the result of the relevant information only being available in Swedish.

Our findings contradict those of US studies of participation in 401(k) systems, possibly due to the fact that this is the first study that covers a representative population. This study finds that women make active investment decisions to a larger extent than men. Interestingly, the portfolio of the average active female investor is associated with a higher risk compared with the risky default alternative. Hence, risk aversion can not explain the high participation rate. Our results also show that younger individuals are more interested than older individuals in making an active investment decision, which differs from US evidence. Specifically, they do not invest in or perceive the default alternative as investment advice as US findings would suggest. Lower activity among older individuals may be explained by the fact that they only had a small share of their contributions to invest due to the transition rules that applied. This finding is in line with previous findings which show that individuals with a shorter planning period are less likely to participate than individuals with a longer planning period. Another personal characteristic that seems to affect investment decision-making is family situation, in particular marriage. Our results show that married individuals make more active investment decisions. This indicates the existence of a relation between forward-looking behavior and individuals' willingness to make an active investment decision.

This paper adds important evidence to the current public policy debate regarding privatization of social security. The findings show that active participation in the new Swedish pension system is related to several characteristics of the individual and that financial education can significantly increase participation rates. These results can therefore serve as input in the design of default alternatives and play a significant role in public pension reform decisions. Future research needs to evaluate the performance of individuals' investment decisions and how pension systems should be designed to promote better savings outcomes.

References

Barber, Brad and Odean, Terence (2001) Boys will be Boys: Overconfidence, and Common Stock Investment. *Quarterly Journal of Economics*, **116**: 261–292.

Basset, William F., Fleming, Michael J., and Rodrigues, Anthony P. (1998) How Workers Use 401(k) Plans: The Participation, Contribution and Withdrawal Decisions. *National Tax Journal*, **51**: 236–289.

https://doi.org/10.1017/S1474747203001331 Published online by Cambridge University Press

Bayer, Patrick J., Bernheim, Douglas B., and Scholz, John Karl (1996) The Effects of Financial Education in the Workplace: Evidence from a Survey of Employers. WBER Working paper 5655.

Choi, James J., Labison, David, Madrian, Birgitte C., and Metrick, Andrew (2002) Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance. In Poterba, James M. (ed.), *Tax Policy and the Economy*. Cambridge, MA: MIT Press.

Coval, Joshua D. and Moskowitz, Tobias J. (1999) Home Bias at Home: Local Equity Preference in Domestic Portfolios. *Journal of Finance*, **54**: 2045–2073.

Engström, Stefan and Westerberg, Anna (2003) Information Costs and Mutual Fund Flows, Working paper, Stockholm School of Economics.

Grinblatt, Mark and Keloharju, Matti (2001) How Distance, Language, and Culture Influence Stockholdings and Trades. *Journal of Finance*, **56**: 1053–1073.

Huberman, Gur (2001) Familiarity Breeds Investment. *Review of Financial Studies*, **14**: 659–680.

Madrian, Birgitte C. and Shea, Dennis F. (2001) The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior. *Quarterly Journal of Economics*, **116**: 1149–1187.

Merton, Robert C. (1987) A Simple Model of Capital Market Equilibrium with Incomplete Information. *Journal of Finance*, **42**: 483–510.

Munnell, Alica H., Sundén, Annika, and Taylor, Catherine (2000) What Determines 401(k) Participation and Contributions?, Working paper 2002-12, Centre for Retirement Research at Boston College.

Palmer, Edward (2002) Swedish Pension Reform. How Did it Evolve and What Does It Mean for the Future? In Feldstein, Martin and Siebert, Horst (eds), *Social Security Pension Reform in Europe*. Chicago: University of Chicago Press.

Samuelsson, William and Zeckhauser, Richard (1988) Status Quo Bias in Decision Making. *Journal of Risk and Uncertainty*, **1**: 7–59.

Sundén, Annika and Surette, Brian J. (1998) Gender Difference in the Allocation of Assets in Retirement Savings Plans. *American Economic Review*, **88**: 207–211.

Tversky, Amos and Shafir, Eldar (1992) Choice under Conflict: The Dynamics of Deferred Decisions. *Psychological Science*, **3**: 358–361.

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