WORKING PAPER F-2005-02

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April, 2005

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The authors thank the Danish Social Science Research Council for financial support. We appreciate useful comments from Magnus Dahlquist, Lars Noren, Andrei Siminov, Per Strömberg, Helena Skyt Nielsen, Michael Svarer, and Jesper Bagger, as well as from participants at the Symposium on Asset Allocation at Copenhagen Business School, the Arne Ryde workshop at Lund University, and seminars at University of Aarhus, Aarhus School of Business, and Stockholm Institute for Financial Research. The usual disclaimer applies. We are grateful to Anne Keller and Maria K. Humlum for competent research assistance.

Do More Economists Hold Stocks?

Abstract: A unique data set enables us to test the hypothesis that more economists than otherwise identical investors hold stocks due to informational advantages. We confirm that economists have a significantly higher probability of participating in the stock market than investors with any other education, even when controlling for several background characteristics. We make use of a large register-based panel data set containing detailed information on the educational attainments and various financial and socioeconomic variables. We model the stock market participation decision by the probit model. The results are shown to be highly robust to various assumptions, including unobserved individual heterogeneity.

Keywords: Investor Education; Portfolio Choice; Stock Market Participation.

JEL Classifications: G11; I29; J24.

1 Introduction

Surprisingly large fractions of households do not invest in stocks. In the US, 51% of the households did not hold stocks in 1998 (Hong, Kubik & Stein, 2004) and 76% of the European households did not hold stocks in 1998 (Guiso & Jappelli, 2003). In the Danish data set we analyze, 72% of the investors did not invest in stocks in 2001.

It is puzzling why so many households choose not to participate in the stock market. In fact, standard portfolio models imply that investors should hold portfolios comprising *all* assets: In the standard model with no trading costs and investors having constant relative risk-aversion, all investors hold the same portfolio of risky assets (the "market portfolio") which includes *all* the risky assets in the economy. Household portfolio heterogeneity then boils down to heterogeneity with respect to how much is invested in the risk-free asset and the risky market portfolio, respectively (depending on the investor's risk aversion) and heterogeneity with respect to the correlation of non-financial income with the return on the portfolio of risky assets (Viceira, 2001). It is only under the extreme and unlikely condition that the investor is either infinitely risk averse or the investor's non-financial income is highly volatile and perfectly correlated with stock returns that the investor chooses not to hold stocks. Empirically, however, it turns out that stock market participation is strongly correlated with income, wealth, and – important for the message of this paper – the level of education of the investor (Mankiw & Zeldes, 1991; Halliassos & Bertaut, 1995; Bertaut, 1998; and Guiso & Jappelli, 2003).

One explanation for the stock market participation puzzle is that there are costs associated with stock market investments. Such costs include both the monetary costs associated with investments in the stock market, but also costs reflecting time spent on understanding risk-return trade-offs and information about stock markets all-in-all (Vissing-Jørgensen, 2004; Peress, 2004; and Guiso & Jappelli, 2003). It follows that if some agents are better able to gather and understand information about stock markets and investment opportunities, their effective costs of stock market participation are lower and these investors consequently have a higher probability of participating in the stock market.

We investigate whether formal education in economics is associated with higher stock market participation. For this reason, the underlying hypothesis we pursue in this paper is related to the work of Bernheim & Garrett (2003) and Bernheim, Garrett & Maki (2001). Bernheim & Garrett (2003) show that financial education in the workplace significantly increases the probability of savings in general, whereas Bernheim *et al.* (2001) report that households who

were exposed to financial curricula during high school have higher savings rates than others. However, there are a number of important differences to these papers. First, we have much more detailed information about educational choices and can thus split up investors along different education dimensions. Second, we focus on the stock market participation puzzle and not savings in general. Finally, we do not have to resort to survey data, but use very reliable register-based data.

Learning about financial markets and the risk-return trade-off can be achieved by studying economics but learning can also take place more informally if the investor learns from peers. In this sense, our paper is related to the recent literature on social interaction and stock market participation. Hong *et al.* (2004) show that households that socially interact with their neighbors or attend church are more likely to invest in the stock market and Duflo & Saez (2002) demonstrate that the decision of workers to participate in retirement plans is influenced by the choices of their colleagues.

It should also be noted that since we investigate the presumption that investors with economics insights are more likely to invest in the stock market, our paper is related to the studies that show that investor information matters for portfolio choice in the sense of for instance Coval & Moskowitz (1999, 2001) and Grinblatt & Keloharju (2000) who show that investors invest in the stocks they are mostly familiar with.

There are several reasons why it is important to understand the degree of stock market participation in more detail. For instance, it has been argued that the stock market participation puzzle can help understand the equity premium puzzle (Basak & Cuoco, 1998 and Guvenen, 2003). Furthermore, the consumption patterns of stock holders and non-stock holders differ (Mankiw & Zeldes, 1991), i.e. the degree of non-participation on the stock market has consequences for the distribution of welfare in the economy. Finally, the public opinion on stock-related issues most likely depends upon the degree of stock market participation amongst individuals and hereby the development of the stock market culture.

We investigate whether investors with better knowledge about investment opportunities have a higher probability of participating in the stock market. In particular, our hypothesis is that investors who are economists have higher probabilities of stock market participation when controlling for other factors likely to affect the decision to enter the stock market. In order to investigate our main hypothesis, we analyze a unique data set that provides us with very detailed information on investor education and stock market participation choices, as well as a host of detailed control variables. More specifically, we use a representative sample of 10% of

the Danish population for which we have annual data during the 5-year period 1997-2001. In total, we have in excess of 1.87 million observations of individual investor decisions. In addition to the sheer magnitude of the number of investors, there are several other advantages of this data set: (*i*) We have detailed information on the educational choices of investors, i.e. we can provide more detailed information about the relation between stock market participation choices and education than what is found in the literature; see for instance Mankiw & Zeldes (1991), Halliassos & Bertaut (1995), Guiso & Jappelli (2003), and Vissing-Jørgensen (2004). (*ii*) The data contain the total value of many of the assets that investors have access to; most prominently the taxable property value. Many existing studies of stock market participation do not have data on the value of real estate. Yet, controlling for real estate is important, as real estate is the most important asset (in terms of value) for many investors apart from their human capital. (*iii*) We have a large number of socioeconomic control variables enabling us to focus on the effect of educational choices on stock market participation behavior after accounting for these potentially important background characteristics.

We investigate stock market participation using a probit model, and our results are astonishingly clear: Controlling for background characteristics, the probability of owning stocks increases substantially if the investor has an economics education. This effect shows up in all our robustness checks, and is both economically and statistically important. There is no other educational background that gives rise to as large an increase in the probability of stock market participation as being an economist.

Our results are consistent with the view that economists have a higher probability of participating in the stock market because they have more knowledge about investment opportunities and risk-return trade-offs. In principle, there are other reasons that could account for our results. For instance, economists could be less risk-averse or more optimistic. In order to evaluate whether unobserved characteristics such as ability, risk preferences, or tastes affect our overall results, we also estimate a model where we allow for individual heterogeneity by including parameterized random individual effects to the basic probit model. Even when controlling for individual heterogeneity, there is a higher probability of owning stocks if the investor has a formal education in economics.

We extend our basic probit analyses in a number of ways in order to make sure that our results are robust. For instance, we investigate stratified subsamples comprising highly educated investors only (to make sure that differences in the levels of investor education do not blur the results) and subsamples comprising investors with high incomes only. We confirm

for both the group of highly-educated investors and the group of high-income investors that the probability of owning stocks is higher for investors with an economics education. We also verify that the amount of information about economics matters in the sense that investors with a long economics education have an even higher probability of participating in the stock market than investors with a shorter economics education.

Before initiating the main part of the paper, it should be mentioned that the rich data set allows us to draw a number of conclusions in addition to our main result that more economists hold stocks. For instance, we find that stock market participation rates increase markedly with the non-financial income of the individual. We also find that the probability of owning stocks is higher when the return on the stock market is high and when the investor also participates in the bond market. Finally, we document that single males without children have a higher probability of owning stocks which matches up with the results of Barber & Odean (2001).

The remaining part of the paper is structured as follows. In the next section, we introduce our data set. The probit model that we apply is presented in Section 3, and the empirical results are discussed in detail in Section 4. A modified probit model that allows for individual heterogeneity is presented in Section 5. The length of education is further analyzed in Section 6. In section 7 we investigate the effect on the stock market participation of an economist moving into the household of the investor. Some further robustness tests are discussed in Section 8. Finally, Section 9 concludes.

2 Data

We apply a very rich register-based panel data set containing a random 10% sample of the Danish population covering the period 1997-2001. The data stem from Statistics Denmark and the Institute of Local Government Studies - Denmark.

For each individual, we have access to the value of a number of financial variables that apply at the end of each year (originally collected for tax reporting purposes): Cash holdings, stock holdings, bond holdings, taxable property value, the compulsory (labor-contract based) pension contributions, and the contributions to private pension funds.[1] We also know the yearly income measured by the gross non-capital income.

[1] Mutual fund investments are included in the stock and bond holdings. Mixed mutual funds (both bonds and stocks) are counted in the stock holdings. The mixed mutual funds account for around 5% of the Danish mutual funds. So, the stock holdings are slightly overvalued at the expense of the bond holdings. Investments through mutual funds only make up 5.8% of total investments.

Exact information about the educational history of each individual is available. We also know whether the individuals are currently undertaking an education (both students and apprentices).

The individuals are grouped into 11 groups based on the subject of their highest completed education. We single out economics as one of the groups. We have conducted the analysis using two different definitions of economists. According to the narrow definition, the economics group only includes individuals who have completed an economics education at university level (BA, Master, and PhD). The broad definition includes the individuals from the narrow definition as well as individuals who have completed a relevant apprenticeship education in the financial services industry, e.g. bank clerks. The results obtained using the narrow and the broad economics definition are qualitatively identical, and therefore we only report the latter in the paper. In its entirety, the subject-based educational groups are as follows (the proportion of the sample in each group is provided in the lower part of Table 1): Educator/Teacher, Humanities/Arts, Agriculture/Food/Forestry/Fishing, Business/Commercial (excluding Economics), Social Sciences (excluding Economics), Health Care, Natural Sciences/Technical Educations, Police/Armed Forces/Transportation, High School, Basic School/Preparatory School, and Economics.

The data source also contains information on a number of socioeconomic factors that are applied as control variables, including age, gender, marital status, and children living at home. We also have access to various information about the investor's cohabitant/spouse (in the following the spouse).

We restrict our sample to individuals older than 18 years (the age of majority). We exclude individuals born before 1920 because there were no regulations on compulsory school attendance before 1920. On top of that, the educational information is very poor for individuals born before 1920. After these restrictions, we have observations on 405,271 individuals during the five-year period 1997-2001. The data form an unbalanced panel data set, since some people enter the sample when they turn 18, and other leave the sample as they die or move abroad. On average, the individuals are observed for 4.6 years such that we have in total 1,870,324 observations of individual investor decisions.

2.1 Descriptive Statistics

Unless otherwise noted, we consider the pooled data set covering the entire 5-year sample period using real 2002 DKK amounts. The rate of exchange at the end of 2002 was 7.0784

DKK/USD. Summary statistics are provided in Table 1. The first column considers the entire sample and the second column only the group of economists.

The average person in the sample is 45.3 years old and has an education of 11.3 years. 49.8% are males, 51.5% are married, 14.1% have children younger than 7 years old living at home, and 17.1% have children between 7 and 18 years old living at home. 7.4 % are students receiving a government grant, and 3.6% are apprentices.

A rather large proportion of the sample, 31.7%, only holds a basic education (18.7% 7 years and 13.0% 9 years, respectively), and a small group (5.9%) has also attended preparatory school (10 years).[2] High school and apprenticeship educations account for 44.2 % of the sample (12 years). 3.5% of the sample has a short-cycle higher education (14 years) and 10.3% has a bachelor degree/medium-cycle higher education (16 years). A relatively small proportion, namely 4.2%, holds a master degree (18 years), and even fewer (0.2%) a Ph.D. degree (20 years).

The average non-capital income is DKK 235,637. The average individual in the sample holds DKK −18,273 cash at year end. 25% of the individuals in the sample take out private pension schemes.[3] This proportion is rather small, because many Danish employees (71%) have adequate pension schemes in their labor contracts. The average amount paid to compulsory pension schemes is DKK 11,372, whereas the average amount spent on private pension schemes is DKK 4,128 per year across all individuals in the sample. 60% own their own home and the average taxable property value across all individuals (i.e. also those not owning their own home) equals DKK 366,822. 8.2 % of the individuals participate in the bond market, i.e. own bonds at year end (excluding mortgage backed-bonds and bond debt).

There are 46,038 observations of economists' investment decisions. The average economist is younger than other investors (40.9 years) and has a longer education (14.1 years). Furthermore, the financial situation is on average better than that of other investors. A larger proportion of economists participate in the bond market, namely 13%.

[2] The 7-year compulsory school attendance was replaced with 9 years in 1972 applying to cohorts born in 1959 and onwards.

[3] The private pension contribution is only registered from 1999 onwards.

2.2 Stock Market Participation Rates

An investor is defined to participate in the stock market if the investor holds stocks with a value in excess of DKK 1,000 (around USD 141) at year end.[4] Hereby, we obtain the stock market participation indicators for each individual for each year.

Overall, during the five-year period, 23.1% participate in the stock market. The proportion that participates in the stock market varies greatly across the educational groups. Figure 1 shows the average rates of participation across the subject-based educational groups for the entire 1997-2001 period. It is noted that the stock market participation rate is much higher for economists than for others, around 42% compared to 25% or less for the other educational groups.

Figure 2 shows the time series of stock market participation rates for the entire sample as well as for economists. The overall rate of participation in the stock market is remarkably stable at around 23%. The stock market participation rate for economists increases in the sample period, from a low of 37% to a high of 47%.

More males than females participate in the stock market, on average 24.9% compared to 21.3%.

As a very first step in the empirical analysis, we apply chi-square test of independence to the stock market participation indicators. For each year in the sample, and for the entire sample period, we test the independence of the two outcomes (participation / non-participation) across the educational groups. In all cases, with any usual level of significance, we reject that the stock market participation is independent of the education. So, this gives us a first indication that the educational choice influences the investors' stock market participation decision. However, we have not yet taken into account that there are other differences between investors than their educational background.

3 Model

To answer the question of whether economists have a higher probability of participating in the stock market than otherwise comparable individuals, we investigate the factors which collectively determine individuals' choice of participation in the stock market.

[4] Investors are defined as participating in the stock market if they have stocks in excess of a small threshold value. This excludes individuals who e.g. have been given a single stock by their employer as a Christmas present. Previous studies have applied a zero threshold value. Our conclusions are robust to the exact choice of threshold value.

In each time period, the investor faces the decision of whether to participate in the stock market or not. According to the random utility model, the utility-maximizing investor chooses the alternative that provides the investor with the greatest utility. Let the utility that investor i derives from participating in the stock market in time period t be given by U_{it}, and normalize the utility that the investor derives from non-participation to be equal to zero for all investors, $i = 1, ..., N$, and time periods, $t = 1, ..., T_i$. Thus, investor i participates in the stock market in period t, if and only if the investor gets greater utility from participation than from non-participation, that is if and only if $U_{it} > 0$. Although we do not observe all aspects of the investor's utility, we do observe some background characteristics of the investor, X_{it}, where the educational-group indicators are of principal interest. We also observe the time t return on the stock market, KFX_t. Hence, we decompose the investor's utility into two parts: the representative utility, which is a linear function of the observable characteristics, $\beta X_{it} + \gamma KFX_t$, and the unobservable factors that affect utility but are not included in the representative part, ε_{it}. The stock market participation decision can therefore be modeled as:

$$S_{it} = \mathbf{1}\left[\beta X_{it} + \gamma KFX_t + \varepsilon_{it} > 0\right], \tag{1}$$

where S_{it} denotes the indicator for active participation in the stock market of individual i at time t. The error terms are assumed independent and identically standard normally distributed, $\varepsilon_{it} \sim N(0, 1)$, i.e. it is the univariate probit model. The variances of the error terms are normalized to one, because only the ratio $\frac{\beta}{Var(\varepsilon_{it})}$ can be identified by probit maximum likelihood estimation.

Our primary interest lies in the marginal effects of the explanatory variables on the probability of participating in the stock market. The marginal effect of an explanatory variable on the choice probability equals the change in the probability caused by a change in the relevant explanatory variable holding all other variables fixed at their mean values except length of education which is fixed at 9 years (basic schooling). For continuous variables the marginal effects concern infinitesimal changes, for indicator variables they concern changes from 0 to 1, and for discrete variables they concern a one unit increase.

4 Yes! More Economists Hold Stocks

In this section we discuss the empirical results obtained using the basic probit model to describe the stock market participation.

4.1 Explanatory Variables in the Basic Probit Model

In the basic probit model, the principal explanatory variables are the subject-based educational-group indicators. In addition hereto, we apply a number of control variables, see also the discussion in Section 2 above.

The following financial control variables are applied: Bond market participation indicator (1 if participation), non-capital income, cash holdings, taxable property value, compulsory pension contribution, and private pension contribution.[5] Furthermore, to control for business cycle effects, we apply the yearly return on the KFX index (the Danish blue-chip index). We use non-capital income to avoid problems of endogeneity of income.

The socioeconomic explanatory variables are: Age, marital indicator (1 if married), gender (1 if male), indicator for having children below 7 years old living at home (1 if yes), and indicator for having children between 7 and 18 years old living at home (1 if yes).

To accommodate the fact that some investors are students at year end and thereby somewhat misplaced in the educational group for the highest completed education before starting the new education, we apply an indicator variable for being a student receiving a government grant and another indicator for undertaking an apprenticeship education (student with wage). These variables capture that the investors are acquiring new information in their ongoing education. Furthermore, we assume that households share information. Therefore, we include an indicator for whether the investors' spouse is an economist, since this provides the investor with information about economics. Finally, we apply the level of education as a control variable.

4.2 Basic Probit Model Results

Table 2 shows the results from the estimation of the basic probit model. The first column contains the parameter estimates and the second column the marginal effects.

The first result to notice is that the coefficient to the economics indicator is strongly significant and positive. From this we conclude that economists have a higher probability of holding stocks than investors with basic school (the indicator for basic schooling as highest completed education is left out of the model, i.e. this is the reference group towards which we compare individuals with other educations). Notice, that the coefficient estimates give us

[5] An indicator function captures that the private pension contribution is not registered during the first two years of the sample.

limited information because their relative sizes carry little information, only their signs and level of significance are relevant. In contrast, the influence of an explanatory variable can be evaluated by the size of its marginal effect; the larger the marginal effect, the more important the variable is for the decision to participate in the stock market.

The stock market participation probability is significantly higher for investors having an agriculture/food/forestry/fishing, business/commercial, social sciences, health care, natural sciences/technical, high school, and an economics education compared to investors with only basic schooling. Moreover, investors with a educator/teacher and a humanities/arts education have significantly lower probability of holding stocks than investors with basic school.

The marginal effect to the stock market participation probability from being an economist is 0.18, and is by far the largest marginal effect for the educational-group indicators. Thus, becoming an economist increases the probability of holding stocks by as much as 18 percentage points compared to having 9 years of basic schooling. The second and third largest marginal effects are for high-school graduates and business/commercial educated, which are 0.04.[6] Thereby, the marginal effects of being an economist is much larger than the marginal effect of any other education. Thus, our initial hypothesis is confirmed. Yes! More economists hold stocks.

The marginal effects to the stock market participation probability from the socioeconomic variables are fairly small. Only the marginal effects of having children living at home (both small and older) are not negligible and are significantly negative.

All the financial variables are significant and have a positive marginal effect upon the stock market participation probability. Not surprisingly, the most important financial variable is the bond market participation indicator for which the marginal effect equals 0.34. This implies that the decision to participation in the stock market is highly influenced by the decision to participate in the bond market. The second largest effect comes from the non-capital income for which the marginal effect equals 0.14, where it is noticed that the non-capital income is divided by 1,000,000. Thus, for an increase in the non-capital income by DKK 1 million (USD 141,275), the probability of participating in the stock market increases by 14 percentage points. Although this is a large effect, it is noteworthy that it is less than the marginal effect from being an economist. The positive effect from income confirms common knowledge from the literature that income plays a prominent role in determining whether

[6] Note that the group of high school graduates stands out from the other educational groups in that 47% of the investors are undertaking further education.

an investor participates in the stock market or not. The non-capital income is followed by the taxable property value (divided by 100,000), for which the marginal effect equals 0.05. Although the effects from the pension contributions are significant (both compulsory and private) they are almost negligible.

The marginal effect from the KFX return to the stock market participation probability is significantly positive and amounts to 0.05. This corresponds well with the notion that when the stock market is rising, investors are more interested in investing in stocks. This is an interesting result, as it reveals how asset allocation decisions of individual investors are affected by fluctuations in stock market returns.

The probability of investing in stocks increases when the investor's spouse is an economist, as the marginal effect from the spouse being an economist is significantly positive, 0.03. This is consistent with information sharing in households, as well as the hypothesis that information about economics increases the probability of investing in stocks.

The marginal effects from being a student or an apprentice are significantly positive. This confirms that investors undertaking an education are in fact misplaced in the educational group for the previously completed education, as they are acquiring new information.

The marginal effect from the level of education to the probability of participating in the stock market is significant but fairly small and smaller than 0.01. This implies that the majority of the variation across educations has already been accounted for by the subject-based educational grouping.

The estimated probability of participating in the stock market equals 0.19 given that all the explanatory variables are equal to their mean values which can be compared to the actual probability of 0.23.

In conclusion, we stress that the results from the basic probit model show that the probability of participating in the stock market increases by 18 percentage points by becoming an economist. This is much more than for any of the other subject-based educational groups. In addition, only the marginal effect from the bond market participation indicator is larger.

5 Individual Heterogeneity

Above, we provide substantial evidence that economists have a much higher probability of participating in the stock market than otherwise comparable investors even after controlling for many *observable* characteristics. Investment decisions are, however, most likely also affected

by *unobservable* characteristics such as ability, tastes, and most importantly risk preferences. It is thus reasonable to investigate whether the results presented so far could be biased because economists have special unobservable characteristics that affect the participation decision. In order to investigate whether economists differ from other groups of investors with respect to differences in unobserved characteristics, we allow for unobserved individual heterogeneity.

It is essential to allow the unobserved individual heterogeneity to be correlated with the observed individual characteristics, since there is substantial evidence that there are ability differences across educational groups, cf. Willis & Rosen (1979), Carneiro, Hansen & Heckman (2003), and Arcidiacono (2004). Likewise, there is evidence of correlation between risk preferences and educational choices, cf. Chen (2003). A common way to allow for arbitrary correlation is to use a fixed effects approach, where the individual effects are estimated along with the other parameters. However, the drawbacks of this approach include its inability to identify the effect of time-invariant explanatory variables and the incidental parameters problem, cf. Heckman (1981). Instead we parameterize the random individual effects in order to deal with individual fixed effects that are correlated with the explanatory variables. That is, we directly specify the distribution of the individual effects conditional on the means of the time-varying explanatory variables, as first suggested by Mundlak (1978).[7] This way of accounting for individual effects is fairly standard, cf. e.g. Wooldridge (2001).

5.1 Specification of Individual Heterogeneity

More formally, we decompose the error term in the basic probit model in equation (1) into an individual specific part and an individual-time specific part, $\varepsilon_{it} = \alpha_i + u_{it}$, and specify the individual effect, α_i, as a linear projection on the within-individual means of the time-varying explanatory variables, $\overline{Z_i}$. Thus the portion of unobserved individual specific factors that affect utility, is given by:

$$\alpha_i = \alpha \overline{Z_i} + c_i, \tag{2}$$

where $c_i \sim N\left(0, \sigma_c^2\right)$. This portion reflects the investors' propensity to participate in the stock market, and depends both on observed (through $\overline{Z_i}$) and unobserved (through c_i) individual specific factors. Substituting equation (2) into our basic probit model in equation (1) yields

[7] A more general correlation structure could be allowed for by specifying the distribution of the individual effect conditional on all explanatory variables, as suggested by Chamberlain (1980). Given the huge size of our unbalanced panel data set, this turned out to be computationally infeasible.

the following model for the stock market participation decision:

$$S_{it} = \mathbf{1}\left[\beta X_{it} + \gamma KFX_t + \alpha\overline{Z_i} + c_i + u_{it} > 0\right], \tag{3}$$

where $u_{it} \sim N(0,1)$, and the error components u_{it} and c_i are assumed to be independent for all $i = 1, .., N$ and all $t = 1, ..., T$. Hence σ_c^2 measures the variance in unobserved utility across individuals relative to the variance across time for each individual, and the proportional contribution of the individual-specific variance component to the total variance is given by $\rho = \frac{\sigma_c^2}{\sigma_c^2+1}$. Thereby, ρ is an indicator of the relative importance of the unobserved individual effect.

By including $\overline{Z_i}$ among the explanatory variables, the model can be consistently estimated by probit maximum likelihood, where the random individual effects are numerically integrated out using Gauss-Hermite quadrature.[8] The inclusion of the observed individual fixed effects, $\overline{Z}_i$, has the additional advantage that it takes care of all selectivity that is dependent on observed time-invariant factors, thus it ensures that the unobserved random individual effects c_i are uncorrelated with the explanatory variables.

Note that marginal effects of the explanatory variables are calculated as the average partial effects on the stock market participation choice probability conditional on the unobserved random individual effects being at its mean values, $c_i = 0$.

5.2 Individual Heterogeneity Probit Results

The results from the probit model with unobserved individual heterogeneity are shown in Table 3. The first column of Table 3 contains the coefficient estimates, and the second column the marginal effects on the probability of participating in the stock market. The first part of the table concerns the explanatory variables (i.e. those from Table 2), whereas the second part of the table concerns the individual effects.

The first point to notice is that unobserved individual heterogeneity is important and cannot be ignored: The contribution of the individual-specific variance component to the total variance is large and amounts to 90%, $\widehat{\rho} = 0.9$. Furthermore, the likelihood ratio test strongly rejects the hypothesis of $\rho = 0$.

To investigate how accounting for unobserved individual heterogeneity affects our results,

[8] Given that we only have two choices and five time periods, this is the most efficient procedure for integrating out c_i, cf. Butler & Moffitt (1982).

we compare the first part of Table 3 with Table 2. Overall, the marginal effects of the explanatory variables decrease in absolute size when controlling for individual heterogeneity. Thus, ignoring unobserved individual heterogeneity provides an upward bias in the absolute size of the coefficient estimates. Most notably, we find that the only educational background that still has a significant positive marginal effect on stock market participation is economics. Becoming an educator/teacher slightly lowers the probability of participating in the stock market by 0.2 percentage points, while becoming an economists substantially increases the probability of participating in the stock market by 1.7 percentage points.

Note that the effects of the explanatory variables are identified by their variation over time for given investors. Focusing on the educational indicators, their effects are identified by investors completing the education during the observation period, and their fixed effects are identified by all investors holding the education (both those who completed the education before and during the observation period).[9]

Turning to the second part of Table 3, we find that the unobserved individual effects are positively correlated with some of the educational fixed effects, and the highest correlation is with the economics education. The interpretation is that investors who are more prone to invest in stocks also have a higher propensity of being economists. Investors having an education within educator/teacher, agriculture/food/forestry/fishing, business/commercial, health care, and police/armed forces/transportation are also more prone to hold stocks. However, the correlations with the unobserved individual effects are lower for these groups' fixed effects than for the economist fixed effect.

Furthermore, the unobserved individual effects are positively correlated with all the financial variables' fixed effects (except non-financial income), and most strongly with the fixed effect of bond market participation. The marginal effect of the bond market participation indicator actually becomes negative (whereas it is positive in the basic probit model), since all of the positive effect of bond market participation is explained by the positive correlation of bond market participation with the unobserved individual effect. Thus, investors participating in the bond market have a higher probability of participating in the stock market only because they a priori are more prone to holding stocks.

To conclude, even though economists have unobservable characteristics that make them more prone to holding stocks, there is still a significant positive marginal effect on the prob-

[9] We verify that there is sufficient variation in the variables; e.g. for economists 8,765 investors are economists for the entire period, 1,736 become economists during the period, and the remaining 394,770 investors remain non-economists for the entire period.

ability of participating in the stock market of having a formal economics education. The marginal effect from an economics education is still larger than for any other education. Thus controlling for individual heterogeneity does not change our initial conclusions - it only makes the picture even clearer.

6 Length of Education

In this section we investigate in more detail the effect of the length of education. Firstly, we restrict the analysis to a sub sample of highly-educated investors. Secondly, we investigate the effect of information acquisition from economics educations of different lengths.

6.1 Highly-Educated Investors

Above, we argue that the costs associated with time spent on gathering and understanding information about the stock market are lower for investors with higher ability (e.g. longer educations), and especially for investors with an economics education. We control for the level of education by including years of schooling as a control variable. There is, however, evidence of ability sorting across levels of education. In order to make a cleaner comparison between investors with the same length of education, we estimate the basic probit model on a subsample of investors with at least 18 years of schooling, i.e. the roughly 5% of the investors with at least a long-cycle higher education.

There are 19,233 investors with an education of at least 18 years. The groups of investors with basic school and high school drop out of the sample. The comparison group is now police/armed forces/transportation. Table 4 shows the results from the basic probit model. The most important result is that the economics education still have the highest marginal effect on the stock market participation probability compared to investors with other educations. The marginal effect of being an economist is 0.073, whereas the second highest effect is for the group of investors having an agriculture/food/forestry/fishing education (marginal effect 0.067). When controlling for individual effects, the highest marginal effect is again found for the economics education (results available upon request).

6.2 Economists' Information Acquisition

Our presumption is that the longer an economics education is, the more information the investor has about economics and thereby about stock market investments. In this section,

we investigate this hypothesis. There are investors with economics educations of 2, 4, and 6 years beyond high school, i.e. in total 14, 16, and 18 years of schooling.[10] This means that the investors in the economics group have different levels of information about the stock market due to differences in time spent on the formal economics education.

We estimate the basic probit model and exclude years of schooling from the set of explanatory variables. Instead, we use separate indicators for the three levels of economics education mentioned above. The results (not shown but available upon request) confirm that the more time spent on studying economics, the larger the marginal effect on the probability of investing in stocks. In other words, the 6-year economics education has a larger marginal effect upon the stock market participation probability than the 4-year economics education, which again is larger than for the 2-year economics education.

To sum up, these results support the hypothesis that the reason why more economists participate in the stock market is that they have informational advantages.

7 An Economist Moves in

An investor with an economist spouse is hypothesized to have lower participation costs because of information sharing in the household. Above, we find evidence hereof in the basic probit model, where the marginal effect for the economist spouse is significantly positive, cf. the discussion of Table 2 in Section 4.2. Here, we pursue the information sharing hypothesis. We evaluate the effect of an exogenous information shock to the investor, namely what happens when an economist (spouse) moves into the investor's household. We expect an increase in the probability of holding stocks when an investor moves together with an economist.

Let $D_i = 1$ for investors who move together with an economist at $t = 0$, and $D_i = 0$ for the investors who do not cohabit with an economist during the observation period.[11] We are interested in estimating the average effect on stock market participation for the investors that move together with an economist: $E\left[S_{it}^1 - S_{it}^0 | D_i = 1\right]$ for $t > 0$,where S_{it}^1 is the stock market participation indicators for investor i at time t when the investor cohabits with an economist and equivalently S_{it}^0 is the stock market participation indicator when the investor does not cohabit with an economist. Since the stock market participation decision of an

[10] We exclude the apprenticeship educated economists as well as the very few economists with a PhD degree.

[11] In order to observe the investors and all the control variables both in the year before and the year after they start cohabiting with an economist, we only consider investors who move together with an economist in the penultimate year of the sample, namely year 2000. 675 investors move together with an economist in 2000.

investor cannot be observed both when the investor cohabits and does not cohabit with an economist at the same point in time, the central problem of evaluating this effect is the construction of counterfactuals. In the following we analyze whether the likelihood of holding stocks increases for investors who move together with an economist at time $t = 0$ using two commonly used evaluation strategies.

7.1 The Before-After Estimator

The *before-after* estimator uses the expected participation rate of the investors who move together with an economist in the year before the information shock as a proxy for the unobservable participation rate that these same investors would have had the year after the information shock if they had not experienced the shock. The before-after estimator compares the participation rates for investors the year before ($t = -1$) and the year after ($t = 1$) they move together with an economist:[12]

$$\alpha_{BA} = E[S_{i1}^{1} - S_{i,-1}^{0} | D_i = 1] = 0.0405. \tag{4}$$

α_{BA} is significantly positive.[13] Thus, the average participation rate of investors moving together with an economist is 4.05 percentage points higher the year after the investor moved together with an economist.

Note that α_{BA} can be considered a lower bound on the "true" effect on the stock market participation decision of the additional information about economics in the household: If the investors share information with their future spouse before they move together, there will be a pre-shock effect and it is likely that the participation rate of investors will start to rise before the investor moves together with an economist. In this case, the before-after estimator underestimates the information effect of an economist spouse moving into the household.

7.2 The Difference-In-Difference Estimator

The *difference-in-difference* estimator compares the changes in participation rates for investors moving together with an economist with the changes in participation rates for investors who do not move together with an economist:

[12] The results obtained using three years together (1998, 1999, and 2000) are identical to those obtained using only one year (2000).

[13] The one-sided p-value for $\alpha_{BA} = 0$ equals 4.7%. The non-standard test statistic is approximately t-distributed.

$$\begin{aligned}\alpha_{DID} &= E[S^1_{i1} - S^0_{i,-1}|D_i = 1] - E[S^0_{j1} - S^0_{j,-1}|D_i = 0] \\ &= \alpha_{BA} - \big(E[S^0_{j1} - S^0_{j,-1}|D_i = 0]\big) = 0.0471 \end{aligned} \tag{5}$$

The difference-in-difference estimator is significantly positive and slightly larger than the before-after estimator.[14]

All-in-all, the results of this section show that the stock market participation rate of investors that move together with an economist increases as a result of their social interaction with the economist. We interpret this as supporting our hypothesis that economists hold more stock due to informational advantages.

8 Robustness Tests

In this section we provide further evidence of the robustness of the results. To this end we conduct a number of probit estimations, some with additional explanatory variables compared to the basic probit model and others based on stratified sub samples. The results from the robustness tests are not tabulated, but available upon request.

8.1 Stratified Sub Samples

Since the fixed monetary costs are less important for wealthier investors, we run the basic probit model on stratified sub samples consisting of the investors in the higher end of the income distribution. More precisely, we run two estimations using only investors in the top quartile and top decile of the income distribution, respectively. For both estimations, the economics education remains the most important educations indicator for the stock market participation.

Different age groups may have different preferences, hence cohorts might behave differently investment wise. In the basic probit model, we control for this by including age among the explanatory variables. Here, to get an even cleaner picture, we estimate the basic probit model using three samples consisting only of cohorts aged 25-35, 35-45, and 45-55, respectively. Cohort effects might also exist when we control for observed individual fixed effects, e.g. the fixed individual income effect of older cohorts may be overestimated compared to the fixed

[14] The one-sided p-value for $\alpha_{DID} = 0$ equals 2.6%. The non-standard test statistic is approximately t-distributed.

individual income effect of the younger cohort. Therefore, we also estimate the probit model with individual effects using the same three cohorts. For all three age groups and in both estimations, the marginal effect of the economics education is by far the largest and all other qualitative results hold as well.

Thus, we conclude that neither income nor cohort effects are driving our results.

8.2 Dynamic Probit Model

An interesting extension of our model is a dynamic model with state dependence which captures the fact that current behavior on the financial markets depends on past behavior. This extends the work by Alessie, Hochguertel & van Soest (2001) who find that the dynamics of stock market participation are driven both by unobservable individual heterogeneity and state dependence. If the investor participated in the stock market last period, the investor has already paid part of the participation costs, and probably has more knowledge about investment opportunities than current non-participants. Thus, we expect that participation last period has a positive effect on the probability of participating this period. This is indeed what we find when we conduct the basic probit regression including the 1-period lagged stock market participation indicator as an additional explanatory variable. The largest marginal effect is from the lagged stock market participation indicator and it equals 0.88, which reveals that stock market participation is highly persistent over time. The marginal effect from the bond market participation indicator falls. The marginal effect from being an economist is much larger than for any of the other educational groups.

8.3 Residence and Occupation

We verify that residence and occupation of investors are not spuriously driving our results.

Including three dummy variables for investors living in Copenhagen, the suburbs of Copenhagen, and the other big cities in Denmark into the basic probit model, imply that city dwellers have significantly lower probabilities of investing in stocks. Yet, including the city dummies does not influence our results.[15]

We also find that investors employed in the financial sector (banks, finance, and insurance

[15] Goetzmann *et al.* (2004) investigate how city agglomeration affects portfolio choice. Our study is different from theirs as we investigate the decision to participate in the stock market whereas they investigate the effect of city agglomeration on the kind of, and the number of, risky assets that investors include in their portfolio.

companies) as well as self-employed and high-level employees have a significantly higher probability of participating in the stock market than otherwise comparable investors. However, including these occupational explanatory variables does not change any of our conclusions.

We do not include dummies for residence and occupation in our basic probit model because they can be considered confounders as they are partly outcomes of the investor's education.

9 Conclusion

It is puzzling that so few individuals hold stocks. In our data, only 23% of the investors participate in the stock market, even though standard portfolio theory predicts that all investors should hold some fraction of risky assets. Understanding the investment decisions and portfolio choices of individuals is important and has implications for e.g. asset pricing and the distribution of wealth.

A promising explanation of the stock market participation puzzle is that there are costs associated with stock market participation which deter individuals from entering the stock market. Such costs include both the monetary costs associated with stock investments and costs that reflect the time spent on understanding risk-return trade-offs and general information about stock markets. Thus, if some agents are better able to gather and understand information about investment opportunities and stock markets, their effective costs of stock market participation will be lower and consequently they will have a higher probability of participating in the stock market. Previous studies have shown that income, wealth, and length of education are important factors in explaining the stock market participation, but our study is the first to apply detailed educational information. In particular, we test the hypothesis that economists have a higher probability of investing in stocks due to informational advantages. This is done by estimating a probit model where we use a unique register-based panel data set covering the period 1997-2001 comprising more than 1.87 million observations on individual investor choices at year-end, as well as a wide range of other background characteristics assumed to affect the investment choices.

We confirm the hypothesis that economists have a higher probability of holding stocks. The result is astonishingly clear; a formal education in economics implies that the probability of participating in the stock market is higher than for any other educational background. Our result that economists have a higher probability of holdings stocks is robust across a wide range of robustness specifications including accounting for unobserved individual heterogeneity.

In the present paper we only focus on the decision of investors to participate in the stock market or not. Since investors first decide whether to participate, and then decide the degree of participation (i.e. the amount to invest), an interesting future extension is to analyze the proportion of investors' financial wealth invested in stocks conditional on participation. To perform this analysis, Vissing-Jørgensen (2002) estimates a sample selection model that corrects for the selection of individuals into the group of stock market participants, since applying a linear regression without this correction would lead to inconsistent estimates. Our suggestion would provide an extension of Vissing-Jørgensen (2002), since she has neither access to as detailed educational information as we have, nor as detailed financial variables.

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Table 1: Descriptive Statistics

Variables	Mean All	Mean Economists
Age	45.34	40.92
	(16.63)	(12.76)
Married	0.5152	0.5664
Male	0.4982	0.5395
Children 0-6 Years	0,1420	0.2187
Children 7-18 Years	0.1709	0.1965
Non-capital Income	235636	373736
	(224694)	(583887)
Cash Holdings	-18273	-41119
	(487937)	(598725)
Taxable Property Value	366822	541370
	(861801)	(1246691)
Private Pension Contribution	2497	3290
	(20654)	(21117)
Public Pension Contribution	11372	32284
	(33445)	(86643)
Bond Market Participation Rate	0.0821	0.1286
KFX Return	0.2005	
	(0.2225)	
Student, Goverment Grant	0.0743	0,0750
Student, Wage	0.0362	0.0243
Length of Education	11.31	14.13
	(3.007)	(2.526)
Educator/Teacher	0.0500	
Humanities/Arts	0.0190	
Argriculture/Food/Forestry/Fishing	0.0598	
Business (excl. Economics)	0.1267	
Social Science (excl. Economics)	0.0334	
Health Care	0.0622	
Natural Sciences/Technical Educations	0.1898	
Police/Armed Forces/Transportation	0.0112	
High School	0.1026	
Basic School/Preparatory School	0.3257	
Economics	0.0246	

Notes to Table 1: The table shows summary statistics for the entire sample (column 1) and for economist (column 2). For indicator variables the proportion of the sample included in the group is shown. Otherwise, the table provides the mean and standard deviation in parenthesis.

Table 2: Basic Probit Model for Stock Market Participation

Explanatory Variables	βs	dΦs/dx
Intercept	-2.2292 ***	
	(0.0081)	
Age	0.0164 ***	0.0045
	(0.0001)	(0.0000)
Married	0.0348 ***	0.0095
	(0.0024)	(0.0007)
Male	0.0233 ***	0.0064
	(0.0025)	(0.0007)
Children 0-6 Years	-0.0540 ***	-0.0145
	(0.0036)	(0.0010)
Children 7-18 Years	-0.1268 ***	-0.0334
	(0.0032)	(0.0008)
Bond Market Participation	0.9538 ***	0.3311
	(0.0037)	(0.0015)
Non-Capital Income/1,000,000	0.5082 ***	0.1392
	(0.0074)	(0.0021)
Cash Holdings/100,000	0.0251 ***	0.0069
	(0.0002)	(0.0001)
Taxable Property Value/100,000	0.1897 ***	0.0519
	(0.0015)	(0.0004)
Cumpulsory Pension Contribution /10,000	0.0106 ***	0.0029
	(0.0004)	(0.0001)
Private Pension Contribution/10,000	0.0334 ***	0.0091
	(0.0007)	(0.0002)
KFX	0.1760 ***	0.0482
	(0.0056)	(0.0015)
Student, Government Grant	0.1353 ***	0.0389
	(0.0058)	(0.0017)
Student, Wage	0.0120 *	0.0033
	(0.0069)	(0.0019)
Spouse Education, Economics	0.0954 ***	0.0271
	(0.0070)	(0.0021)
Length of Education	0.0249 ***	0.0068
	(0.0007)	(0.0002)
Educator/Teacher	-0.0744 ***	-0.0198
	(0.0079)	(0.0020)
Humanities/Arts	-0.0378 ***	-0.0102
	(0.0101)	(0.0027)
Agriculture/Food/Forestry/Fishing	0.0972 ***	0.0276
	(0.0061)	(0.0018)
Business/Commercial (excl. Economics)	0.1497 ***	0.0430
	(0.0047)	(0.0014)
Social Science (excl. Economics)	0.0265 ***	0.0073
	(0.0077)	(0.0022)
Health Care	0.0249 ***	0.0069
	(0.0067)	(0.0019)
Natural Sciences/Technical Educations	0.0902 ***	0.0253
	(0.0048)	(0.0014)
Police/Armed Forces/Transportation	-0.0115	-0.0031
	(0.0119)	(0.0032)
High School	0.1464 ***	0.0421
	(0.0057)	(0.0017)
Economics	0.5414 ***	0.1780
	(0.0079)	(0.0030)
Observed Probability, P_1	0.2310	
Predicted Prob. (at mean), P_1	0.1928	
Log likelihood	-876171	
Pseudo R-square	0.1333	
Number of Observations	1870324	
Number of Investors	405271	

Notes to Table 2: The table shows the parameter estimates and the marginal effects from the probit regression with IID error terms. The dependent variable is the stock market indicator. The comparison groups are women, not married, not having children below 18 living at home, not undertaking an education, and basic school as highest completed education. The first column provides the parameter estimates and the second column the marginal effects, (standard errors in parentheses). ***, **, * indicates parameter significance at the 1%, 5%, 10% level of significance, respectively.

Table 3: Probit Model for Stock Market Participation with Individual Effects

Explanatory Variables	βs	dΦs/dx
Intercept	-6.2471 ***	
	(0.0518)	
Age	0.0386 ***	0.0004
	(0.0006)	(0.0000)
Married	-0.2232 ***	-0.0021
	(0.0149)	(0.0002)
Male	0.1237 ***	0.0011
	(0.0125)	(0.0001)
Children 0-6 Years	0.0945 ***	0.0010
	(0.0152)	(0.0002)
Children 7-18 Years	0.0179	0.0002
	(0.0149)	(0.0001)
Bond Market Participation	-0.0933 ***	-0.0008
	(0.0111)	(0.0001)
Non-Capital Income/1,000,000	0.5621 ***	0.0052
	(0.0228)	(0.0004)
Cash Holdings/100,000	0.0029 ***	0.0000
	(0.0008)	(0.0000)
Taxable Property Value/100,000	-0.0460 ***	-0.0004
	(0.0083)	(0.0001)
Cumpulsory Pension Contribution /10,000	0.0061 ***	0.0001
	(0.0009)	(0.0000)
Private Pension Contribution/10,000	0.0168 ***	0.0002
	(0.0014)	(0.0000)
KFX	0.4083 ***	0.0038
	(0.0112)	(0.0002)
Student, Government Grant	-0.0980 ***	-0.0008
	(0.0183)	(0.0002)
Student, Wage	-0.1056 ***	-0.0009
	(0.0200)	(0.0002)
Spouse Education, Economics	0.1558 ***	0.0018
	(0.0470)	(0.0007)
Length of Education	0.0022	0.0000
	(0.0087)	(0.0001)
Educator/Teacher	-0.2461 ***	-0.0017
	(0.0893)	(0.0004)
Humanities/Arts	-0.0608	-0.0005
	(0.1026)	(0.0008)
Agriculture/Food/Forestry/Fishing	-0.0017	0.0000
	(0.0764)	(0.0007)
Business/Commercial (excl. Economics)	0.0250	0.0002
	(0.0690)	(0.0007)
Social Science (excl. Economics)	0.0328	0.0003
	(0.0657)	(0.0007)
Health Care	-0.0961	-0.0008
	(0.0753)	(0.0005)
Natural Sciences/Technical Educations	0.0568	0.0005
	(0.0652)	(0.0007)
Police/Armed Forces/Transportation	-0.0828	-0.0007
	(0.1121)	(0.0008)
High School	-0.0718	-0.0006
	(0.0526)	(0.0004)
Economics	0.7149 ***	0.0174
	(0.0835)	(0.0044)

Table 3 *continued*

Mean(Married)	0.3853 ***	0.0035
	(0.0198)	(0.0003)
Mean(Children 0-6 Years)	-0.0482 *	-0.0004
	(0.0278)	(0.0003)
Mean(Children 7-18 Years)	-0.1933 ***	-0.0018
	(0.0228)	(0.0002)
Mean(Bond Market Participation)	4.7770 ***	0.0439
	(0.0278)	(0.0026)
Mean(Non-Capital Income/1,000,000)	-0.4641 ***	-0.0043
	(0.0291)	(0.0004)
Mean(Cash Holdings/100,000)	0.0460 ***	0.0004
	(0.0008)	(0.0000)
Mean(Taxable Property Value/100,000)	0.4265 ***	0.0039
	(0.0098)	(0.0003)
Mean(Compulsory Pension Contribution/10,000)	0.0546 ***	0.0005
	(0.0016)	(0.0000)
Mean(Private Pension Contribution/10,000)	0.2042 ***	0.0019
	(0.0038)	(0.0001)
Mean(Spouse Education, Economics)	0.0023	0.0000
	(0.0638)	(0.0006)
Mean(Length of Education)	0.0695 ***	0.0006
	(0.0096)	(0.0001)
Mean(Educator/Teacher)	0.2122 **	0.0020
	(0.0991)	(0.0009)
Mean(Humanities/Arts)	-0.1247	-0.0011
	(0.1161)	(0.0011)
Mean(Agriculture/Food/Forestry/Fishing)	0.3324 ***	0.0031
	(0.0837)	(0.0008)
Mean(Business/Commercial (excl. Economics))	0.3127 ***	0.0029
	(0.0738)	(0.0007)
Mean(Social Science (excl. Economics))	0.0779	0.0007
	(0.0794)	(0.0007)
Mean(Health Care)	0.2154 ***	0.0020
	(0.0826)	(0.0007)
Mean(Natural Sciences/Technical Educations)	0.1008	0.0009
	(0.0702)	(0.0006)
Mean(Police/Armed Forces/Transportation)	0.5105 ***	0.0047
	(0.1331)	(0.0012)
Mean(High School)	0.2753 ***	0.0025
	(0.0613)	(0.0006)
Mean(Economics)	1.2598 ***	0.0116
	(0.0918)	(0.0009)
σ^c	2.9984	
	(0.0064)	
ρ	0.8999	
	(0.0004)	
Log likelihood	-440884	
LR test of $\rho = 0$	840000	
Number of Observations	1870324	
Number of Investors	405271	

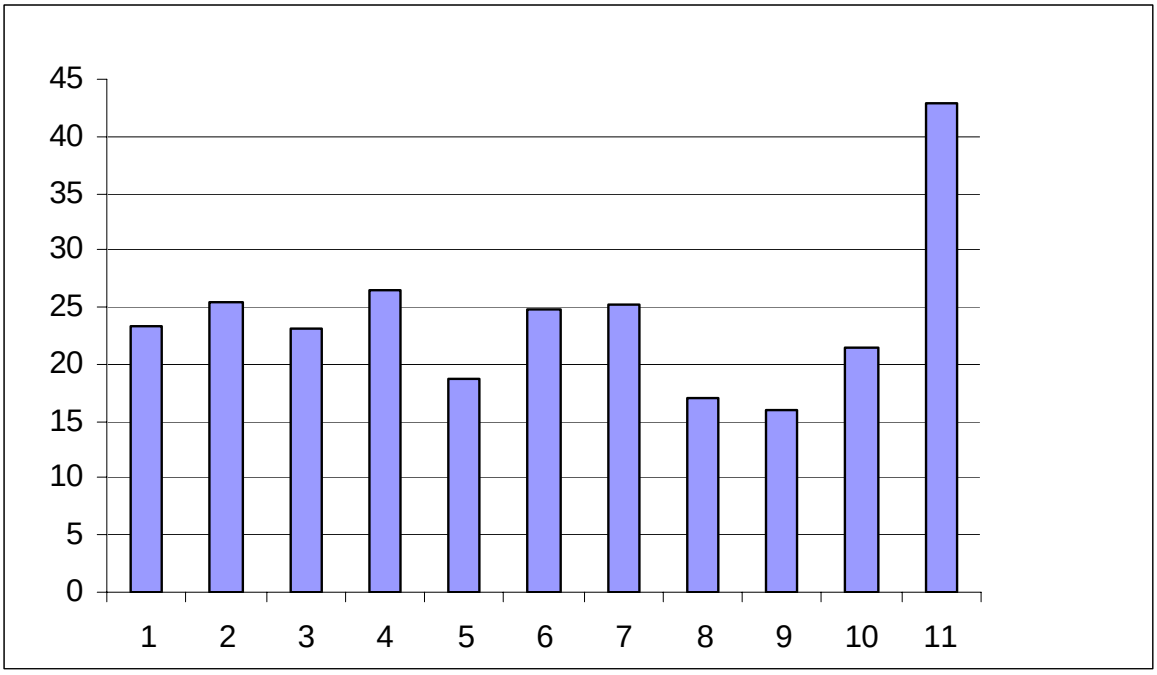
Notes to Table 3: The table shows the parameter estimates and the marginal effects from the probit regression with individual effects. The dependent variable is the stock market indicator. The comparison groups are women, not married, not having children below 18 living at home, not undertaking an education, and basic school as highest completed education. The first column provides the parameter estimates and the second column the marginal effects, (standard errors in parentheses). ***, **, * indicates parameter significance at the 1%, 5%, 10% level of significance, respectively. The marginal effects of the explanatory variables are calculated as the average effects on the choice probability of stock market participation conditional on the unobserved random individual effects being at its mean values, $c_i = 0$. σ_c indicates the cross-individual standard deviation relative to the within-individual standard deviation, and ρ indicates the proportion of total variance contributed by the individual specific variance component.

Table 4: Probit Model for Stock Market Participation - At least 18 Years of Schooling

Explanatory Variables	**βs**	**dΦs/dx**
Intercept	-2.3511 ***	
	(0.2148)	
Age	0.0133 ***	0.0049
	(0.0005)	(0.0002)
Married	-0.0838 ***	-0.0310
	(0.0113)	(0.0042)
Male	0.0669 ***	0.0245
	(0.0108)	(0.0040)
Children 0-6 Years	0.0119	0.0044
	(0.0130)	(0.0048)
Children 7-18 Years	-0.1410 ***	-0.0511
	(0.0119)	(0.0042)
Bond Market Participation	0.9322 ***	0.3577
	(0.0137)	(0.0050)
Non-Capital Income/1,000,000	0.2846 ***	0.1048
	(0.0186)	(0.0069)
Cash Holdings/100,000	0.0203 ***	0.0075
	(0.0008)	(0.0003)
Taxable Property Value/100,000	0.0781 ***	0.0288
	(0.0050)	(0.0018)
Cumpulsory Pension Contribution /10,000	0.0140 ***	0.0052
	(0.0010)	(0.0004)
Private Pension Contribution/10,000	0.0133 ***	0.0049
	(0.0015)	(0.0006)
KFX	0.1542 ***	0.0568
	(0.0241)	(0.0089)
Student, Government Grant	-0.0120	-0.0044
	(0.0307)	(0.0113)
Student, Wage	-0.0095	-0.0035
	(0.0282)	(0.0103)
Spouse Education, Economics	0.0609 ***	0.0227
	(0.0215)	(0.0081)
Length of Education	0.0559 ***	0.0206
	(0.0116)	(0.0043)
Educator/Teacher	-0.2489 ***	-0.0865
	(0.0612)	(0.0198)
Humanities/Arts	-0.1838 ***	-0.0660
	(0.0355)	(0.0124)
Agriculture/Food/Forestry/Fishing	0.1762 ***	0.0667
	(0.0391)	(0.0151)
Business/Commercial (excl. Economics)	0.1150 **	0.0432
	(0.0511)	(0.0196)
Social Science (excl. Economics)	-0.1258 ***	-0.0455
	(0.0356)	(0.0126)
Health Care	0.0473	0.0175
	(0.0357)	(0.0133)
Natural Sciences/Technical Educations	0.0356	0.0131
	(0.0347)	(0.0129)
Economics	0.1919 ***	0.0725
	(0.0364)	(0.0140)
Observed Probability, P_1	0.3543	
Predicted Prob. (at mean), P_1	0.3446	
Log likelihood	-46890	
Pseudo R-square	0.1290	
Number of Observations	82817	
Number of Investors	19233	

Notes to Table 4: The table shows the parameter estimates and the marginal effects from the probit regression with IID error terms conducted for a sub sample of investors with at least 18 years of schooling. The dependent variable is the stock market indicator. The comparison groups are women, not married, not having children below 18 living at home, not undertaking an education, and police/armed forces/transportation as highest completed education. The first column provides the parameter estimates and the second column the marginal effects, (standard errors in parentheses). ***, **, * indicates parameter significance at the 1%, 5%, 10% level of significance, respectively.

Figure 1: Stock Market Participation Rates across Educational Groups



Notes to Figure 1: The figure shows the proportion (in percentage) of investors who hold stocks across educational groups, 1997-2001. Subject 1: Education. Subject 2: Humanities/arts. Subject 3: Agriculture/food/forestry/ fishing. Subject 4: Business/Commercial (excluding economists). Subject 5: Social sciences (excluding economists). Subject 6: Health care. Subject 7: Natural sciences/technical educations. Subject 8: Police/armed forces/transportation. Subject 9: High school Subject 10: Basic school/preparatory school Subject 11: Economics.

Figure 2: Stock Market Participation over Time

Notes to Figure 2: The figure shows the time-series of the proportion (in percentage) of investors (all and economists) who hold stocks.

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ISBN 87-7882-051-0

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