Do More Economists Hold Stocks?

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This draft: December, 2004

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We thank the Danish Research Agency for financial support, this project is part of 'Education as a Risky Asset'. We appreciate useful comments from participants at the Symposium on Asset Allocation at CBS, the workshop on Applied Econometrics and Finance at the University of Aarhus, the Danish Graduate Programme in Economics PhD-workshop, and seminars at the Aarhus School of Business. The usual disclaimer applies. We are grateful to Anne Keller for competent research assistence.

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Abstract: A unique data set enables us to test the hypothesis that more economists hold stocks than others due to informational advantages. We find that economists have a significantly higher probability of participating in the stock market than investors with any other education, even when controlling for various 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 apply the probit model to the stock market participation decision. Individual heterogeneity is accounted for by including parameterized random individual effects to the basic probit model.

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 individuals 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 his non-financial income is highly volatile and perfectly correlated with stock returns that he 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 on the stock market, but also costs interpreted more broadly to reflect 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 will be lower and these investors will consequently have a higher probability of participating on 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. 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 education along different 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 his 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 on the stock market and Duflo & Saez (2002) demonstrate that the decision of workers to participate in retirement plans is influenced by the choices of colleagues.

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

Finally, it should be mentioned that there are other explanations for the low rate of stock market participation than the information-based reasons we take up here. For instance, Barberis & Huang (2004) argue that narrow framing, (i.e. that an agent when offered a new gamble evaluates this gamble separately from his other risks), can help understand the stock market participation puzzle. If the investor gets utility from stocks alone, i.e. not in combination with the other assets the investor holds, and if the investor is risk averse over fluctuations in stock returns, he may refuse to participate in the stock market gamble. Also, we do not investigate the correlation between the returns to human wealth of the individual investor and stock returns of the individual investor (as we do not have data on the returns to the individual's holdings of stocks) and the implication of this correlation for stock market participation, as in Heaton & Lucas (2000), Vissing-Jørgensen (2002), and Massa & Siminov (2004).[1]

[1] Massa & Simonov (2004) investigate how positions in risky assets are related to non-financial income

We investigate whether investors with better knowledge about investment opportunities have a higher probability of investing on 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 or not. In order to investigate the hypothesis that economists are more likely to hold stocks, we analyze a unique data set that provides us with very detailed information on investor education and stock and bond 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. There are several advantages of this data set, in addition to the sheer magnitude of the number of investors examined: (*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 education as an economist. This effect shows up in all our robustness checks (e.g. when accounting for individual heterogeneity), 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.

In addition to our main result that more economists hold stocks than other individuals

of individual investors using a detailed Swedish data set. Yet, they do not analyze the stock market participation puzzle.

with different educational backgrounds, the rich data set that we use allows us to draw a number of other interesting conclusions. For instance, we find that stock market participation rates increase markedly with non-financial income of the individual. We also find that the probability of owing stocks is higher when the return on the stock market is high and if the investor already participates on the bond market. Finally, an interesting effect that we document is that single men without kids have a higher probability of owing stocks. This last results is interesting because it matches up with the results of Barber & Odean (2001) that single men trade more than others.

Our results are consistent with the view that economists have a higher probability of participating on 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, however. For instance, it could be that economists are less risk-averse or more optimistic. In order to evaluate whether unobserved characteristics such as 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. Also when we allow for individual unobserved characteristics, do our results carry through.

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 at length in Section 4. A modified probit model that allows for individual heterogeneity is presented in Section 5. Some further robustness tests are discussed in Section 6. Finally, Section 7 concludes.

2 Data

In this section, we describe the unique data that we use.

2.1 Data Presentation

We apply a very rich register-based panel data set containing a random 10% sample of the Danish population covering the time period 1997-2001.[2] The data stem from Statistics Denmark and the Institute of Local Government Studies - Denmark. All amounts are

[2] The raw data cover the period 1984-2001, but due to a structural break in 1997 in the financial data, we focus on the time period 1997-2001.

converted into real terms with 2002 as the base year.

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.[3] We also know the yearly income measured by the gross non-capital income.

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 economists 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 its entirety, the subject-based educations groups are given below (proportion of sample in each group in parenthesis):

- Subject 0: Education (4.5%)
- Subject 1: Humanities/arts (1.9%)
- Subject 2: Agriculture/food/forestry/fishing (6.0%)
- Subject 3: Business (excluding economists) (12.7%)
- Subject 4: Social sciences (excluding economists) (3.3%)
- Subject 5: Health care (6.2%)
- Subject 6: Natural sciences/technical educations (19.0%)

[3] 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. Collective investments in Denmark only make up 5.8% of total investments.

- Subject 7: Police/armed forces/transportation (1.1%)
- Subject 8: High school (10.3%)
- Subject 9: Basic school/preparatory school (32.6%)
- Subject 10: Economics (2.5%)

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 the 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.

2.2 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.

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.[4] This proportion is rather small, because many Danish employees (71%)

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

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 owing 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%. The differences between economists and other investor types are accounted for in our analysis.

We distinguish between eight levels of education (length of education in parenthesis). A rather large proportion, 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).[5] 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).

2.3 Stock Market Participation Rates

An investor is defined to participate in the stock market if he holds stocks with a value in excess of DKK 1,000 (around USD 141) at year end.[6] 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 pro-

[5] The individuals in the 7-year group are rather unusual in that they are fairly old (on average 62.7 years). The 7-year compulsory school attendance was replaced with 9 years in 1972 applying to cohorts born in 1959 and onwards. The individuals having 7 years and 9 years of basic school turn out to behave quite differently investment-wise, thus it is important to distinguish between these two levels of schooling.

[6] 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.

portion that participates in the stock market varies greatly across the educational groups. Figure 1 shows the 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 rate of stock market participation for the various levels of education for the entire 1997-2001 period. The stock market participation rate decreases from 26% at 7-year to 15% at 9-year and down to 10% at 10-year, and then increases all the way up to 38% at 20-year (with a small drop from 14-year to 16-year).

Figure 3 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 subject-based 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.

In each time period, the investor faces the decision of whether to participate in the stock market or not. We assume that investors behave as utility maximizers. Hence, according to the random utility model, the investor chooses the alternative that provides her 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 ($t = 1, ..., T_i$). Note that we allow for an unbalanced panel data set. Thus investor i participates in period t, if and only if she gets greater utility from participating than from non-participation, that is if and only if $U_{it} > 0$. Although, we do not observe all aspects of the investors' utility, we do observe some background characteristics of the investors, X_{it}, where the educational-group indicators are of principal interest. We also observe the return on the stock market, KFX_t, during the time periods $t = 1, ..., T$, where $T = \max\{T_1, ...T_N\}$. We decompose the utility into the representative utility, which is a function of the observable characteristics, $V_{it} = \beta X_{it} + \gamma KFX_t$, and the (unobservable) factors that affect utility but are not included in the representative part, ε_{it}. The stockmarket participation decision can therefore be modeled as:

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

hence S_{it} is an indicator for active participation in the stock market of individual i at time t. Since we assume that the error terms are independent and identically standard normally distributed, $\varepsilon_{it} \sim N(0, 1)$, we have 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 (educational indicator) explanatory variables on the probability of choosing to participate in the stock market.[7] The marginal effect of an explanatory variable on the choice probability equals the change in the probability connected with a change in the relevant explanatory variable holding all other variables fixed at their mean values. 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 changes from k to $k + 1$.

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.

[7] This choice probability is given by $P(S_{it} = 1|X_{it}, KFX_t) = \Phi(\beta X_{it} + \gamma KFX_t)$.

4.1 Explanatory Variables in the Basic Probit Model

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

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).

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, private pension contribution, spouse stock market participation indicator, and spouse bond market participation indicator.[8] 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 spouse stock and bond market participation indicators are included because households are likely to make their investment decisions jointly. Furthermore, we hypothesize that households share information. Therefore, we include an indicator for whether the investors' spouse is an economist, since we presume that this provides the investor with information about economics.

To accommodate for 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). Finally, we apply the level of education as a control variable.

4.2 Basic Probit Model Results

Table 2 shows the results from the basic probit model regression. The first column contains the parameter estimates and the second column the marginal effects. The marginal effects are based on 9 years of schooling (instead of the average level of schooling).

The first result to notice is that the coefficient to the economics indicator is strongly significant and positive. From this we conclude that economists are more prone to holding

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

stocks than investors with basic school. Notice, that the coefficient estimates give us 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 education, business education, social sciences education, natural sciences/technical educations, high school degree, and an economics education compared to investors with only basic schooling. Moreover, investors with a educator/teacher education and a humanities/arts education are significantly less prone to 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% as compared to having nine years of basic schooling only. The second largest marginal effect is for high-school graduates, which is 0.04. 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 than others.

The marginal effects to the stock market participation probability from the socioeconomic variables are fairly small. The largest marginal effect stems from being married (-0.05) which reduces the probability of participating in the stock market. The marginal effect from being a male is significantly positive (0.03), whereas the marginal effects of having children living at home (both small and older) are significantly negative. In other words, we find that single men without children have a higher probability of participating on the stock market. Barber & Odean (2001) report that single men trade stocks more than others. We do not have data on trading. Yet, our results do confirm that single men hold more stocks.

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 0.15, 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 million), the probability of participating in the stock market increases by 15%. This is less than the marginal effect from being an economist. The non-capital income is followed by the taxable property value, for which the marginal effect equals 0.05. It confirms common knowledge from the literature that income plays a prominent role in determining whether an investor participates in the stock market or not. Although the effects from the pension contributions are significant (both compulsory and private) they are almost negligible.

The marginal effect from the spouse being an economist surprises us by being negative (-0.03). This means, that the probability of investing in stocks decreases when the investor's spouse is an economist, the opposite of our presumption based on information sharing in households. Perhaps this effect is caused by the possibility that in households consisting of an economist and a non-economists, the investments are conducted by the economist.

The marginal effect from the spouse stock market participation is significant and very large (0.32). This is in accordance with the presumption that investments decisions are generally taken jointly by households. However, if the spouse is an economist, he holds the stocks. The marginal effect of spouse bond market participation is negative but fairly small.

The marginal effect from the KFX return to the stock market participation probability is significantly positive and amounts to 0.04. This corresponds well with the notion that when the stock market is rising, investors are more interested in investing in stocks. We find this to be an interesting result, as it reveals how asset allocation decisions of individual investors are affected by fluctuations in stock market returns.

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.

From the unconditional participation probabilities observed in Figure 2, the length of education might be expected to play a role for the stock market participation decision. Yet, the marginal effect from the level of education to the probability of participating in the stock market is significant but fairly small and equals 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 marginal probability of participating in the stock market equals 20% given that all the explanatory variables are equal to their mean values which compares to the actual probability of 23%. Thus, the basic probit model has a tendency to overestimate the probability of not participating in the stock market.

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

4.3 Level-Based Educational Groups

We conduct a probit regression using eight minus one level-based educational group indicators as the primary explanatory variables instead of the subject-based educational group indicators. We conduct this regression in order to investigate whether the properties of our data are in accordance with those of the previous studies where the length of education is found to be an important determinant of the probability of owing stocks. We apply the same set of control variables as those in Table 2 except for the length of education.

Table 3 shows the results of estimating the level-based probit regression. The level of schooling coefficients are all significantly positive. This implies that the probability of holding stocks is larger for investors having 7 years and 10 years or more of education compared to an investor having 9-years of education.[9] In general, the marginal effect from the level variables to the stock market participation probability increases with the level of education, although it decreases from the 14-year to the 16-year group. Investors with 16 years of education hold BAs and other medium-cycle higher educations including educations that typically lead to public employment and relatively low-wage occupations such as nurses, educators, and teachers. This is in accordance with the results of Table 2 that Educators/Teachers have a lower probability of holdings stocks, i.e. this effect can be due to self-selection of more risk averse individuals into less risky educations. The marginal effect from the 12-year level is 0.06, around 0.08 from the 14-year/16-year/18-year level, and 0.13 from becoming a PhD. The influence of the control explanatory variables is identical for the subject-based bivariate probit model and the level-based bivariate probit

[9] The reason why investors with only seven years of schooling have a higher probability of owing stocks than those with nine years of schooling, is that the investors with seven years of schooling are much elder.

model and we refrain form commenting on these.

In conclusion, we confirm the previous findings that the probability of participating in the stock market is increasing with the level of education.

5 Individual Heterogeneity

We have found substantial evidence that economists have much higher probability of participating on the stock market than otherwise comparable investors even after controlling for many *observable* characteristics. Investment decisions, however, are 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. For instance, other possibilities for our results could be that economists are less risk averse, have higher ability, or have tastes for risky stock investments. In order to investigate whether economists differ from other groups of investors with respect to differences in unobserved characteristics, we will in this section allow for individual heterogeneity, since unobserved individual heterogeneity such as risk preferences, ability, and tastes may be key aspects when modelling individuals' decisions on financial markets.

In our approach, we acknowledge that 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, Heckman & Vytlacil (2003), and Arcidiacono (2004). Likewise, there is evidence of correlation between risk attitudes 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. A drawback of this approach, however, is the lack of ability 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 conditional distribution of the unobservable individual heterogeneity conditional on the mean of the time-varying explanatory variables, as first suggested by Mundlak (1978).[10]

[10] A more general way of allowing for individual heterogeneity is to specify the conditional distribution of

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 and unobserved individual specific factors.

Substituting (2) into our basic probit model (1) yields the model:

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

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 $t = 1, ..., T$. By including $\overline{Z_i}$ among the explanatory variables, the model can be consistently estimated by maximum likelihood probit estimation, where the random individual effects are numerically integrated out using Gauss-Hermite quadrature.[11] The inclusion of the fixed individual 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 (observed) explanatory variables are calculated as the average effect on the choice probability of stock market participation conditional on the unobserved random individual effect being at its average value, $c_i = 0$.

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the unobservable individual heterogeneity conditional on all explanatory variables, as suggested by Chamberlain (1980). Given the huge size of our unbalanced panel dataset, this turned out to be computationally infeasible.

[11] Butler & Moffitt (1982) shown this to be the most computationally efficient procedure. Furthermore, the approximation of the integral in the likelihood function can be made exact by using P evaluation points, when we have a polynomial of degree $2P-1$ (which is the product of T univariate standard normal cdf's).

5.2 Individual Heterogeneity Probit Results

In this section we comment on the results from the probit model with individual heterogeneity. The results are shown in Table 4.

The first point to notice is that the individual heterogeneity is important and cannot be ignored. The reason is as follows: The estimated value of $\widehat{\sigma}_c^2 = 0.9$ indicates the variance in unobserved utility across individuals relative to the variance across time for each individual. To interpret this cross-individual variance relative to the within-individual variance, we look at $\rho = \frac{\sigma_c^2}{\sigma_c^2+1}$, which indicates the proportion of total variance contributed by the individual specific variance component. Given that $Var(u_{it}) = 1$, this can be interpreted as an indicator of the relative importance of the unobserved individual effect. Thus the high estimate of $\widehat{\rho} = 0.9$ shows that the unobserved individual effect is indeed important. Furthermore, a likelihood ratio test strongly rejects the hypothesis of no serial correlation, $\rho = 0$.

How does taking account of individual heterogeneity affect our results? Overall, the marginal effects of the explanatory variables decrease in absolute size when controlling for observed individual fixed effects and unobserved random individual effects.

We find that the unobserved individual effects are positively correlated with some of the educational fixed effects, and the highest positive correlation is with the economics indicator (the estimates of α_i are shown in the second half of Table 4). The interpretation of this finding is that individuals who are more prone to invest in stocks also have a higher propensity of being economists. This is very plausible, since the observed individual fixed effects pick up some unobserved (time invariant) individual characteristics like (talent,) ability, risk preferences and (investment) tastes. Apart from economics, unobserved time-invariant (fixed) factors that positively affect the individuals propensity of participating in the stock market, also positively affect the propensity of holding an educational asset with the subject of high school, health care, business, agriculture/food/forestry/fishing, educator/teacher or natural sciences/technical educations, as compared to having only 9 years of basic schooling.

Furthermore, the individual effects are positively correlated with all the financial variables, and most strongly (positively correlated) with the bond market participation indicator, and the spouses stock market participation indicator.

In order to further interpret the results, it is useful to rewrite the model in (3) as:

$$S_{it} = \mathbf{1}\left[\beta\left(Z_{it} - \overline{Z_i}\right) + \gamma KFX_t + (\alpha + \beta)\,\overline{Z_i} + c_i + u_{it} > 0\right]. \tag{4}$$

The model in (4) allows one to focus on the time-varying explanatory variables. In (4), the permanent effect of the explanatory variables on representative utility is given by $\alpha + \beta$, and the transitory effect is given by β. For e.g. non-capital income the permanent effect has the clear interpretation as the permanent income effect, cf. Friedman (1957), and the difference between current and permanent income is the transitory income.

The effects of the explanatory variables are identified by the variation for given individuals over time. Focusing on the educational indicators, we note that the effects are identified by the individuals completing the education during the observation period.[12] The only educational subject indicators that give rise to significant transitory effects on the probability of stock market participation are educator/teacher and economics. We see that becoming a educator/teacher slightly lowers the probability of participating on the stock market by 0.2%, while becoming an Economists increases the probability of participating on the stock market by significant 2.2%.

Concerning the permanent effects on the stock market participation probability, the subject of highest completed education that has the highest permanent marginal effect is economics (estimated to be 1.6%). Other educational subjects that also have a significant positive permanent marginal effect on stock market participation (although smaller than economics), are high school, health care, business, agriculture/food/forestry/fishing, educator/teacher, and natural sciences/technical educations. The effects for these groups are lower than for the economist group, however.

Thus we can conclude that controlling for individual heterogeneity does not change our initial conclusions - it only makes the picture even more clear.

6 Robustness Tests

In this section we provide further evidence of the robustness of the results based on the basic probit regression, cf. Section 4.2. To this end we conduct a number of probit regressions, some with additional explanatory variables compared to the basic probit regression

[12] We have controlled that there is enough variation in the variables. E.g. for economists we have that 8,765 individuals are economists for the entire observation period, 1,736 become economists during the period, and the remaining 394,770 individuals remain non-economists for the entire period.

and others based on stratified sub samples. The results are not tabulated, but available upon request.

We run a probit regression similar to the one in Table 2, but assume that the error terms are clustered on individuals instead of IID. This regression allows correlations for individuals over time, but not across individuals. The empirical results hardly change, i.e. our basic results are robust against the assumptions regarding the error terms being IID or clustered.

An interesting extension is a dynamic model with state dependence which captures the fact that 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 on the stock market last period, he has already paid part of the (fixed) 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 conducting 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 equals 0.88, which reveals that stock market participation is highly persistent over time. The marginal effect from the bond market participation indicator falls and so does the marginal effect from the spouse stock market participation indicator. Across all educational groups, the marginal effect from being an economist is still the largest, and much larger than for any of the other groups.

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

Above we argue that the costs associated with time spent on gathering and understand information about the stock market are lower for investors with longer educations. To get a cleaner comparison of educations, we therefore finally estimate the basic probit model on sub samples comprising only investors with at least a medium cycle higher education (16

years/BA), and at least a master degree (18 years), respectively. Once again, we find that the economics education has the highest marginal effect on the stock market participation probability compared to the other educations.

To conclude, our qualitative results are robust to different model specifications: A formal education in economics increases the probability of participating on the stock market by more than any other education, *ceteris paribus*.

7 Conclusion

It is puzzling that so few individuals hold stocks. In our data, only 23% of Danish individuals participate in the stock market, even though standard portfolio theory models predict 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 on the stock market. Previous studies have shown that income, wealth, and 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 and 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 are more prone to hold stocks. The result is astonishingly clear, as a formal education in economics implies that the probability of participating on the stock market is higher than for any other education compared to having 9 years of basic education.

Another interesting result to notice is that the non-capital income has a fairly large marginal effect on the stock market participation, (although smaller than that for economists). Thus, the paper shows that an important asset in the wealth portfolio (in terms of value), namely human capital, is also an important determinant of individuals' choice of investment in other risky assets. Therefore, future theoretical models of portfolio choice and capital asset pricing should include the role of human capital. This is in line with the insights provided by e.g. Palacios-Huerta (2003) and relates to models proposed by e.g. Campbell (1996) and Constantinides & Duffie (1996).

We interpret our results within the framework of economists having better information and knowledge about stock markets and investment opportunities in general. However, there is another, more subtle, potential interpretation of our results: Perhaps economist are more confident about their investment abilities than other groups of investors, and therefore invest more heavily in stocks that are expected to yield higher, but also more risky, returns than safe investments. Such an interpretation is related to the work of e.g. Barber & Odean (2001) who study the relation between *trading* and investor characteristics. Barber & Odean (2001) find that men are overconfident with respect to their investment abilities compared to women, and consequently trade more often than women, i.e. there are individual characteristics that distinguishes different investor groups. Furthermore, Haliassos & Bertaut (1995) find that (apart from income, wealth, and education) departures from expected-utility theory provide a promising explanation of the stock market participation puzzle. If investors learn to act more rationally by formal education in economics, then investor behavior will converge to the rational behavior assumed by expected-utility theory, because of the treatment of an economics education. Thus, our results can also be interpreted as economists being more rational, and therefore being more likely to participate in the stock market. This line of interpretation is related to List (2003), who finds that market experience eliminates important anomalies related to expected-utility theory.

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, an interesting future extension would be to analyze the proportion of investors' financial wealth invested in stocks conditional on participation. To perform this analysis, Vissing-Jørgensen (2002) suggests to estimate 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. This would extend the work of Vissing-Jørgensen (2002), since she does not have access to as detailed educational information as we have.

The above mentioned extensions of our analysis will probably get us even closer towards an explanation of individuals' portfolio choices, and give an even clearer picture of the role of the human capital asset in determining the choices of other risky assets in the individual wealth portfolio.

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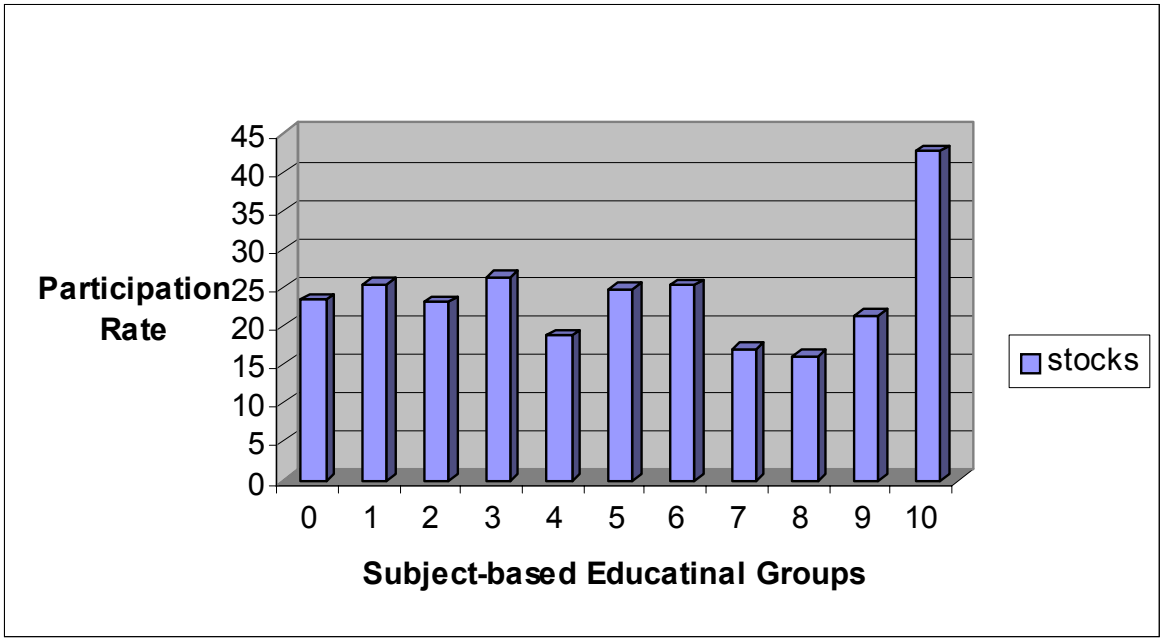

Figure 1: Stock Market Participation across Subject-Based Educational Groups

Note: The figure shows the proportion of investors who hold stocks across subject-based educational groups, 1997-2001. Subject 0: Education. Subject 1: Humanities/arts. Subject 2: Agriculture/food/forestry/fishing. Subject 3: Business (excluding economists). Subject 4: Social sciences (excluding economists). Subject 5: Health care. Subject 6: Natural sciences/technical educations. Subject 7: Police/armed forces/transportation. Subject 8: High school Subject 9: Basic school/preparatory school Subject 10: Economics.

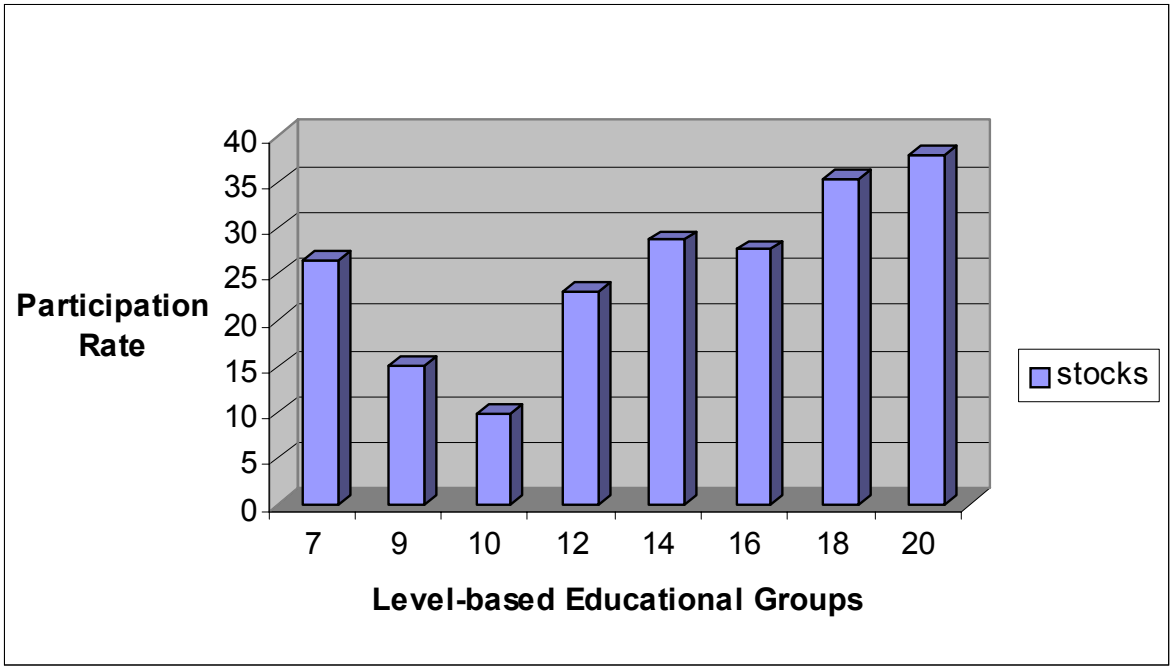

Figure 2: Stock Market Participation across Level-Based Educational Groups

Note: The figure shows the proportion of investors who hold stocks across leve-based educational groups, 1997-2001.

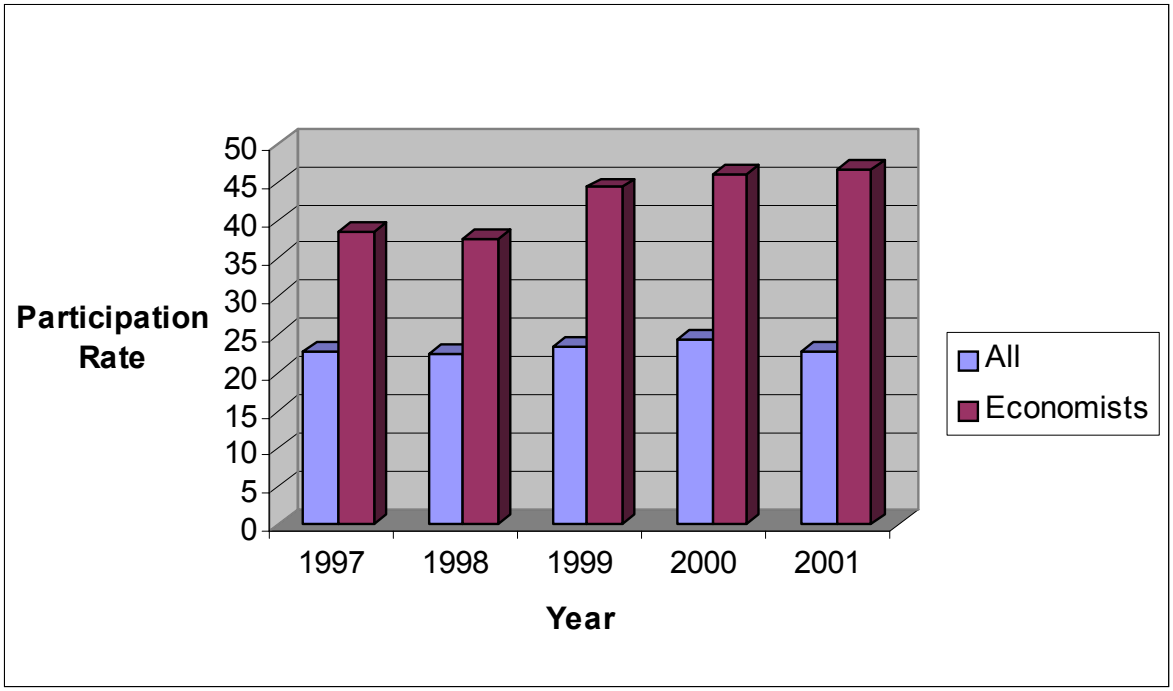

Figure 3: Stock Market Participation over Time

Note: The figure shows the time-series of the proportion of investors (all and economists) who hold stocks.

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	

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	**β_s**	**$d\Phi_s/dx$**
Intercept	-2.2444 ***	
	(0.0083)	
Age	0.0155 ***	0.0043
	(0.0001)	(0.0000)
Married	-0.1755 ***	-0.0492
	(0.0026)	(0.0007)
Male	0.0895 ***	0.0251
	(0.0025)	(0.0007)
Children 0-6 Years	-0.0448 ***	-0.0124
	(0.0037)	(0.0010)
Children 7-18 Years	-0.1058 ***	-0.0288
	(0.0033)	(0.0009)
Bond Market Participation	0.9612 ***	0.3377
	(0.0038)	(0.0015)
Non-capital Income/1,000,000	0.5353 ***	0.1500
	(0.0075)	(0.0021)
Cash Holdings/100,000	0.0235 ***	0.0066
	(0.0002)	(0.0001)
Taxable Property Value/100,000	0.1776 ***	0.0497
	(0.0016)	(0.0004)
Cumpulsory Pension Contribution /10,000	0.0095 ***	0.0027
	(0.0004)	(0.0001)
Private Pension Contribution/10,000	0.0259 ***	0.0073
	(0.0007)	(0.0002)
KFX	0.1588 ***	0.0445
	(0.0057)	(0.0016)
Student, Government Grant	0.1360 ***	0.0399
	(0.0058)	(0.0018)
Student, Wage	0.0146 **	0.0041
	(0.0070)	(0.0020)
Spouse Education, Economics	-0.1081 ***	-0.0289
	(0.0073)	(0.0019)
Spouse Bond Market Participation	-0.1645 ***	-0.0432
	(0.0050)	(0.0012)
Spouse Stock Market Participation	0.9380 ***	0.3181
	(0.0030)	(0.0011)
Length of Education	0.0222 ***	0.0062
	(0.0007)	(0.0002)
Educator/Teacher	-0.0813 ***	-0.0221
	(0.0081)	(0.0021)
Humanities/Arts	-0.0286 ***	-0.0079
	(0.0103)	(0.0028)
Agriculture/Food/Forestry/Fishing	0.0877 ***	0.0254
	(0.0062)	(0.0018)
Business (excl. Economics)	0.1312 ***	0.0382
	(0.0048)	(0.0014)
Social Science (excl. Economics)	0.0290 ***	0.0082
	(0.0079)	(0.0023)
Health Care	0.0002	0.0001
	(0.0069)	(0.0019)
Natural Sciences/Technical Educations	0.0818 ***	0.0234
	(0.0049)	(0.0014)
Police/Armed Forces/Transportation	-0.0136	-0.0038
	(0.0121)	(0.0034)
High School	0.1520 ***	0.0447
	(0.0058)	(0.0018)
Economics	0.5447 ***	0.1819
	(0.0081)	(0.0030)

Table 2: *(continued)*

Observed Probability, P1	0.2310327
Predicted Prob. (at mean), P1	0.200189
Log likelihood	-825954
Pseudo R-square	0.183
Number of Observations	1870324
Number of Investors	405271

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, Level-Based Educational Groups

Explanatory Variables	βs	dΦs/dx
Intercept	-2.0400 ***	
	(0.0062)	
Age	0.0143 ***	0.0040
	(0.0001)	(0.0000)
Married	-0.1771 ***	-0.0498
	(0.0026)	(0.0007)
Male	0.0943 ***	0.0264
	(0.0023)	(0.0007)
Children 0-6 Years	-0.0423 ***	-0.0117
	(0.0037)	(0.0010)
Children 7-18 Years	-0.1150 ***	-0.0312
	(0.0033)	(0.0009)
Bond Market Participation	0.9699 ***	0.3412
	(0.0038)	(0.0015)
Non-capital Income/1,000,000	0.5716 ***	0.1603
	(0.0075)	(0.0021)
Cash Holdings/100,000	0.0236 ***	0.0066
	(0.0002)	(0.0001)
Taxable Property Value/100,000	0.1755 ***	0.0492
	(0.0016)	(0.0004)
Cumpulsory Pension Contribution /10,000	0.0117 ***	0.0033
	(0.0004)	(0.0001)
Private Pension Contribution/10,000	0.0252 ***	0.0071
	(0.0007)	(0.0002)
KFX	0.1585 ***	0.0444
	(0.0057)	(0.0016)
Student, Government Grant	0.1594 ***	0.0472
	(0.0054)	(0.0017)
Student, Wage	0.0447 ***	0.0128
	(0.0071)	(0.0021)
Spouse Education, Economics	-0.0372 ***	-0.0103
	(0.0072)	(0.0020)
Spouse Bond Market Participation	-0.1593 ***	-0.0420
	(0.0050)	(0.0012)
Spouse Stock Market Participation	0.9355 ***	0.3174
	(0.0030)	(0.0011)
7-Year Education	0.0348 ***	0.0098
	(0.0045)	(0.0013)
10-Year Education	0.0162 **	0.0046
	(0.0067)	(0.0019)
12-Years Education	0.2146 ***	0.0608
	(0.0038)	(0.0011)
14-Year Education	0.3008 ***	0.0938
	(0.0066)	(0.0022)
16-Year Education	0.2227 ***	0.0669
	(0.0048)	(0.0015)
18-Year Education	0.2604 ***	0.0800
	(0.0063)	(0.0021)
20-Year Education	0.3972 ***	0.1285
	(0.0233)	(0.0084)

Table 3: *(continued)*

Observed Probability, P1	0.2310
Predicted Prob. (at mean), P1	0.2006
Log likelihood	-828824
Pseudo R-square	0.1802
Number of Observations	1870324
Number of Investors	405271

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 9-year 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 4: Probit Model for Stock Market Participation with Individual Effects

Explanatory Variables	β_s	$d\Phi_s/dx$
Intercept	-6.0888 ***	
	(0.0496)	
Age	0.0373 ***	0.0004
	(0.0006)	(0.0000)
Married	-0.4790 ***	-0.0062
	(0.0156)	(0.0003)
Male	0.2305 ***	0.0028
	(0.0133)	(0.0002)
Children 0-6 Years	0.0720 ***	0.0009
	(0.0158)	(0.0002)
Children 7-18 Years	-0.0088	-0.0001
	(0.0157)	(0.0002)
Bond Market Participation	-0.0757 ***	-0.0008
	(0.0115)	(0.0001)
Non-capital Income/1,000,000	0.5286 ***	0.0064
	(0.0227)	(0.0003)
Cash Holdings/100,000	0.0018 **	0.0000
	(0.0007)	(0.0000)
Taxable Property Value/100,000	-0.0328 ***	-0.0004
	(0.0083)	(0.0001)
Cumpulsory Pension Contribution /10,000	0.0055 ***	0.0001
	(0.0009)	(0.0000)
Private Pension Contribution/10,000	0.0143 ***	0.0002
	(0.0014)	(0.0000)
KFX	0.3859 ***	0.0046
	(0.0116)	(0.0002)
Student, Government Grant	-0.0909 ***	-0.0010
	(0.0186)	(0.0002)
Student, Wage	-0.1016 ***	-0.0011
	(0.0205)	(0.0002)
Spouse Education, Economics	-0.3189 ***	-0.0026
	(0.0490)	(0.0003)
Spouse Bond Market Participation	-0.1872 ***	-0.0018
	(0.0174)	(0.0001)
Spouse Stock Market Participation	1.4473 ***	0.0744
	(0.0126)	(0.0018)
Length of Education	-0.0018	0.0000
	(0.0089)	(0.0001)
Educator/Teacher	-0.2424 ***	-0.0022
	(0.0908)	(0.0006)
Humanities/Arts	-0.0964	-0.0010
	(0.1036)	(0.0010)
Agriculture/Food/Forestry/Fishing	-0.0199	-0.0002
	(0.0774)	(0.0009)
Business (excl. Economics)	0.0163	0.0002
	(0.0699)	(0.0009)
Social Science (excl. Economics)	0.0120	0.0001
	(0.0662)	(0.0008)
Health Care	-0.1042	-0.0011
	(0.0774)	(0.0007)
Natural Sciences/Technical Educations	0.0472	0.0006
	(0.0660)	(0.0009)
Police/Armed Forces/Transportation	-0.0829	-0.0009
	(0.1133)	(0.0011)
High School	-0.0504	-0.0006
	(0.0530)	(0.0006)
Economics	0.7220 ***	0.0222
	(0.0849)	(0.0051)

Table 4: *(continued)*

Mean(Married)	0.1540 ***	0.0019
	(0.0211)	(0.0003)
Mean(Children 0-6 Years)	0.1205 ***	0.0015
	(0.0289)	(0.0004)
Mean(Children 7-18 Years)	-0.0310	-0.0004
	(0.0245)	(0.0003)
Mean(Bond Market Participation)	4.4260 ***	0.0533
	(0.0311)	(0.0012)
Mean(Non-capital Income/1,000,000)	0.0000 ***	0.0000
	(0.0000)	(0.0000)
Mean(Cash Holdings/100,000)	0.0000 ***	0.0000
	(0.0000)	(0.0000)
Mean(Taxable Property Value/100,000)	0.0000 ***	0.0000
	(0.0000)	(0.0000)
Mean(Cumpulsory Pension Contribution /10,000)	0.0000 ***	0.0000
	(0.0000)	(0.0000)
Mean(Private Pension Contribution/10,000)	0.0000 ***	0.0000
	(0.0000)	(0.0000)
Mean(Spouse Education, Economics)	-0.1558 **	-0.0019
	(0.0656)	(0.0008)
Mean(Spouse Bond Market Participation)	-0.7409 ***	-0.0089
	(0.0396)	(0.0005)
Mean(Spouse Stock Market Participation)	1.9614 ***	0.0236
	(0.0205)	(0.0005)
Mean(Length of Education)	0.0418 ***	0.0005
	(0.0096)	(0.0001)
Mean(Educator/Teacher)	0.2784 ***	0.0034
	(0.1009)	(0.0012)
Mean(Humanities/Arts)	0.1858	0.0022
	(0.1153)	(0.0014)
Mean(Agriculture/Food/Forestry/Fishing)	0.2963 ***	0.0036
	(0.0850)	(0.0010)
Mean(Business (excl. Economics))	0.3323 ***	0.0040
	(0.0748)	(0.0009)
Mean(Social Science (excl. Economics))	0.0906	0.0011
	(0.0804)	(0.0010)
Mean(Health Care)	0.3652 ***	0.0044
	(0.0861)	(0.0010)
Mean(Natural Sciences/Technical Educations)	0.1597 **	0.0019
	(0.0713)	(0.0009)
Mean(Police/Armed Forces/Transportation)	0.1464	0.0018
	(0.1304)	(0.0016)
Mean(High School)	0.3858 ***	0.0046
	(0.0625)	(0.0008)
Mean(Economics)	1.3520 ***	0.0163
	(0.0946)	(0.0012)
σ_c	3.0328	
	(0.0069)	
ρ	0.9019	
	(0.0004)	
Log likelihood	-418504	
LR test of ρ=0	7,80E+05	
Number of Observations	1870324	
Number of Investors	405271	

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. 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.