Preliminary and incomplete.
Please do not distribute.

IQ and Stock Market Participation*

Mark Grinblatt
UCLA Anderson School of Management

Matti Keloharju
Helsinki School of Economics and CEPR

Juhani Linnainmaa
University of Chicago Booth School of Business

April 22, 2009

Preliminary and incomplete. Please do not distribute.

ABSTRACT

An individual's IQ stanine, measured early in adult life, is monotonically related to his stock market participation decision later in life. The high correlation between IQ and participation, which exists even among the 10% most affluent individuals, controls for wealth, income, and other demographic and occupational information. An instrumental variables approach with data on siblings is used to show that our results apply to both females and males and that reverse causality with an omitted variable does not account for our findings.

Keywords: Intelligence, household finance, market participation

JEL classification: D14, G11

---

* We would like to thank the Finnish Armed Forces, the Finnish Central Securities Depository, the Finnish Tax Authorities, and the Helsinki Exchanges for providing access to the data, as well as the Office of the Data Protection Ombudsman for recognizing the value of this project to the research community. Our appreciation also extends to Antti Lehtinen who provided superb research assistance, and to Emir Kamenica, Adair Morse, and Annette Vissing-Jørgensen, who generated many insights that benefited this paper. We also thank Markku Kaustia, Samuli Knüpfer, Lauri Pietarinen, and Elias Rantapuska for participating in the analysis of the Finnish Central Securities data, as well as Rena Repetti and seminar participants at the University of Chicago for comments on earlier drafts. We acknowledge financial support from the Academy of Finland, the OP-Pohjola Research Foundation, and the Wihuri Foundation.

Stock market participation rates are low throughout the world. In the U.S., fewer than 50% of individuals invest in the stock market, either directly or indirectly (e.g., via mutual funds in retirement and non-retirement accounts). Participation tends to be even lower in Europe.[1] Such low participation rates puzzle economists because non-participation is inconsistent with virtually every neoclassical model of portfolio choice. In these models, everyone invests something in risky stocks because the equity premium is positive and individuals are locally risk-neutral at zero risky investment.[2]

We study stock market participation at the end of 1999 as a function of IQ measured early in adult life. The IQ scores are comprehensive for Finnish males in a 20-year age range because they are obtained on induction into Finland's mandatory military service. We have IQ data on all inductees who took the IQ test between 1982 and 2001, as well as stock registry data that can unambiguously assess whether they own stock at any point after 1995. We also have access to data from the 1999 tax returns of approximately 160,000 of these inductees. These tax returns contain subject-level controls for wealth, income, employment status, marital status, children, age, home and foreign asset ownership, primary language, employment status, and occupation (including whether one is an entrepreneur or finance professional). We instrument for education, using zip code level data.

With all controls, probit regression coefficients on IQ stanine dummies exhibit a perfectly monotonic pattern: Individuals with the highest IQ scores are most likely to participate; those with the second highest scores participate more than those with the third highest scores, and so

---

[1] See Guiso, Sapienza, and Zingales (2008).

[2] See Arrow (1965).

forth. IQ also remains a statistically and economically significant predictor of the participation decision even among the most affluent 10% of individuals. The economic size of the IQ effect is remarkably large—larger than the effect of income on participation.

Our paper fits into a body of theoretical and empirical research that tries to identify the factors that keep potential investors out of the stock market.[3] This body of inquiry addresses a key issue in asset pricing: whether suboptimal behavior or frictions account for non-participation. Understanding the more primitive forces underlying non-participation may help to develop models of asset pricing that are more consistent with extant data. For example, a sufficient degree of non-participation, exogenously assumed, can help resolve the equity premium puzzle of Mehra and Prescott (1985) and the low risk-free rate puzzle of Weil (1989). This is because the consumption of stockholders differs considerably from the consumption of non-participants.[4] Such models are less relevant to our understanding of asset pricing if non-participation arises from a costly friction that is also born by the marginal investor. On the other hand, suppose that suboptimal behavior, arising from cognitive impairment, drives non-participation. In this case, a large block of investors are infra-marginal for reasons that have nothing to do with asset prices and nonparticipation by these investors could generate a high market risk premium.

---

[3] Haliassos and Bertaut (1995), using data from the U.S. Survey of Consumer Finances, conclude that "inertia and departures from expected-utility maximization" are more promising explanations. Vissing-Jørgensen (2003) finds that moderate fixed participation costs can explain the non-participation of many U.S. households. However, Mankiw and Zeldes (1991) and Heaton and Lucas (2000) conclude that fixed participation costs do not explain why non-participation rates are low also among the wealthiest investors. To explain the latter, researchers have turned to lack of awareness about the stock market (Hong, Kubik, and Stein 2004; Guiso and Jappelli 2005), non-standard preferences with agents exhibiting ambiguity aversion (Dow and Werlang 1992; Cao, Wang, and Zhang 2005), lack of education (Campbell 2006; Calvet, Campbell, and Sodini 2007; Christiansen, Joensen, and Rangvid 2008; Rooij, Lusardi, and Alessie 2007), and lack of trust (Guiso, Sapienza, and Zingales 2008).

[4] See Mankiw and Zeldes (1991), Basak and Cuoco (1998), Brav, Constantinides, and Geczy (2002), Vissing-Jørgensen (2002), Vissing-Jørgensen and Attanasio (2003), and Malloy, Moskowitz, and Vissing-Jørgensen (2008).

We also employ geographic data going to back to the birth year of our oldest subject to identify siblings. Motivated by the advantages of the classic instrumental variables approach, we employ the measured IQ score of a brother as the instrument for the IQ of the remaining siblings—both brothers and sisters—for which we have 1999 control variables from the tax data set. Despite the errors-in-variables bias towards a finding of no IQ-participation relation, we find that predicted IQ from a brother's IQ exam plays a significant role in stock market participation decisions. Indeed, the same specification as that for the non-instrumented approach yields very similar coefficients for IQ.

The paper is organized as follows. Section I describes the sample's data and summary statistics. Section II, where we present our results, contains three analyses: all individuals, affluent individuals, and instrumental variables analysis of siblings – both male and female. We end with a summary and conclusion section.

I. Data and Summary Statistics

A. Data Sources

We merge five data sets for our analysis.

Finnish Central Securities Depository (FCSD) Registry. This contains the daily portfolios and trades of all Finnish household investors in FCSD-registered stocks (all traded Finnish stocks and all foreign stocks traded on the Helsinki Exchanges) from January 1, 1995 through November 29, 2002. The electronic records we use are exact duplicates of the official certificates of ownership and trades, and hence are very reliable.[5] We analyze the FCSD holdings at the end of 1999, the date that coincides with the 1999 report dates for control variables from our tax data. Participation is a dummy variable that takes on the value one for subjects who held any FCSD-registered stock on December 31, 1999.[6]

FAF Intelligence Assessment. Around the time of induction into mandatory military duty in the Finnish Armed Forces (FAF), typically at age 19 or 20, and thus generally prior to significant stock trading, males in Finland take a battery of psychological tests to assess which conscripts are most suited for officer training. One portion consists of 120 questions that measure cognitive functioning in three areas: mathematical ability, verbal ability, and logical reasoning. The results from this test are aggregated into a composite intelligence score. The FAF composite intelligence score, which we use and refer to as IQ, is standardized to follow the stanine distribution (integers 1 through 9 with 9 being most intelligent). We have test results for all exams taken between January 1, 1982 and December 31, 2001.[7]

Compared to other countries, IQ variation in Finland is less likely to reflect differences in culture or environmental factors like schooling that might be related to successful stock market participation. For example, the Finnish school system is remarkably homogeneous: all education, including university education, is free and the quality of education is uniformly high across the

---

[5] Grinblatt and Keloharju (2000) provide the relevant details about this data set.

[6] Our robustness checks analyze broader definitions of participation.

[7] The FAF's internal documents conclude that the composite score has high reliability. Historically, the military has considered the IQ assessment to be unreliable for 7.2% of the conscripts. Individuals with unreliable ability scores are left out from our analysis.

country.[8] The country is also racially homogeneous. These factors make it more likely that differences in measured IQ in Finland reflect genuine differences in innate intelligence.

Finnish Tax Administration Data. The Finnish Tax Administration (FTA) provides entries from the 1999 tax returns of all individuals domiciled in the provinces of Uusimaa and East Uusimaa, a region encompassing Greater Helsinki, as well as data from a population registry. Variables constructed from this source include labor income, taxable wealth from all sources, whether one owns various assets (a home, a forest, or foreign assets), native language (Finnish or Swedish), marital status (single, married, or unmarried but cohabiting), whether one has any dependents under 18 years old, occupation (including whether one is an entrepreneur, farmer, or finance professional), employment status, and year of birth. We also use the gender variable from the FTA data set to obtain a comprehensive sample of females from the two provinces and record observations for the same set of variables described above.

Finnish Address Data Set. A supplementary section to the tax return data contains current and historical addresses for all individuals domiciled in the provinces of Uusimaa and East Uusimaa. These also report move-in and move-out dates. These data contain each subject's residences for each day in 1998, 1999, and 2000, the move-in date for the first address in this 3-year period, and the move-in date for the prior address if later than the birth year. For example, if a person was born on February 7th, 1950, moved to a new address on June 10, 1968, and resided there until 2001, the data show both the first and the second address, with the move-in date for the first address coinciding with the person's birth date. All addresses were converted to latitude and longitude coordinates. The coordinates were then translated and rotated with parameters that

---

[8] See, for example, a recent article in the Economist (December 6, 2007) and Garmerman (2008).

were destroyed to maintain anonymity. We use the historical location data to determine brother-brother and brother-sister sibling pairs. Two individuals born within 15 years of one another are siblings if they can be classified as either (i) moving on that date to the same location or (ii) living in a single family dwelling at the same geographic location at that date. We also use transitivity to establish sibling pairs. For example, suppose A and B are siblings, based on the criteria above, with only A having an IQ score. If B or C can be established to be a sibling pair, based on the criteria above, then A and C is a sibling pair. We verify this by denoting A and C as a sibling pair if their move (or lived-in address) indicated that there was a common adult at the address.[9] Our sample restricts siblings to be 20 or older as of December 31, 1999.

Finnish Census Data Set. We employ average education level of adults within each zip code to control for the education level of a subject living within a zip code at the end of 1999. The census data set breaks educational attainment into four categories: basic education which ends at 9th grade, vocational education, matriculation (a high-school diploma as determined by passing a college-prep examination at the end of 12th grade), and university degree. For each zip code and each of five age groups – 18-24, 25-34, 35-44, 45-54, and 55 or older – the data set reports what fraction of the age group attained each of these education levels. We estimate the education attained by each individual as the average for their December 31, 1999 age group and zip code of residence.

---

[9] We know these rules establish reliable sibling pairs because when we apply the rules to identify brother-brother pairs where both have IQ scores, the IQ correlation is 0.4. This correlation is similar to those found in the literature on IQ and families. Herrnstein and Murray (1994), for example, survey the literature and adopt a 60-percent estimate for the heritability of IQ. Bound, Griliches, and Hall (1984) report a brother-brother correlation of 0.440 and brother-sister correlation of 0.480 in the U.S. National Longitudinal Surveys of Young Men and Young Women.

B. Summary Statistics

Table 1 reports summary statistics on the sample of 159,342 males who took the FAF intelligence test between 1982 and 2001 for whom we have both a reliable IQ score and 1999 tax returns. (We later extend our analysis to 6,181 brothers and sisters of the male subjects.) The data window, combined with the requirement that one enters the military before age 29, means that all subjects in the sample were born between 1953 and 1983. Thus, we lack intelligence data on older individuals. Panel A describes the distribution of IQ scores for the sample used in our regression, for the entire Finnish Armed Forces data set, and the theoretical distribution. Panel B provides the average values of the variables from which we develop regression variables (often as decile-based categorical dummy variables). In addition to reporting the averages for all male subjects in the study, it reports average values based on whether the males participate in the stock market. Panel C describes means of these same variables as a function of IQ.

Panels A shows that the intelligence scores in our sample are slightly higher than both the theoretical stanine distribution and the scores of males throughout Finland.[10] This is because the FTA (tax) data, from which we derive most of our controls, come from those who reside either in the largest and the most urban province in Finland (Uusimaa) or its neighboring province (East Uusimaa). These provinces tend to attract affluent professionals. This mean effect is of little concern, as there are sufficiently large sample sizes within each IQ stanine.

[10] The latter differ from the theoretical distribution because IQ scores that the FAF deems unreliable are thrown out of the data set.

Panel B shows that the participant and non-participant groups markedly differ in their IQ scores. Participants' average IQ stanine is almost a full point (about half a standard deviation) above the average for non-participants. Figure 1, which graphs IQ distribution for participants and non-participants, illustrates that the difference in the average IQ scores of participants and non-participants does not arise from a preponderance of IQ scores of any one stanine for either group. There are relatively fewer participants in every below-average IQ stanine and more in every above-average IQ stanine.

Panel B also shows that stock market participants differ from non-participants for all of the variables used to construct regressor controls. Participants have significantly higher labor income. The average stock market participant collects annual wages of 25,899 euros per year; this is almost 50% more than non-participants' average of 17,566 euros. Similarly, participants are wealthier and have a greater tendency to own homes, forests, and foreign assets.

Using zip-code level education data broken down by age groupings, we find that non-participants are more likely to have attained only basic education (less than high school) while participants are more likely to have completed university education. The other demographic variables, such as homeownership, employment, and marital status, also are related to market participation. Market participants are more likely to own homes than non-participants, are 1.4 times more likely to marry, and 1.2 times more likely have kids. Market participants are almost four times more likely to work in the finance profession and three times less likely to be unemployed than non-participants.

Panel C, which presents averages for these same variables conditional on IQ stanine, shows that many of these same variables are related to IQ. Income and wealth are almost perfectly monotonic in IQ score. For example, income increases from 14,614 euros per year for stanine 1 to 25,376 euros per year for stanine 9. Taxable net wealth increases from just 3,467 euros for the lowest IQ category to 43,470 euros for the highest IQ category. Using zip-code level data, the proportion of individuals attaining only a basic education monotonically decreases from 36.9% for the lowest IQ score category to 29.0% for the highest IQ score category. At the same time, the fraction of individuals with university-level education monotonically increases from 13.5% to 20.7% as the IQ stanine increases. The differences across IQ stanines of the demographic variables are often equally remarkable. The unemployment rate of the lowest IQ stanine is 25.4%, in contrast to the 2.7% rate observed among those with the highest IQ stanine. The homeownership rate increases from 26.3% to 39.5%; the marriage rate goes from 21.4% to 31.5%; and the fraction of people working in the finance profession increases from 0.1% to 2.1% as we move from the least intelligent category to the most intelligent. Most notable, however, is that the stock market participation rate increases perfectly monotonically: from 7.9% for stanine 1 to 37.6% for stanine 9.

Some of the relationships documented above diminish or disappear when controlled for in a multivariate setting. For this reason, our primary analysis makes use of regression to address the issue of the marginal effects of IQ and the other variables listed above.

II. Regression Results

A. Probit Regressions of Participation Decision on IQ

Table 2 reports estimates from probit regressions. The table includes probit coefficients, marginal participation rate effects (at the average values of non-IQ regressors), and test statistics (from zip-code clustered residuals) for regressions of a stock market participation dummy against IQ stanine dummies and a host of control variables. As described earlier, the participation variable is one if an individual holds FCSD stocks at the end of 1999 and zero otherwise. The highest IQ score, stanine 9, serves as the omitted category. The 1,418.8 Wald statistic at the bottom of the column tests whether the participation rate of the highest IQ stanine differs from the other eight stanines. The critical chi-squared value of the Wald statistic using the 0.001 significance level is 26.1. Note that effect of IQ on participation is perfectly monotonic. Individuals with the lowest IQ score are less likely to own stock than individuals with the second lowest IQ scores, who in turn are less likely to own stock than individuals with the third lowest IQ scores, and so forth. The economic significance is equally impressive. The marginal effects column indicates that the highest IQ investors are 2.6 times (0.247 / (0.247 – 0.154)) more likely to participate in the stock market than the lowest IQ investors.

The regression control variables are described in the prior data section. They include educational attainment proxies, fixed effects for age, as well as dummy variables for income decile, wealth decile, certain types of wealth ownership and occupations, native language, marital status, and employment status. A few of these variables have previously been used in the participation literature. Many of the explanatory variables are highly significant. For example, individuals with ordinary (i.e., labor) income in deciles other than the tenth decile are significantly less likely to be stock market participants. Moreover, the coefficients are impressive. For example, the marginal effects column indicates that the highest income decile (omitted) has a participation rate of at least 4.4% more than any other decile, keeping other observables, including wealth, fixed. Unemployed individuals have a participation rate that is

8.8% lower than employed individuals. Finance professionals' participation rate is 11.0% higher than others.

As impressive as the coefficients on the controls are, the most striking coefficients largely belong to IQ. The marginal effects and probit coefficients of the two lowest stanines (about 11% of the sample) are about 1.5 times as large as the marginal impact of being in the lowest income decile. This is all the more remarkable when one considers that the IQ test is just 120 questions and, for most subjects, it is scored many years before participation is analyzed; income, by contrast, is measured contemporaneously with participation and is deemed to be highly reliable because there are civil and criminal penalties associated with false reporting. Wealth seems to be relatively more important, but remember that participation causes wealth: 1999 was a very good year to be in the Finnish stock market and the 1990s were a good decade to be in Finnish stocks. Moreover, the importance of wealth is most apparent only for individuals with no wealth at all and for individuals who are in the top wealth decile. While the participation rate of the top wealth decile subjects exceeds that of the ninth decile subjects, no similar difference exists for adjacent deciles, except the poorest and second poorest deciles.

Table 2's marginal effects column can be used for a back of the envelope calculation of how much wealth is kept out of the market by low IQ. Table 2 indicates that the participation rate for the lowest IQ individuals (with taxable wealth of 3,467 euros according to Table 1 Panel C) is 12.2% lower than that for the highest IQ stanine individuals. Suppose we keep all observables constant and hypothetically "smarten" those in the lowest stanine IQ by forcing them to take a magical "smart pill." After taking the pill, they all suddenly transform into stanine 9 geniuses. This would imply that 533 more euros per each of the 5,620 stanine 1 individuals would participate in the stock market—a stock market participation increase of 3 million euros.

Smartening the remaining stanines in an analogous manner increases the total taxable wealth of stock market participants by 80 million euros. By contrast, the current amount of taxable wealth held by stockholders is 498 million euros for our sample of individuals. Thus, keeping other observables fixed, artificial shocks that generate participation for all on a par with the participation rate of IQ stanine 9 individuals hypothetically increases the amount of wealth in stocks by about 16%.

B. Participation Decisions of the Affluent Individuals

We now examine the participation decisions of affluent individuals. The affluent play a prominent role in the debate about whether nonparticipation affects asset pricing. If fixed participation costs rationally deter participation, only the poor are affected. This type of nonparticipation has little influence on asset prices, as only a negligible amount of wealth fails to participate in the stock market.[11] This would not be true if the mechanism that underlies non-participation also keeps the wealthiest out of the market. Curcuru, Heaton, Lucas, and Moore (2004) and Campbell (2006) observe that the degree non-participation among wealthy individuals is puzzling. Partly, this is because participation costs seem to be an implausible explanation for nonparticipation among the wealthy and other mechanisms that might account for this have not been verified empirically.

By limiting our analysis to the most affluent individuals in the sample, we can examine whether cognitive deficits might plausibly explain non-participation decisions. These affluent

[11] See Cochrane (2007).

individuals should not be subject to any fixed cost or minimum investment barriers of entry to the stock market. Another motivation is that one cannot explain IQ-related nonparticipation of the affluent as a spurious consequence of noisy measurement of income or wealth controls. It would take an implausibly large amount of measurement error to misclassify those too poor to rationally bear participation costs as belonging to the 10% most affluent class. Even if such misclassification occurs in rare instances, one would not expect to observe IQ coefficients of similar magnitude to those in Table 2 due to errors-in-variables or related estimation biases.

Table 3 employs the probit regression methodology of Table 2 to estimate the participation regressions for affluent individuals. The Panel A specification is restricted to subjects with ordinary income in the top decile; the Panel B specification restricts the sample to those with taxable net wealth in the top decile. In contrast to Table 2's regressions, the former regression omits income decile controls and the latter omits wealth decile controls.

Both definitions of affluence lead to the same conclusion: IQ significantly predicts the participation decision, even among these most affluent individuals. The IQ score coefficient pattern remains almost perfectly monotonic. The economic significance column indicates that the participation rate for the lowest IQ stanine is 7.5% lower than the rate of the highest IQ stanine for the income-affluent specification and 24.3% lower for the wealth-affluent specification. Although the sample is smaller, which tends to increase standard errors of the estimates, the slopes on low IQ stanine dummies are almost identical in magnitude in the wealth specification than the slopes estimated from all individuals in Table 2. The insignificant *z*-statistic in the income-affluent specification for stanine 1 does not affect the conclusion here. The slope estimate for the stanine 1 category has to be estimated with low precision: Only 105 of the

15,617 most income-affluent individuals are in the lowest IQ stanine. These results all speak to IQ's important role in the participation decisions of the most affluent individuals.

C. Evidence on Siblings

The geographic location and move-in/move-out dates in the Finnish tax data, described earlier, identify 6,181 subjects (both male and female) who are at least 20-years old as of December 31, 1999 and have a brother who is a data subject in Table 2.[12] Table 4 repeats the probit regression of Table 2 for these siblings. Panel A reports the analysis for all of them, Panel B for those siblings who are brothers, and Panel C for those who are sisters of the Table 2 subjects. In contrast to Table 2, all of the IQ stanine dummies in Table 4's probit regressions are based not on actual stanines, but on the stanines of the brothers they are paired with. The key motivation for instrumenting IQ with sibling IQ is to eliminate the bias arising from omitted controls that are caused by the person's own IQ. In the classic instrumental variables motivation, estimation of the model (with coefficient vectors b_1, b_2, b_3)

$$\text{participation}(j) = b_0 + b_1{*}\text{IQ}(j) + b_2{*}\text{observed controls}(j) + b_3{*}\text{unobservable controls}(j) + e(j),$$

leads to a biased estimate of the coefficient vector b_1. This is because the unobservable controls are correlated with one's actual IQ, as would be the case with the linear specification

$$\text{unobservable control}(j) = c_0 + c_1{*}\text{IQ}(j) + z(j).$$

[12] Because of the nature of the historical address data set and the requirement that siblings be at least 20 years of age, the sibling sample is far smaller than the sample of 159,342 subjects from our prior analysis.

Using the brother's IQ(j) stanine dummy vector in the first equation as a substitute for one's actual IQ stanine dummy vector (which sometimes is and sometimes is not available) eliminates the bias from failure to include unobservable controls(j) in that regression. It has the additional virtue of allowing us to study IQ's role in female participation.

The significant IQ coefficient estimates in Table 4's regressions suggest that IQ scores do not spuriously predict stock market participation because of some omitted variable that is caused by the person's own IQ. These coefficient estimates are nearly monotonic in instrumented IQ, often statistically significant, and very similar between brother-brother pairs (Panel B) and brother-sister pairs (Panel C). By contrast, many of the control variables, except for wealth, are statistically insignificant in Table 4's sibling regressions.

Moreover, Table 4's instrumented IQ coefficient estimates are nearly of the same economic magnitude as Table 2's estimates. This is surprising because the instrumented IQ stanine regressors are noisy proxies for the true values and the average degree of participation among Table 4's siblings tends to be far lower than those of their brothers from Table 2 because of the former's relative youth. In Panel A, siblings whose Table 2 brothers are in the highest IQ stanine are 2.3 times more likely to participate in the stock market than those whose brothers are in the lowest IQ stanine. Table 2's analogous ratio is 2.6.

III. Conclusion

An individual's IQ stanine, measured early in adult life, is monotonically related to his stock market participation later in life. The high correlation between IQ and participation, which exists even among the 10% most affluent individuals, controls for wealth, income, and other demographic and occupational information. The economic size of the IQ effect is remarkably large even after controlling for each subject's observable characteristics: the participation rate for individuals in the lowest IQ stanine is 15.4% lower than what it is for individuals at the other end of the spectrum. This IQ effect is far larger than the effect of income on participation. Instrumenting for IQ with brother's scores does not alter our conclusions, suggesting that omitted variables bias is not relevant here – at least for any omitted variable that is caused by own IQ, such as permanent income.

Our finding on IQ's role in the limited participation puzzle also has ramifications for another puzzle: the sizable premia of stocks. Cochrane (2007) criticizes models that use limited participation to explain the equity risk premium puzzle because they exogenously assume limited participation. By failing to model what drives limited participation, they risk being internally inconsistent. For example, Cochrane (2007) argues that non-participation, when driven by the costs of stock market participation, may have little influence on the pricing kernel (and, as a consequence, the equity risk premium). This is because the participation costs of the wealthy are negligible and the consumption of the wealthy constitutes most of aggregate consumption. If nonparticipation were driven by participation costs, only the poorest individuals would be absent from the stock market, and thus, nonparticipation could have only a limited effect on asset prices. Our finding, that cognitive impairment prevents many of the wealthy from participating in the stock market, suggests that the consumption of the smarter individuals, rather than the wealthy, may be what drives the pricing kernel. Moreover, the substantial degree of non-participation by the affluent is explained by a relationship between participation and IQ that is as strong for the affluent as it is for the general population.

Our results are conservative in that the inclusion of wealth as a control also leads to an endogeneity bias. Those who participate, for reasons other than the fact that they are wealthy, became wealthier at the end of 1999 as a consequence of choosing to invest in stocks. To the extent that the reason for investing in stocks is related to IQ, wealth endogenously picks up some of this effect. This means that our IQ coefficients are conservative.

We also tested whether our findings are robust to other definitions of participation. Using the decision to hold either individual stocks or mutual funds as the variable of interest leads to even stronger results. We could not assess the degree to which a better measure of education weakens the link between IQ and participation. No better measure of education was made available to us. Because of issues like this, we cannot say that IQ is some magical genetic characteristic, like physical brain size, which causes participation. IQ may have unobservable correlates that may be common to families, which we do not control for. This issue is one we continue to study.

As with any experimental design of this sort, one can always argue that omitted variables bias and errors in variables bias is the culprit behind the significant IQ coefficients and that innate cognitive ability per se plays no role in participation. However, we employ an enormous number of controls from the tax data set. It is truly difficult to believe that the usual suspects are going to overturn our major findings. The fact that 120 questions from an IQ test taken years before we measure participation explains as much if not more than contemporaneous controls like income is truly remarkable.

References

Allen, Franklin and Douglas Gale, 1994, Limited market participation and volatility of asset prices, American Economic Review 84, 933-955.

Arrow, Kenneth J., 1965, *Aspects of the Theory of Risk Bearing*. Helsinki: Yrjö Jahnson Lectures.

Ashenfelter, Orley and Alan Krueger, Estimates of the economic return to schooling from a new sample of twins, American Economic Review 84, 1157-1173.

Basak, Suleyman and Domenico Cuoco, 1998, An equilibrium model with restricted stock market participation, Review of Financial Studies 11, 309-341.

Bertaut, Carol C., 1998, Stockholding behavior of U.S. households: evidence from the 1983-1989 Survey of Consumer Finances, Review of Economics and Statistics 80, 263-275.

Bound, John, Zvi Griliches, and Bronwyn H. Hall, 1984, Brothers and sisters in the family and the labor market, NBER Working Paper No. 1476.

Brav, Alon, George M. Constantinides, and Christopher C. Geczy, 2002, Asset pricing with heterogeneous consumers and limited participation: empirical evidence, Journal of Political Economy 110, 793-824.

Calvet, Laurent, John Campbell, and Paolo Sodini, 2007, Down or out: Assessing the welfare costs of household investment mistakes, Journal of Political Economy 115, 707-747.

Campbell, John, 2006, Household finance, Journal of Finance 61, 1553-1604.

Cao, H. Henry, Tan Wang, and Harold H. Zhang, 2005, Model uncertainty, limited participation, and asset prices, Review of Financial Studies 18, 1219-1251.

Christiansen, Charlotte, Juanna Joensen, and Jesper Rangvid, 2008, Are economists more likely to hold stocks? Review of Finance 12, 465-496

Cochrane, John H., 2007, Financial markets and the real economy. In Rajnish Mehra (Eds.), *Handbook of the Equity Risk Premium*. Amsterdam: Elsevier North-Holland.

Curcuru, Stephanie, John Heaton, Deborah Lucas, and Damien Moore, 2004, Heterogeneity and portfolio choice: theory and evidence. In Yacine Aït-Sahalia and Lars Peter Hansen (Eds.), *Handbook of Financial Econometrics*, forthcoming.

Dow, James and Sergio Ribeiro da Costa Werlang, 1992, Uncertainty aversion, risk aversion, and the optimal choice of portfolio, Econometrica 60, 197-204.

Economist Magazine. Puzzling new evidence on education: the race is not always to the richest. 6 December 2007.

Garmerman, Ellen, 2008, What makes Finnish kids so smart? Wall Street Journal, February 29, 2008.

Geronimus, Arline T. and Sanders Korenman, 1992, The socioeconomic consequences of teen childbearing reconsidered, Quarterly Journal of Economics 107, 1187-1214.

Greene, William, 2002, The bias of the fixed effects estimator in nonlinear models, New York University, working paper.

Guiso, Luigi and Tullio Jappelli, 2005, Household portfolios in Italy. In Luigi Guiso, Michael Haliassos, and Tullio Jappelli (Eds.), *Household Portfolios*. London: MIT Press.

Guiso, Luigi and Tullio Jappelli, 2005, Awareness and stock market participation, Review of Finance 9, 537-567.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2008, Trusting the stock market, Journal of Finance 63, 2557-2600.

Haliassos, Michael and Carol C. Bertaut, 1995, Why do so few hold stocks? Economic Journal 105, 1110-1129.

Heaton, John and Deborah Lucas, 2000, Portfolio choice and asset prices: the importance of entrepreneurial risk, Journal of Finance 55, 1163-1198.

Herrnstein, Richard J. and Charles Murray, 1994, *The Bell Curve: Intelligence and Class Structure in American Life*, New York: Free Press.

Hsiao, Cheng, 1996, Logit and probit models. In László Mátyás and Patrick Sevestre (eds.), *The Econometrics of Panel Data: Handbook of Theory and Applications*, Dordrecht: Kluwer Academic Publishers.

Korenman, Sanders and Christopher Winship, 1995, A reanalysis of The Bell Curve, NBER Working Paper No. 5230.

Kubik, Jeffrey D., Harrison G. Hong, and Jeremy C. Stein, 2004, Social interaction and stock market participation, Journal of Finance 59, 137-163.

Malloy, Christopher, Tobias Moskowitz, and Annette Vissing-Jørgensen, 2008, Long-run stockholder consumption risk and asset returns, Journal of Finance, forthcoming.

Mankiw, N. Gregory and Stephen P. Zeldes, 1991, The consumption of stockholders and nonstockholders, Journal of Financial Economics 29, 97-112.

Mehra, Rajnish and Edward C. Prescott, 1985, The equity premium: a puzzle, Journal of Monetary Economics 15, 145-161.

van Rooij, Maarten, Annamaria Lusardi, and Rob Alessie, 2007, Financial literacy and stock market participation, working paper.

Vissing-Jørgensen, Annette, 2002, Limited asset market participation and the elasticity of intertemporal substitution, Journal of Political Economy 110, 825-853.

Vissing-Jørgensen, Annette and Orazio P. Attanasio, 2002, Stock market participation, intertemporal substitution and risk aversion, American Economic Review 93, 383-391.

Vissing-Jørgensen, Annette, 2003, Perspectives on behavioral finance: Does "irrationality" disappear with wealth? Evidence from expectations and actions, NBER Macroeconomics Annual 2003.

Weil, Philippe, 1989, The equity premium puzzle and the risk-free rate puzzle, Journal of Monetary Economics 24, 401-421.

Wooldridge, Jeffrey M., 2002, *Econometric Analysis of Cross Section and Panel Data*, Cambridge: The MIT Press.

Figure 1: Distribution of IQ Score Conditional on Market Participation

Figure 1 plots IQ score distributions for stock market participants and non-participants. An individual is a stock market participant if he held individual stocks registered with the FCSD at the end of 1999.

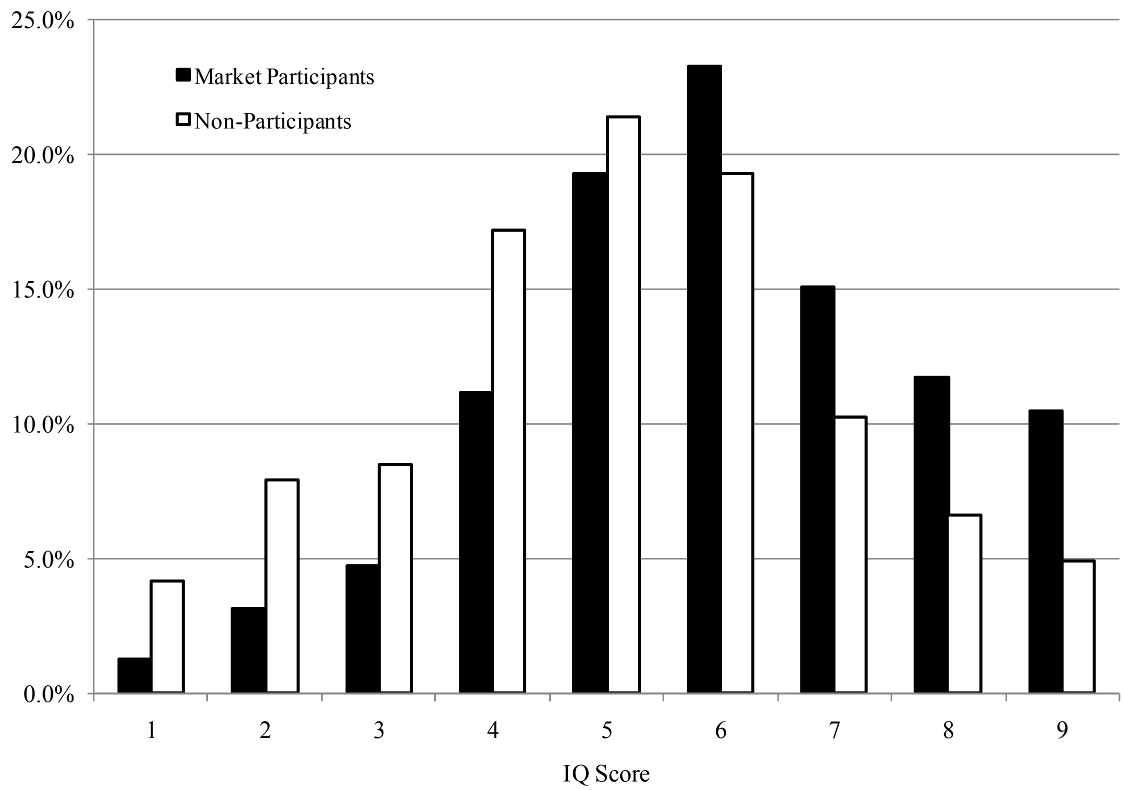

Table 1

Descriptive statistics

Panel A reports the distribution of IQ scores. Panels B and C report mean values for variables that we either directly use or form categorical variables from for use in regression analyses. See the text for descriptions of the variables. Panel B reports means sorted by participation and Panel C reports means sorted by IQ score. Participation is a dummy variable that takes on the value one for subjects who held individual stocks registered with the FCSD at the end of 1999. Income and wealth variables in Panel B are from the 1999 Finnish tax dataset, with the exception of FCSD stock wealth, which is a portfolio's market value at the end of 1999. Education variables are derived from the Finnish Census Data Set using each individual's age and zip code. Other demographics and occupation information are from the tax data.

Panel A: Distribution of IQ score

	IQ score									
Sample	1	2	3	4	5	6	7	8	9	N
Theoretical Stanine Distribution	4%	7%	12%	17%	20%	17%	12%	7%	4%	
Full Sample	5%	9%	9%	18%	21%	18%	9%	6%	4%	586,187
Uusimaa / East Uusimaa	4%	7%	8%	16%	21%	20%	11%	8%	6%	159,342

Panel B: Mean socioeconomic characteristics by stock market participation

		Stock Market Participant	
	Everyone	No	Yes
IQ	5.23	5.02	5.98
Education			
Basic	33.1%	33.9%	30.4%
Vocational	11.7%	11.3%	13.4%
Matricular	38.1%	38.6%	36.1%
University	17.0%	16.2%	20.1%
Ordinary Income, EUR	19,392	17,566	25,899
Wealth			
Taxable home wealth > 0	36.9%	34.1%	46.7%
Taxable forest wealth > 0	1.2%	0.9%	2.2%
Taxable foreign wealth > 0	0.02%	0.01%	0.06%
Taxable private equity > 0	2.4%	2.0%	3.9%
Taxable net wealth, EUR	11,723	2,981	42,881
Other Demographics			
Swedish	7.4%	7.1%	8.5%
Married	27.8%	25.6%	35.7%
Cohabiter	6.1%	6.3%	5.2%
Kids	27.8%	26.4%	32.7%
Occupation			
Entrepreneur	2.6%	2.4%	3.1%
Farmer	0.9%	0.7%	1.4%
Finance professional	1.1%	0.7%	2.5%
Unemployed	10.1%	11.8%	3.9%
Number of observations	159,342	124,430	34,912

Panel C: Mean socioeconomic characteristics by IQ score

	IQ score									
	1	2	3	4	5	6	7	8	9	All
Stock Market Participant	7.9%	10.0%	13.5%	15.4%	20.2%	25.3%	29.2%	33.3%	37.6%	21.9%
Education										
Basic	36.9%	36.1%	35.7%	34.7%	33.5%	32.3%	31.2%	30.1%	29.0%	33.1%
Vocational	40.1%	39.9%	39.8%	39.3%	38.6%	37.7%	36.7%	35.8%	34.6%	38.1%
Matricular	9.4%	9.7%	9.9%	10.5%	11.2%	12.1%	13.2%	14.3%	15.7%	11.7%
University	13.5%	14.2%	14.6%	15.4%	16.7%	17.8%	18.9%	19.8%	20.7%	17.0%
Ordinary Income, EUR	14,614	15,919	16,579	17,435	18,751	20,301	21,399	23,152	25,376	19,392
Wealth										
Taxable home wealth > 0	26.3%	29.4%	31.6%	32.3%	34.7%	36.8%	37.2%	38.8%	39.5%	34.8%
Taxable forest wealth > 0	1.1%	1.3%	1.2%	1.1%	1.2%	1.1%	1.1%	1.2%	1.2%	1.2%
Taxable foreign wealth > 0	0.00%	0.00%	0.01%	0.01%	0.02%	0.03%	0.04%	0.01%	0.05%	0.02%
Taxable private equity > 0	1.9%	1.9%	2.1%	2.2%	2.4%	2.6%	2.8%	2.9%	3.1%	2.4%
Taxable net wealth, EUR	3,467	4,336	7,390	7,158	9,174	10,407	12,097	20,417	43,470	11,723
Other Demographics										
Swedish	6.9%	7.7%	10.5%	6.1%	7.1%	7.3%	7.0%	7.4%	8.9%	7.4%
Married	21.4%	24.1%	24.3%	25.2%	27.5%	29.8%	30.2%	31.8%	31.5%	27.8%
Cohabiter	9.9%	9.4%	9.1%	7.6%	6.4%	5.0%	3.9%	3.3%	2.6%	6.1%
Kids	28.4%	30.0%	30.0%	28.5%	28.0%	27.7%	26.2%	26.4%	24.9%	27.8%
Occupation										
Entrepreneur	3.0%	3.3%	3.0%	2.8%	2.5%	2.5%	2.2%	2.2%	2.4%	2.6%
Farmer	1.0%	1.2%	1.2%	0.8%	0.9%	0.7%	0.7%	0.7%	0.7%	0.9%
Finance professional	0.1%	0.2%	0.2%	0.4%	1.0%	1.4%	1.8%	2.3%	2.1%	1.1%
Unemployed	25.4%	19.3%	16.2%	13.3%	9.8%	7.2%	5.0%	4.1%	2.7%	10.1%
Number of observations	5,620	10,903	12,151	25,242	33,312	32,102	18,009	12,290	9,713	159,342

Table 2

IQ Scores and Stock Market Participation

Table 2 reports summary data from probit regressions of stock market participation on IQ scores and a host of control variables (described in the body of the paper) derived from the Finnish tax data and the Finnish census data set. Participation is a dummy variable that takes on the value one for subjects who held individual stocks registered with the FCSD. Psuedo *R*-squared and sample sizes are reported at the bottom of the table. Standard errors are clustered by zip code. The first and second columns report on the coefficients from the probit regression along with the associated *z*-values. The third column reports on the marginal effects, which are evaluated at the average value of regressors, except for IQ stanine dummies, which are evaluated at zero. The marginal effects for indicator variables indicate the shift in the participation probability when the indicator variable changes from zero to one. The dummy variable associated with the highest category – IQ stanine 9, university-level education, highest ordinary income, and taxable net wealth in the highest decile – are omitted and serve as a benchmark. Taxable net wealth deciles are computed after removing individuals with no taxable net wealth. A dummy variable, no taxable wealth, identifies the latter individuals. The regressions also contain 30 (unreported) cohort fixed effects for birth years 1953 through 1982.

Independent variables	Coefficients	*z*-values	Marginal Effects	Independent variables	Coefficients	*z*-values	Marginal Effects
IQ stanine				*Wealth decile*			
Lowest	-0.635	-21.47	-0.154	No taxable wealth	-1.704	-51.33	-0.594
2	-0.538	-22.50	-0.136	Lowest	-1.084	-29.30	-0.215
3	-0.409	-18.08	-0.110	2	-0.974	-26.28	-0.204
4	-0.345	-17.08	-0.095	3	-0.672	-19.35	-0.162
5	-0.235	-14.12	-0.068	4	-0.866	-26.43	-0.191
6	-0.143	-7.85	-0.043	5	-0.872	-26.17	-0.191
7	-0.081	-4.43	-0.025	6	-0.827	-23.43	-0.186
8	-0.038	-1.86	-0.012	7	-0.723	-20.86	-0.170
				8	-0.605	-17.75	-0.150
Education				9	-0.388	-12.31	-0.106
Basic	-0.004	-2.47	-0.001				
Vocational	-0.017	-11.27	-0.005	*Other demographics*			
Matricular	0.002	0.66	0.001	Swedish speaker	0.052	1.95	0.017
				Married	-0.002	-0.17	-0.001
Ordinary income decile				Cohabitor	-0.029	-1.26	-0.009
Lowest	-0.333	-13.84	-0.095	Kids	-0.037	-2.36	-0.012
2	-0.380	-18.03	-0.107				
3	-0.356	-16.51	-0.101	*Occupation*			
4	-0.373	-17.05	-0.105	Entrepreneur	-0.004	-0.15	-0.001
5	-0.443	-22.89	-0.122	Farmer	-0.097	-1.65	-0.030
6	-0.424	-22.02	-0.117	Finance professional	0.318	7.62	0.110
7	-0.333	-18.64	-0.095	Unemployed	-0.304	-16.89	-0.088
8	-0.251	-14.56	-0.074				
9	-0.144	-8.56	-0.044	Cohort Fixed Effects	Yes		
Wealth dummies by wealth type							
Housing	0.166	12.90	0.053	Baseline probability			0.247
Forest	-0.129	-2.66	-0.039	Wald-χ^2 (IQ1 = … = IQ8 = 0)	1,413.8		
Private equity	-0.133	-5.40	-0.040	Pseudo R-squared	0.196		
Foreign assets excluding equity	0.090	0.44	0.029	N	154,764		

Table 3

IQ Scores and Stock Market Participation of Affluent Individuals

Table 3 reports summary data from probit regressions of stock market participation on IQ scores and a host of control variables (described in the body of the paper) derived from the Finnish tax data and the Finnish census data set. The sample is restricted to the 10% most affluent individuals in the data set. Panel A restricts the sample to the 10% of individuals with the largest ordinary income for 1999 as reported on their tax returns. Panel B restricts the sample to the 10% of individuals with the largest taxable net wealth for 1999 as reported on their tax returns. Participation is a dummy variable that takes on the value one for subjects who held individual stocks registered with the FCSD. Pseudo *R*-squared and sample sizes are reported at the bottom of the table. Standard errors are clustered by zip code. The first and second columns report on the coefficients from the probit regression along with the associated *z*-values. The third column reports on the marginal effects, which are evaluated at the average value of regressors, except for IQ stanine dummies, which are evaluated at zero. The marginal effects for indicator variables indicate the shift in the participation probability when the indicator variable changes from zero to one. The dummy variable associated with the highest category – IQ stanine 9, university-level education, highest ordinary income (Panel B), and taxable net wealth (Panel B) in the highest decile – are omitted and serve as a benchmark. Taxable net wealth deciles are computed after removing individuals with no taxable net wealth. A dummy variable, no taxable wealth, identifies the latter individuals. The regressions also contain 30 (unreported) cohort fixed effects for birth years 1953 through 1982.

Panel A: Ordinary Income in Top 10% of the Distribution

Independent variables	Coefficients	*z*-values	Marginal Effects	Independent variables	Coefficients	*z*-values	Marginal Effects
IQ stanine				*Wealth decile*			
Lowest	-0.190	-1.39	-0.075	No taxable wealth	-1.436	-30.25	-0.526
2	-0.451	-4.65	-0.173	Lowest	-1.113	-12.17	-0.366
3	-0.291	-4.15	-0.114	2	-1.082	-12.80	-0.361
4	-0.266	-5.79	-0.104	3	-0.932	-12.62	-0.324
5	-0.166	-4.88	-0.066	4	-0.915	-12.95	-0.320
6	-0.094	-2.90	-0.038	5	-0.845	-12.91	-0.302
7	-0.046	-1.29	-0.018	6	-0.889	-13.40	-0.314
8	-0.018	-0.46	-0.007	7	-0.745	-10.40	-0.273
				8	-0.669	-11.54	-0.249
Education				9	-0.417	-6.82	-0.162
Basic	-0.001	-0.35	0.000				
Vocational	-0.014	-4.78	-0.005	*Other demographics*			
Matricular	0.006	1.13	0.002	Swedish speaker	0.058	1.25	0.023
				Married	0.000	0.00	0.000
Ordinary income decile				Cohabitor	-0.006	-0.10	-0.002
Lowest				Kids	-0.050	-1.44	-0.020
2							
3				*Occupation*			
4				Entrepreneur	0.036	0.66	0.014
5				Farmer	-0.083	-0.60	-0.033
6				Finance professional	0.281	5.00	0.111
7				Unemployed	-0.432	-2.26	-0.166
8							
9				Cohort Fixed Effects	Yes		
Wealth dummies by wealth type							
Housing	0.186	7.67	0.074	Baseline probability			0.489
Forest	0.012	0.12	0.005	Wald-χ^2 (IQ1 = … = IQ8 = 0)	78.5		
Private equity	-0.036	-0.68	-0.014	Pseudo R-squared	0.1137		
Foreign assets excluding equity				N	15,617		

Panel B: Taxable Net Wealth in Top 10% of the Distribution

Independent variables	Coefficients	*z*-values	Marginal Effects	Independent variables	Coefficients	*z*-values	Marginal Effects
IQ stanine				*Wealth decile*			
Lowest	-0.632	-7.77	-0.243	No taxable wealth			
2	-0.469	-7.32	-0.178	Lowest			
3	-0.317	-5.21	-0.118	2			
4	-0.364	-7.06	-0.136	3			
5	-0.229	-5.54	-0.084	4			
6	-0.167	-4.19	-0.060	5			
7	-0.089	-1.89	-0.032	6			
8	-0.088	-1.85	-0.031	7			
				8			
Education				9			
Basic	-0.003	-1.13	-0.001				
Vocational	-0.025	-9.46	-0.009	*Other demographics*			
Matricular	-0.001	-0.14	0.000	Swedish speaker	0.029	0.59	0.010
				Married	-0.049	-1.19	-0.017
Ordinary income decile				Cohabitor	-0.042	-0.68	-0.015
Lowest	0.086	1.63	-0.030	Kids	-0.084	-2.11	-0.029
2	0.134	2.27	-0.048				
3	0.231	4.28	-0.084	*Occupation*			
4	0.331	6.57	-0.122	Entrepreneur	-0.010	-0.18	-0.004
5	0.342	7.31	-0.126	Farmer	-0.055	-0.73	-0.019
6	0.325	6.55	-0.120	Finance professional	0.310	3.49	0.098
7	0.233	5.54	-0.084	Unemployed	-0.181	-3.07	-0.065
8	0.164	4.06	-0.059				
9	0.102	2.86	-0.036	Cohort Fixed Effects	Yes		
Wealth dummies by wealth type							
Housing	-0.563	-13.94	-0.171	Baseline probability			0.703
Forest	-0.015	-0.25	-0.005	Wald-χ^2 (IQ1 = … = IQ8 = 0)	124.5		
Private equity	-0.054	-1.23	-0.019	Pseudo R-squared	0.0973		
Foreign assets excluding equity	0.158	0.53	0.052	N	15,238		

Table 4

Stock Market Participation Decisions of Siblings using Instrumented IQ Scores

Table 4 reports summary data from probit regressions of stock market participation on instrumented IQ scores and a host of control variables (described in the body of the paper) derived from the Finnish tax data and the Finnish census data set. Panel A reports on all subjects with siblings who have an IQ score, Panel B restricts Panel's A sample to males, and Panel C restricts the sample to females. IQ stanine dummies are the IQ stanine dummies of one's brother. Participation is a dummy variable that takes on the value one for subjects who held individual stocks registered with the FCSD. Pseudo *R*-squared and sample sizes are reported at the bottom of the table. Standard errors are clustered by zip code. The first and second columns report on the coefficients from the probit regression along with the associated *z*-values. The third column reports on the marginal effects, which are evaluated at the average value of regressors, except for IQ stanine dummies, which are evaluated at zero. The marginal effects for indicator variables indicate the shift in the participation probability when the indicator variable changes from zero to one. The dummy variable associated with the highest category – IQ stanine 9, university-level education, highest ordinary income, and taxable net wealth in the highest decile – are omitted and serve as a benchmark. Taxable net wealth deciles are computed after removing individuals with no taxable net wealth. A dummy variable, no taxable wealth, identifies the latter individuals. The regressions also contain 27 (unreported) cohort fixed effects for birth years 1953 through 1979. IQ for each female is proxied for the IQ score of a brother who has an IQ score. Sibling pairs are identified using supplementary location data to the Finnish tax data. These data contain both current and historical addresses for all individuals in the data. We identify siblings by studying historical location information. Two opposite-gendered individuals are identified as a sibling pair if they lived together as children at the same address at the same time or moved at the same time. We also use transitivity to establish a sibling pair as described in the body of the paper.

Panel A: All Siblings

Independent variables	Coefficients	*z* -values	Marginal Effects	Independent variables	Coefficients	*z* -values	Marginal Effects
IQ stanine				*Wealth decile*			
Lowest	-0.460	-2.63	-0.076	No taxable wealth	-2.421	-14.91	-0.762
2	-0.546	-3.78	-0.086	Lowest	-1.617	-6.74	-0.136
3	-0.431	-3.38	-0.073	2	-1.760	-7.67	-0.138
4	-0.420	-4.00	-0.071	3	-1.110	-5.08	-0.125
5	-0.302	-3.08	-0.055	4	-1.328	-6.07	-0.131
6	-0.243	-2.52	-0.046	5	-0.837	-3.97	-0.111
7	-0.024	-0.24	-0.005	6	-1.176	-5.54	-0.127
8	-0.239	-2.03	-0.045	7	-1.055	-5.16	-0.123
				8	-0.902	-4.51	-0.115
Education				9	-0.665	-3.29	-0.098
Basic	-0.012	-1.78	-0.003				
Vocational	-0.031	-4.88	-0.007	*Other demographics*			
Matricular	-0.008	-1.20	-0.002	Swedish speaker	0.057	0.73	0.013
				Married	0.095	0.53	0.022
Ordinary income decile				Cohabitor	-0.193	-0.49	-0.038
Lowest	0.017	0.11	0.004	Kids	-0.046	-0.20	-0.010
2	0.187	0.93	0.045				
3	0.107	0.82	0.025	*Occupation*			
4	0.094	0.74	0.021	Entrepreneur	-0.585	-1.82	-0.090
5	0.131	1.28	0.030	Farmer	0.166	0.45	0.039
6	0.193	2.06	0.045	Finance professional	0.905	2.02	0.287
7	0.049	0.55	0.011	Unemployed	-0.279	-2.97	-0.054
8	0.173	2.03	0.040				
9	-0.045	-0.53	-0.010	Cohort Fixed Effects	Yes		
Wealth dummies by wealth type							
Housing	-0.304	-3.46	-0.058	Baseline probability	0.136		
Forest	-1.066	-2.81	-0.122	Wald-χ^2 (IQ1 = … = IQ8 = 0)	41.7		
Private equity	-0.281	-1.44	-0.052	Pseudo R-squared	0.2433		
Foreign assets excluding equity				N	6,181		

Panel B: Brothers Only

Independent variables	Coefficients	*z*-values	Marginal Effects	Independent variables	Coefficients	*z*-values	Marginal Effects
IQ stanine				*Wealth decile*			
Lowest	-0.368	-1.76	-0.067	No taxable wealth	-2.368	-11.46	-0.750
2	-0.625	-3.30	-0.097	Lowest	-1.464	-5.01	-0.140
3	-0.465	-2.85	-0.080	2	-1.420	-4.89	-0.138
4	-0.490	-3.59	-0.083	3	-0.876	-3.04	-0.117
5	-0.253	-2.01	-0.049	4	-1.183	-4.30	-0.133
6	-0.257	-2.05	-0.050	5	-0.805	-3.00	-0.113
7	-0.040	-0.30	-0.009	6	-1.070	-4.08	-0.129
8	-0.197	-1.31	-0.040	7	-0.866	-3.23	-0.117
				8	-0.683	-2.70	-0.104
Education				9	-0.471	-1.84	-0.081
Basic	-0.006	-0.65	-0.001				
Vocational	-0.029	-3.48	-0.006	*Other demographics*			
Matricular	-0.003	-0.36	-0.001	Swedish speaker	0.060	0.59	0.014
				Married	0.297	1.22	0.077
Ordinary income decile				Cohabitor	0.542	0.81	0.156
Lowest	0.007	0.04	0.002	Kids	-0.720	-1.58	-0.107
2	0.258	1.14	0.066				
3	0.244	1.60	0.061	*Occupation*			
4	0.246	1.56	0.062	Entrepreneur	-0.754	-1.64	-0.109
5	0.068	0.50	0.016	Farmer	0.222	0.54	0.056
6	0.379	3.19	0.099	Finance professional	0.820	1.55	0.258
7	0.082	0.69	0.019	Unemployed	-0.333	-2.65	-0.065
8	0.325	3.02	0.082				
9	0.028	0.26	0.006	Cohort Fixed Effects	Yes		
Wealth dummies by wealth type							
Housing	-0.270	-2.40	-0.054	Baseline probability	0.142		
Forest	-1.017	-2.25	-0.125	Wald-χ^2 (IQ1 = … = IQ8 = 0)	28.8		
Private equity	-0.441	-1.86	-0.077	Pseudo R-squared	0.275		
Foreign assets excluding equity				N	3,682		

Panel C: Sisters Only

Independent variables	Coefficients	z-values	Marginal Effects	Independent variables	Coefficients	z-values	Marginal Effects
IQ stanine				*Wealth decile*			
Lowest	-0.756	-2.09	-0.091	No taxable wealth	-2.724	-9.33	-0.822
2	-0.394	-1.68	-0.060	Lowest	-2.211	-4.77	-0.120
3	-0.371	-1.73	-0.058	2	-2.609	-6.33	-0.124
4	-0.351	-2.03	-0.055	3	-1.540	-4.20	-0.118
5	-0.332	-2.03	-0.053	4	-1.809	-4.55	-0.119
6	-0.233	-1.47	-0.040	5	-1.067	-2.89	-0.107
7	-0.005	-0.03	-0.001	6	-1.644	-4.13	-0.118
8	-0.360	-1.77	-0.057	7	-1.520	-4.32	-0.118
				8	-1.445	-3.98	-0.117
Education				9	-1.055	-2.80	-0.107
Basic	-0.027	-2.34	-0.005				
Vocational	-0.041	-3.65	-0.008	*Other demographics*			
Matricular	-0.020	-1.68	-0.004	Swedish speaker	0.041	0.32	0.008
				Married	-0.024	-0.09	-0.005
Ordinary income decile				Cohabitor	-0.543	-1.03	-0.076
Lowest	-0.173	-0.54	-0.031	Kids	0.374	1.32	0.089
2	-0.279	-0.52	-0.046				
3	-0.445	-1.55	-0.067	*Occupation*			
4	-0.350	-1.42	-0.056	Entrepreneur	-0.460	-0.88	-0.068
5	0.153	0.92	0.032	Farmer			
6	-0.123	-0.74	-0.023	Finance professional	0.626	0.71	0.169
7	-0.039	-0.26	-0.008	Unemployed	-0.261	-1.72	-0.045
8	-0.096	-0.63	-0.018				
9	-0.213	-1.41	-0.039	Cohort Fixed Effects	Yes		
Wealth dummies by wealth type							
Housing	-0.328	-2.17	-0.055	Baseline probability	0.117		
Forest	-0.944	-1.11	-0.101	Wald-χ^2 (IQ1 = … = IQ8 = 0)	15.4		
Private equity	-0.120	-0.31	-0.022	Pseudo R-squared	0.2315		
Foreign assets excluding equity				N	2,475		