The Influence of Non-Cognitive and Cognitive Ability on Individuals' Stock Market Participation

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ABSTRACT

Stock market participation is found to be positively related to cognitive, as well as non-cognitive ability, controlling for wealth, income, age, and other demographic and socioeconomic factors. Interestingly, the effects are of economic significant magnitudes, e.g. participation is on average 11.49% larger among those with high compared with low cognitive and non-cognitive abilities, and holds also when controlling for individuals risk preferences. The later indicates that cognitive and non-cognitive abilities have a role in affecting financial decisions also through non-preference driven effects. Limitations in non-cognitive ability do further explain non-participation among affluent individuals.

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INDIVIDUAL'S COGNITIVE ABILITY have been shown to be an important driver of individuals' stock market behavior. Grinblatt et al. (2011) and Grinblatt et al. (2012), using detailed data for a large representative sample of Finnish household investors, find, for example, that participation is monotonically increasing in cognitive ability and of further importance for subsequent performance. Evidence upon that an individual's non-cognitive ability, i.e. an individuals' personality traits, also matter for financial choices, further exist.[1] Brown and Taylor (2011) and Andersson et al. (2011), do, for example, provide recent evidence linking personality traits (based upon the "Big five" major dimensions of personality) to

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[1] The importance of non-cognitive skills for other socioeconomic outcomes is found by, for example, Jencks (1979), Dunifon and Duncan (1998), Bowles et al. (2001), Heckman and Rubinstein (2001), Carneiro et al. (2005), Osborne (2005), Hanes and Norlin (2011), and Becker et al. (2012).

financial behavior. Guiso et al. (2008) also find that trust (a personality characteristic) is an important determinant of individuals' stock market behavior.

Given that recent research find evidence that personality traits may be interconnected with the measurement of cognitive ability, e.g. Borghans (2008) and Brunello and Schlotter (2011) indicate that scoring high on tests of cognitive ability partly is related to non-cognitive skills (such as motivation), studies jointly including these seems of central importance in the understanding of their effect upon financial behavior. Although Andersson et al. (2011), using data from an economic field experiment on 1,069 US trainee truck drivers, provide some evidence including both personality traits and cognitive skills, few study in finance (to the authors knowledge) consider this issue, especially using data on actually observed investment choices.

In this paper we provide such a study and jointly consider the impact of limitations in cognitive and non-cognitive ability (broadly defined as an individuals' ability to perform in stressful situations) upon an individuals' stock market participation decision. The interest in non-participation is well motivated in the literature, see e.g. Guiso and Sodini (2013), and the topic constitutes a large and central area within household finance. While a number of explanations for observed non-participation, also among the wealthiest, have been put forth, we add to this in particular by empirically considering limitations in non-cognitive ability.[2]

An important issue in linking non-cognitive skills to individuals' behavior concerns the measurement of personality traits. In the current paper the study is performed upon a large sample of Swedish individuals, including detailed information about financial holdings (e.g. stocks, mutual funds), other wealth and socio-economic information, as well as, measures of cognitive and non-cognitive skills taken from the individuals' military enlistment tests. The measure for non-cognitive ability is a composite measure broadly capturing an individual's ability to perform in stressful situations.[3] The score is based upon a psychological evaluation of the individuals', performed by professional psychologists, for use in a real life situation (for the allocation of individuals' to different military positions). In relation to the psychological literature, where psychologists commonly agree upon personality classifications based upon the "The Big Five" personality trait taxonomy (Costa and McCrae, 1992), the measure most closely relates to the dimensions neuroticism (emotional instability) and extraversion (social ability).[4] Thus, in comparison to Guiso et al. (2008), who find trust to be a significant

[2] A number of explanations for non-participation have been proposed, for example, Haliassos and Bertaut (1995) suggest that "inertia and departures from expected-utility maximization", Vissing-Jørgensen (2003) suggest that fixed participation costs, Hong et al. (2004), Guisio and Jappelli (2005) and Brown et al. (2008) suggest that lack of stock market awareness, Dow and Werlang (1992), Ang et al. (2005) and Epstein and Schneider (2007) suggest that non-standard preferences, Campbell (2006), Calvet et al. (2007) and van Rooij et al. (2007) suggest that lack of financial literacy, and Guiso et al. (2008) suggest that lack of trust explains stock market non-participation.

[3] The measure of non-cognitive ability has been shown to predict outcomes on the labor market, i.e. it also has predictive power outside the military domain, see e.g. Hanes and Norlin (2011) and Lindqvist and Vestman (2011).

[4] "The Big Five" personality trait taxonomy classifies individuals according to five factors: openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. Evidence in the psychology literature (see Almlund at al., 2011) suggests that the majority of variables used to describe personality traits in the existing literature can be mapped onto at least one of the Big Five factors.

determining factor of stock market participation, the current paper focus upon effects mainly from other personality dimensions (trust relates to the personality dimension agreeableness).

In studying the influence of cognitive and non-cognitive ability on financial decisions, an important question concern through what channels these abilities work. While papers like Calvet et al. (2007) and Grinblatt et al. (2011) adhere to non-preference driven explanations, i.e. such as that the quality of financial decisions improve in cognitive ability (i.e. IQ correlate with indirect participation costs), evidence in Frederick (2006), Dohmen et al. (2010), Beauchamp, Cesarini and Johannesson (2011), point towards their effect on risk preferences; results indicate that cognitive ability (IQ) is negatively correlated with measures of risk aversion. Results in Andersson et al. (2011) and Calvet and Sodini (2011) further indicate that personality traits are connected to risk preferences; Andersson et al. (2011) do, for example, find that individuals' with a high rank on the neuroticism scale in general are more risk averse. Little evidence does, however, exist indicating whether cognitive and non-cognitive traits mainly work through their effect upon risk preferences, or through other (non-preference) channels.[5] Results in Andersson et al. (2011) do, however, indicate a role for both since cognitive ability and personality traits retain explanatory power when including a measure of individuals' risk aversion. Grinblatt et al. (2011) find evidence, at least, of a non-preference driven effect. They conclude, based upon analysis of sibling data, that their results for participation and IQ are unlikely to be driven by an omitted relationship between risk aversion and IQ. Guiso et al. (2008), study trust in a setting controlling for risk and ambiguity aversion and find evidence of a non-preference driven effect, i.e. an effect not driven by its effect on risk aversion, but without explicit control for cognitive ability. In the current paper we continue this line of research.

As a departure, we assume that cognitive and non-cognitive abilities are important determinants of both individuals risk preferences, as well as, in determining non-preference driven effects. Based upon previous empirical findings risk aversion is assumed falling (and the likelihood for participation increasing) in both non-cognitive (e.g. Hirsch and Inzlicht, 2008; Almlund et al., 2011; Andersson et al., 2011; Calvet and Sodini, 2011) and cognitive (e.g. Dohmen et al., 2010; Beauchampet al., 2011) ability. To fix idea's, and conditional on the determined risk preferences, non-preference driven effects are assumed to affect individuals' subjective expectations of the risk-return trade-off associated with participation (e.g. Dominitz and Manski, 2011).[6] In general, more precise estimates of subjective expected returns and risks, all else equal, are assumed to on average increase the likelihood for participation. For cognitive ability we assume that it increases the quality in information processing (in line with Grinblatt et al., 2011 and Calvet et al., 2007) leading to more precise estimates of subjective expected returns and risks which thereby increase the likelihood for participation. In terms of non-

[5] Obviously, other (indirect) channels through which cognitive and non-cognitive ability affect financial behavior, also exist. As found in Grinblatt et al. (2011), participation is indirectly affected by IQ through its effect upon wealth, income and educational choice. In the current paper we focus, however, on the possible direct effect on participation or through risk preferences.

[6] Differences in choices between individuals' may, thus, differ either depending on risk preferences or through systematic differences in subjective expectations, e.g. Manski 2004.

cognitive ability, more emotional stable individuals (higher non-cognitive ability) are assumed to be less affected by feelings, such as anxiety, and thereby produce more precise (less noisy) estimates of subjective expected outcomes (e.g. Kuhnen et al., 2013). Participation is, thus, through the non-preference channel assumed increasing for higher levels of non-cognitive ability. The above line of reasoning, i.e. that cognitive and non-cognitive ability may work through affecting individuals' subjective expectations, is loosely consistent with Grinblatt et al. (2011, p. 2162) who conclude that "*…low-IQ individuals may view* (our note: expect) *participation's risk-return trade-off as being less favorable than the trade-off faced by high-IQ individuals*" and Guiso et al. (2008), assuming that trust affect beliefs in data used to form subjective expectations.

To access through what channels cognitive and non-cognitive ability affect participation, it is necessary to control for individuals' risk preferences. A problem in the current context is that the decision under study, i.e. whether to own stocks or not, determines the individuals' proportion of wealth invested in risky assets, usually used in traditional analysis of measures of risk aversion (e.g. Hochguertel et al., 1997; King and Leape, 1998; Cocco, 2005; Alan et al., 2010; Wachter and Yogo, 2010).[7] To get around this problem we utilize data for individuals' parents' portfolio choice. The lagged parental proportion of risky asset in relation to total assets in a pre-study period is used as a proxy for individuals' risk preferences. Given that earlier literature, e.g. Charles and Hurst (2003), Guiso et al. (2006) and Dohmen et al. (2012), find a strong connection between parents and child risk preferences, we argue that this is a reasonable proxy for individuals' risk aversion that is exogenous (pre-determined) to the considered decision under study. Although the proxy is broad, one advantage is that the measure is based on actual choice data (by the parents), rather than on stated choices in artificial situations.

Resolving the role of cognitive and non-cognitive abilities in individuals' financial decision making is important. While Grinblatt et al. (2011) indicate a number of reasons, we here emphasize that individuals' responsibility for personal savings has increased worldwide during the last decade. The trend towards defined contribution retirement savings plans, where part of the pension is managed by the individuals, combined with a worldwide aging population, constraining future governmental pension budgets, has increased the individuals' responsibility for its own financial well-being in retirement. If performance on financial markets is linked to individuals' cognitive and non-cognitive abilities, and in particular, if non-cognitive ability impair performance among both low- and high-cognitive individuals, systems and policies to stimulate, for example, stock market participation may actually cost more than other systems with a default equity fund. The question of policies and systems building on increasing financial self-responsibility must also be seen in a different light if performance is depending on individuals' endowments of cognitive and non-cognitive skills. Given the focus upon equality of opportunities in education, a similar reasoning can be applied in regard to, for example, the construction and choice of retirement saving-plans within economies.

[7] The large sample size also makes survey or experimental designs infeasible, unless severely restricting the sample.

The main findings of the study indicate that limitations in non-cognitive ability, here mainly related to the personality dimensions neuroticism and extraversion, adds to the understanding of non-participation among household investors. This result is in line with Guiso et al. (2008), who find trust (a personality characteristics related the personality dimension agreeableness) to be an important driver for individuals decision to own stocks. Participation among those with the lowest non-cognitive ability (stanine score 1) is on average found to be 6.3% lower than for individuals with the highest non-cognitive ability score (stanine 9) and the likelihood for participation is found to monotonically increase, on average, with approximately one percentage point per stanine point increase in non-cognitive ability. Our results further add evidence about the important role of limitations in non-cognitive ability in explaining non-participation among the affluent in wealth and income. In terms of cognitive ability, our results confirm those in Grinblatt et al. (2011), now also conditioning on a measure of non-cognitive ability, a direct proxy for risk aversion, as well as educational controls at the individual level. This is interesting since it both indicates that Grinblatt et al. (2011) are successful in indirectly conditioning on the omitted relationship between participation and risk aversion, as well as in that it confirms the importance of accounting for cognitive ability in explaining participation both in general and for households affluent in wealth. Our results indicate that participation is monotonically increasing in cognitive ability and participation among those with the lowest cognitive ability (stanine 1) is found to be, on average, 7.3% lower than that of individuals' with the highest cognitive ability (stanine 9). The likelihood for participation is further found to increases on average with approximately one percentage point per stanine point increase in cognitive ability. Interestingly, these results imply that limitations in cognitive and non-cognitive ability are of similar importance, i.e. of similar size, in explaining individuals' stock market participation.

Given the nascent interest in integrating economic decision theory with personality theory (Andersson et al. 2011; Guios and Sodini, 2013) the results within the paper provide an interesting contribution. Given that non-cognitive ability (our composite measure of personality traits) retains explanatory value of significant size also when controlling for risk preferences, this confirms the findings in Andersson et al. (2011), now on a larger sample of individuals' based on data for actual financial choices. In the current paper, our conclusion is that personality traits (non-cognitive ability) and cognitive ability both are important determinants of both risk preferences, as well as in affecting through non-preference driven effects. The results within the paper have throughout been challenged by various test and been found to be robust.

The paper is organized as follows. In Section I we discuss our empirical measures of non-cognitive and cognitive ability and relate these to individuals' stock market participation decision. In Section II the data is presented along with details about variable measurement. Section III contains the empirical analysis, as well as robustness testing of the results. Section IV concludes.

I. Psychological traits, cognitive ability and stock market participation

To study the role of non-cognitive and cognitive ability in individuals' financial decision making a key issue concern measurement of these abilities. In the current paper individuals' scores from enlistment tests, regarding cognitive and non-cognitive ability, performed upon induction into Swedish military service is utilized.[8] Below we discuss these measures in more detail.[9]

A. The Swedish Armed Forces Assessment

Non-cognitive ability: In regard to the measure of psychological ability this has been constructed from a psychological evaluation of individuals upon enlistment into mandatory Swedish military service by professional psychologists.[10] The purpose of the evaluation was to identify the individual's ability to handle stress and to work under extraordinary situations, such as combat situations (Carlstedt, 2003), and was intended to capture individual characteristics, such as emotional and social abilities, providing an overall score of "non-cognitive ability". The score is measured on a stanine score scale ranging from one (low) to nine (high), with a population mean of five. The Swedish Armed Forces does not reveal the evaluation procedure explicitly and the measure is therefore to some extent derived from a "black box". The origins and the general structure of the evaluation have, however, been outlined in several reports by the National Service Administration (e.g., Carlstedt, 2003). One source mentioned is Egbert *et al.* (1957), who developed a method to identify links between individual characteristics and "fighting performance". This method is based on the backgrounds of US battlefield soldiers in the Korean War and the responses of peers and officers in interviews with them. The information acquired by the cited American authors was used to develop batteries of questions aiming at identifying "fighters" and "non-fighters". For the Swedish enlistment test, the questions have been adapted to the Swedish environment and the time period for the relevant cohorts (Carlstedt, 2003).

Responses to questions concerning childhood, living conditions, school experiences, commitments to sports associations, etc., are potential indicators of how the individuals interact with others and how they behave under extraordinary situations. Given this information we interpret in this paper the composite measure for non-cognitive ability as mainly capturing an individuals' ability to perform in stressful situations, but also its level of sociability. In reference to psychological personality theory, where there's a wide agreement among psychologists upon five broad major personality dimensions characterizing an individual's stable pattern of thoughts and feelings[11], the considered measure from the enlistment test most closely relates to the dimension neuroticism. This dimension captures an individuals' emotional stability and is described (Caliendo et al., 2011) to capture self-confidence, optimism and the ability to deal with stressful situations. The composite non-cognitive measure may further be related

[8] The enlistment test consists of medical and physical evaluations, a cognitive test, and the evaluation of psychological ability (Carlstedt, 2003).

[9] A detailed account of the measures is also given in Hanes and Norlin (2011) and Lindqvist and Vestman (2011).

[10] In this paper the focus is on individuals born in 1963 and 1973. Even though military service is not mandatory today it was for individuals pertaining to these cohorts.

[11] The so called "big five" are neuroticism, extraversion, openness, agreeableness and conscientiousness.

to the dimension extraversion given that it captures an individual's sociability skills.[12] Given that the measure has been found to predict individuals' labor market outcomes later in life (Hanes and Norlin, 2011; Lindqvist and Vestman, 2011), it seem to also capture important aspects of an individuals' personality relevant outside the military domain.

Cognitive ability: In regard to cognitive ability, the measure is also obtained from individuals' enlistment tests into military service. Over the years (since the 1940:s) the tests have changed a number of times. For the considered cohorts of men in our sample all, however, did the same version of the tests. Carlstedt (2000) provide a detailed account of the history of psychometric testing in the Swedish military and further provides evidence that the test of intelligence is a good measure of general intelligence (Spearman, 1904). The obtained test score ranges from one (low) to nine (high) with a population mean of five and is a composite score from four subtests including: Instructions, Synonyms, Metal Folding, and Technical Comprehension (Carlstedt, 2003).

B. Influence on Stock Market Participation

Before presenting the data and the empirical analysis we first discuss the channels through which individuals' cognitive and non-cognitive skills are assumed to affect stock market participation. To fix ideas heuristically we address the issue in a conventional economic framework in the sense that risk preferences determine whether to participate or not, while non-preference driven effects work through the formation of subjective heterogeneous expectations about expected returns and risks.[13] Thus, individuals with equal risk preferences are then allowed to differ in their decisions based on differences in subjective expectations, e.g. Manski (2004). Below we discuss the role of cognitive and non-cognitive ability in determining risk preferences, as well as, its effect upon subjective expectations formation and subsequent likelihood of participation.

Risk preferences: A number of papers connect cognitive ability to individuals' risk preferences. In a sample of students Fredrick (2006) finds that measures of risk aversion are negatively correlated with IQ scores. Dohmen et al. (2010) confirm this finding on a sample of representative German households, while Beauchamp, Cesarini and Johanesson (2011) in a sample of Swedish twins. Andersson et al. (2011), using data from an economic field experiment, find increasing risk taking for increasing levels of IQ. Given the evidence in the empirical literature, we assume that financial risk taking, and thus the likelihood for stock market participation, increases with cognitive ability.

In terms of non-cognitive ability our measure mostly resembles the dimension neuroticism, i.e. the tendency to experience negative emotional states such as anxiety, anger and guilt. In the psychological literature, Hirsch and Inzlicht (2008) find that a high score in this dimension (in our case a lower non-cognitive ability) is associated with a higher risk aversion of uncertain outcomes. This is confirmed in the economic context by Almlund et al., (2011) and Andersson et al. (2011),

[12] Extraversion is usually described to reflect sensitivity to rewards, often in a social context, reflecting social human rewards such as social status of affiliation.
[13] Andersson et al. (2011) suggest an integration of standard portfolio theory based on risk preferences with psychological trait theory and apply this is an ad hoc fashion.

finding that individuals' ranking high on the neuroticism scale are more risk averse. Brown and Taylor (2011), based on the British Household Panel Survey, on the other hand find that neuroticism appear to be unimportant in influencing household choice of unsecured debt and financial assets, but that openness to experience instead is found to increase the likelihood of holding stocks.[14] Caliendo et al. (2011) study personality traits in relation to individuals' decision to become and remain self-employed (a risky activity) and find that openness to experience and extraversion play an important role for entrepreneurial development. Given the tentative empirical findings in this nascent literature, and given that our measure of non-cognitive ability mainly is related to the dimensions neuroticism and extraversion, we assume that financial risk taking, and thus the likelihood for stock market participation, increases with our measure of non-cognitive ability.

In Figure 1 combinations of cognitive and non-cognitive abilities are schematically displayed.

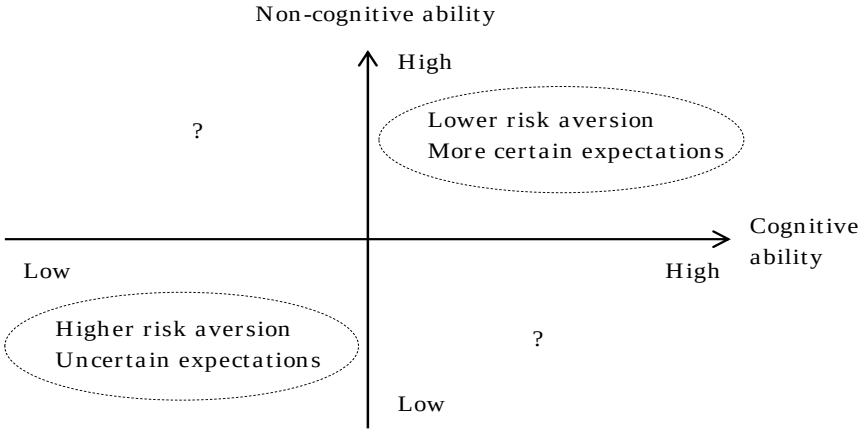

Figure 1: Cognitive and non-cognitive abilities.

As indicated in Figure 1 individuals' in quadrant I, i.e. individuals with a relatively high level of both cognitive, as well as non-cognitive ability, are hypothesized to have a relatively lower level of risk aversion and have a higher likelihood for participation. Contrary to this individuals in quadrant III, i.e. individuals with a relatively low level of both cognitive, as well as non-cognitive ability, are hypothesized to have a relatively higher level of risk aversion and a lower likelihood for participation. Quadrant II (IV) indicates individuals' with low (high) cognitive ability, but relatively higher (lower) levels of non-cognitive ability. For individuals in quadrant II and IV the effect on risk aversion and the likelihood for participation will depend upon whether risk preferences mainly is formed by cognitive or non-cognitive ability.[15]

[14] Brown and Taylor (2011) overall conclude that their empirical evidence indicate that personal traits are important determinants of household financial decisions and that personality traits have different effects across different types of debt and assets.

[15] Although the relative importance of these skills is hard to determine, several studies in the labor market literature argue that non non-cognitive skills may, in that context, actually be more important than cognitive skills e.g., Bowles and Gintis, 2002 and Heckman *et al.*, 2006.

Non-preference driven effects: Conditional on the level of risk aversion, cognitive and non-cognitive ability are assumed to also affect individuals' participation decision through their effect upon subjective return and risk expectations. In line with Calvet et al. (2007) and Grinblatt et al. (2011) information use, processing and the overall quality of financial decisions are assumed increasing in cognitive ability. High-cognitive individuals, thus, use information more efficiently and thereby form more precise expectations about future returns and risks associated with participation. Given more certain estimates of expected returns and risks, i.e. less uncertain expected outcomes, high-cognitive ability individuals' are then more prone to believe and act upon expectations than low-cognitive individuals, who perceive an additional uncertainty from more noisy estimates.[16] Thus, conditional upon risk preferences participation is increasing in cognitive ability due to sharper expectations from better information processing skills among high-cognitive individuals. Evidence that participation is increasing in cognitive ability due to non-preference driven effects is found by Grinblatt et al. (2011), indirectly controlling for differences in risk aversion, and by Andersson et al. (2011) directly controlling for stated risk preferences.

In terms of non-cognitive ability, conditional upon risk preferences, we assume that more emotional stable individuals, in general, react less emotional to stock market movements, while more emotional unstable individuals (lower non-cognitive ability) experience a higher degree of anxiety in regard to stock market volatility. Evidence that individuals' perception (belief) of stock market risk is depending on individuals' personality traits, in this case neuroticism, is found by Kuhnen et al. (2013). In their study results indicate that individuals' with a higher neuroticism score, on average and all else equal, are more likely to perceive stock as very risky compared to individuals with a relatively lower neuroticism score. Assuming individuals form subjective expectations in a heuristic fashion, also affected by feelings such as fear, anxiety and greed (e.g. Lo et al., 2005), individuals with a lower level of non-cognitive skills are assumed to form less precise (more noisy due to a relatively larger level of anxiety) expectations of stock market returns and risks. Due to the added uncertainty in the subjective expectations formation among low-cognitive individuals, participation is assumed increasing in non-cognitive ability, conditional upon risk preferences.

As indicated in Figure 1 individuals' in quadrant I, i.e. individuals with a relatively high level of both cognitive, as well as non-cognitive ability, are hypothesized to have relatively more precise estimates of subjective expectations and therefore a higher likelihood for participation. Contrary to this individuals in quadrant III, i.e. individuals with a relatively low level of both cognitive, as well as non-cognitive ability, are hypothesized to have more uncertain estimates of expectations and therefore a lower likelihood for participation. Quadrant II (IV) indicates individuals' with low (high) cognitive ability, but relatively higher (lower) levels of non-cognitive ability. For individuals in quadrant II and IV the effect on

[16] Assume that participation is triggered if the expected utility from participation is sufficiently large. An individual with a higher belief in its expected utility outcome, i.e. with a more precise estimate of the expected outcome, is then more likely to decide to participate than an individual with a lower belief, i.e. with a less precise estimate of the expected outcome.

subjective expectations formation and the likelihood for participation will depend upon whether these mainly is formed by cognitive or non-cognitive ability.

II. Data and summary statistics

The data used within the study have been compiled by Statistics Sweden (SCB) and include information on individuals' stockholdings collected both from tax records by Statistics Sweden, as well as from the Nordic Central Securities Depository Group (NCSD).[17] Data on individuals' other wealth (mutual funds, bank holdings, real estate, and investments in debt securities), as well as taxable income, are drawn from the Swedish tax authorities. In addition to this, a large number of individual characteristics have been collected from Statistics Sweden, including data pertaining to the individuals' parents'.[18] Moreover, the data for the military enlistment tests are provided by the National Service Administration (Pliktverket).

Our initial data cover the two full cohorts (both men and women) born in 1963 and 1973 observed over the period 2000-2007, i.e. individuals are observed between ages 37-44 and 27-34 for respectively cohort, on an annual basis. Since the enlistment test scores are obtained from mandatory enlistment into military service, our main sample concern only male individuals.[19] Restricting the sample to those enlisted reduces the sample to 104,312 unique individuals, in total 823,134 individual-year observations (below referred to as the full sample).[20] In our empirical analysis the sample is somewhat reduced due to missing observations for some variables, e.g. cognitive ability, non-cognitive ability, educational attainment, as well as data for individuals parents (used in construction of the proxy for individuals risk aversion) are missing for a few individuals. In addition to this a small number of individuals with extreme wealth and/or income are also excluded.[21] The number of individuals and individual-year observations may therefore differ slightly in our analysis (below referred to as the main sample) depending on model specification.

In Table I, Panel A, annual stock market participation rates for the full sample are displayed.

[Table I about here.]

[17] As an official securities depository and clearing organization, NCSD (www.ncsd.eu) plays a crucial role in the Nordic financial system. NCSD currently includes VPC and APK, the Swedish and Finnish Central Securities Depositories, to which all actors on the Nordic capital markets are directly or indirectly affiliated. NCSD is responsible for providing services to issuers, intermediaries and investors, as regards the issue and administration of financial instruments as well as clearing and settlement of trades on these markets. The stock ownership data obtained from NCSD include for each investor the ownership records of all stocks owned at the end of December and at the end of June each year, i.e. the data is recorded at 6-month intervals, while ownership data from the tax records (Statistics Sweden) are observed at an annual basis.

[18] Individual characteristics are collected from the LISA database, Statistics Sweden.

[19] Although a small number of females have been subjected to the military enlistment test, the group is not likely to constitute a representative sample of the female cohort. To what extent our empirical results also extend to the female population have so far not been tested.

[20] A smaller number of individuals are not observed for the full sample period due to dying or leaving the country. The individuals' are on average observed for 7.89 periods.

[21] Individuals with a wealth over 20 million SEK or an annual income above 3 million SEK were excluded since these extreme observations caused numerical identification problems. In total this restriction excluded 140 individuals based on wealth and 174 individuals based on income.

The participation rates, which denote direct ownership of stocks[22], increase with 3.11% from 2000 to 2002, when it reaches its highest value during the considered sample period. From 2002 until 2007, it steadily declines with 5.23% to its lowest value in 2007. In Table I, Panel B, we report the theoretical, the full, the main and "the affluent in wealth and income" (top 10% of each distribution annually) sample distributions for the cognitive and non-cognitive ability scores obtained from individuals' enlistment tests taken at age 18-19, i.e. during the years 1981-1982 and 1991-1992. The distributions indicate that the correspondence between the theoretical, full and main samples is reasonably high for both cognitive and non-cognitive ability. A notable difference, however, is that the full sample distributions are somewhat more centered with thinner tails, in particular for the non-cognitive ability score. For our main sample the centrality tendency is further strengthened, i.e. the distributions are even more centered round the mean scores and more so for non-cognitive ability. This indicates that restrictions imposed upon our initial sample to a relatively larger extent exclude individuals belonging to the tail regions of cognitive and non-cognitive ability. This is especially true for the lower tails of the distributions for our main sample. In comparison, the distributions for cognitive and non-cognitive ability for the samples of individuals affluent in wealth and income, indicate that these to a larger degree contain individuals with higher scores on respectively scale.

In Table II average socioeconomic characteristics for the full sample (823,134 individual-year observations), for all and divided conditional on stock market participation, over the main controls are reported.[23]

[Table II about here.]

As indicated in the table there is a marked difference in mean characteristics for participants and non-participants (significant at the 1% level). Participants' average score for cognitive ability is 0.82 points higher than the average score for nonparticipants (a slightly lower difference than found in the data used by Grinblatt et al., 2011), while a similar comparison for non-cognitive ability render a 0.65 point higher value for participants. In terms of other controls, a main variable of interest concern our proxy for individuals risk preferences. Given that our data contain detailed information also for individuals' parents and given that risk preferences are found to be highly correlated between parents and children (e.g. Dohmen et al. 2012), we use as a proxy for individuals risk preferences the parental proportion of risky assets (here defined as the proportion of stocks and mutual funds in regard to total assets). The parental based proxy is used as a pre-determined variable, i.e. calculated based on data pertaining to the year 1999, while our analysis is carried out between 2000 and 2007. Thus, the parental choice

[22] In contrast to Grinblatt et al. (2011), we consider in our main analysis only direct ownership of stocks, i.e. not indirect ownership through, for example, equity mutual funds. The motivation for only considering direct ownership is that the decision to purchase stocks and mutual funds among household investors are likely to differ. Given that banks, which are likely to be an influence on individuals' saving decision, mainly are biased towards selling their own mutual funds rather than stocks directly, it is possible that the process leading to participation differ for these financial products. In the robustness testing of our results we do, however, also consider participation defined as including both direct and indirect ownership. Results from this additional analysis indicate a very high correspondence with results reported within the paper.

[23] A description of the variables is given in Table A-I in Appendix A.

of risky assets predates the individuals' choice to participate or not. Given that the considered individuals' are relatively young, we argue that the potential influence of individuals' on the parental choice of risk assets (in 1999) should be confined to a relatively smaller group of individuals. Thus, we consider the proxy for risk preferences to be reasonably exogenous to the individuals' choice to participate during the period 2000-2007.[24] In Panel B, the average proportion of risky assets held by parents (our proxy for individuals risk preferences) in the full sample is 0.172, while higher for participants, 0.211, compared to non-participants, 0.153. Thus, this indicates that individuals' with a lower risk aversion (higher parental proportion of risky assets) to a greater extent participate.

In terms of other variables used to construct regression controls, average values differ between participants' and non-participants. Participants, with average salary of 315,951 SEK, earn about 35% more labor income than the average non-participants' 233,502 SEK; are wealthier; are more likely to have a higher education (e.g. more than twice as likely to have a Ph.D.) and a degree in economics; are 1.17 times more likely to be married; 1.06 times more likely to have kids; 1.08 times more likely to belong to the older cohort; 1.56 times more likely to be self-employed (entrepreneur); 2.75 times more likely to work in the finance profession and half as likely to be unemployed.

In Table III average values of variables conditional on cognitive score indicate that many variables (unconditionally) are related to cognitive ability.

[Table III about here.]

Stock market participation is monotonically increasing in cognitive ability and participation rates increases from 11.9% to 49% going from the lowest to the highest category. The average value of non-cognitive ability increases (slightly diminishing) with increasing cognitive ability, indicating a positive correlation between the measures. Ownership of mutual funds increases linearly, while educational attainment in general also increases with cognitive ability. The same pattern is found for income and wealth. Average income increases from 157,593 SEK per year for stanine 1 to 379,680 SEK per year for stanine 9, while the corresponding figures for wealth are 97,244 for stanine 1 and 765,859 for stanine 9. In Table IV the corresponding variable averages conditional upon non-cognitive score is reported.

[Table IV about here.]

In line with cognitive ability, stock market participation increases monotonically with non-cognitive ability. Participation increases from 11.9% for stanine 1 to 47.7% for stanine 9, i.e. almost identical figures as for cognitive ability. This is interesting since it (unconditional) indicate a potential influencing role of non-cognitive ability of similar magnitude as cognitive ability (which is found to be a

[24] The risk proxy is based on the average proportion of risky assets held by both the father and the mother, since a number of individuals' lack one parent (most often the father have died before the mother). This is most pronounced for individuals' born in 1963. Also, since the parental proportion of risky assets is only based on one year (1999) an analysis based on the average parental proportions over 1999 till 2005, studying individuals' participation choice in 2006-2007, will later be considered in the robustness testing of our results. There we also consider other complementary risk preference proxies (parental capital income during child adolescents).

variable of significant importance for individuals' stock market participation by Grinblatt et al., 2011). In terms of cognitive ability, it increases for increasing levels of non-cognitive ability, as do individuals' ownership rates of mutual funds. In regard to educational attainment, this in general increases with increasing non-cognitive ability.[25] In terms of income and wealth, these increases monotonically with the level of non-cognitive ability. The average income (wealth) for individuals in stanine 1 is 134,129 (101,265) SEK per year compared to 401,872 (775,778) SEK per year for stanine 9. With respect to the other variables, we note that the proportions of self-employed and those with a financial profession are both increasing for higher stanines of non-cognitive ability. This tentatively indicates that larger proportions of individuals' better equipped to handle stressful situations are more represented in these more stressful activities.

To get an idea about the participation rates corresponding to different combinations of cognitive and non-cognitive ability, these are reported in Table V.

[Table V about here.]

Overall, the figures in the table correspond to our reasoning in regard to Figure 1. In particular, participation rates are highest among those with both relatively high cognitive and non-cognitive ability (c.f. quadrant I in Figure 1) and lowest among those with both relatively low cognitive and non-cognitive ability (c.f. quadrant III in Figure 1). Almost 50% or more of the individuals' in the upper region, i.e. individuals in stanine 7-9 in both cognitive and non-cognitive ability, participate, while the corresponding participation rates in the lower region, i.e. individuals' in stanine 1-3, are below 18%. This is a notable difference indicating (unconditional) the potential importance of both cognitive and non-cognitive ability for participation. Two broad groups of individuals of particular interest concern those with high cognitive, but low non-cognitive skills ("smart - but with a limited ability to perform in stressful situations") and those with low cognitive, but high non-cognitive skills ("not so smart - but with a high ability to function in stressful situation"), i.e. individuals in quadrant II and IV in Figure 1.[26] In terms of participation rates, between 13%–37.1% among individuals' with high cognitive (stanine 7-9) combined with low non-cognitive (stanine 1-3) ability participate. The participation rates for the reverse ability combinations, i.e. stanine 1-3 in cognitive ability and stanine 7-9 in non-cognitive ability, are 12.6%-41%. On an overall basis, the proportions of individuals participating among those with "high-low" ability combinations (quadrant II and IV) are in general higher than those with "low-low" ability combinations (quadrant III), while in general lower than participation rates among those with "high-high" ability combinations (quadrant I). Interestingly, increasing non-cognitive ability increases participation almost monotonically for all

[25] An interesting aspect concerns the distribution of individuals' with an educational orientation towards economics. For individuals' in the lower-stanine group of non-cognitive ability these proportions are lower than for those in the higher-stanine groups. This is a notable difference compared to the corresponding figures for cognitive ability found in Table III. While the proportion of individuals' with an economic degree monotonically increases for each stanine of non-cognitive ability, it actually decreases for higher levels of cognitive ability (stanine 7 to 9). These figures tentatively indicate the types of individuals' who are drawn towards the educational field of economics, i.e. relatively lower proportions of those with higher levels of cognitive ability, while a relatively higher proportion of those with higher non-cognitive ability.

[26] A priori, individuals' in these two groups seem most likely to suffer behavioral biases. In a parallel paper, Gyllenram, Hanes and Hellström (2013), we study this in more detail.

levels (stanines) of cognitive ability. The participation rates among those with relatively low cognitive ability (stanine 2) increases 2.87 times comparing those with low (stanine 1) with high (stanine 9) non-cognitive ability, while the corresponding figure for the high cognitive ability group of individuals' (stanine 9) increases with a multiple of 3.5. This (unconditionally) indicates the potential important role of non-cognitive ability for individuals' participation.

III. Empirical analysis

To study the effect of cognitive and non-cognitive ability on individuals' decision to participate, the binary participation outcome (one if an individual owns stocks at time *t*, zero otherwise) is related to cognitive and non-cognitive ability, as well as a host of control variables. This is done in a logit framework, controlling for individual specific unobserved heterogeneity by random effects and including time fixed effects controlling for broad market movements. Throughout, marginal participation rate effects (at the mean of the other regressors), standard errors and parameter estimates (with corresponding standard errors) for corresponding linear probability model specifications (as a reference), are reported for two specifications in regard to cognitive and non-cognitive ability scores.[27]

A. Participation and Cognitive and Non-Cognitive Ability

To facilitate a comparison with Grinblatt et al. (2011), we start by reporting results for a model specification only including cognitive ability. Results from these models are reported in Table VI.

[Table VI about here.]

In line with Grinblatt et al. (2011), participation is found to be monotonically increasing in cognitive ability (significant at the 1% level). This holds for both the "dummy", as well as the linear specification of cognitive ability.[28] In terms of size, the marginal effects from the "dummy" specification imply that participation among those with the lowest cognitive ability (stanine 1) is on average 7.3% lower than that of individuals' with the highest cognitive ability (stanine 9). The likelihood for participation increases on average with approximately one percentage point per stanine point increase in cognitive ability, as can also be seen from the linear specification of cognitive ability (column 5).[29] In comparison with Grinblatt et al. (2011) these effects are smaller (they find that the lowest IQ individuals have a participation rate that is 20.5 percentage points less than that

[27] The two specifications of the cognitive and non-cognitive ability score variables follows Grinblatt et al. (2011). In the first specification, dummies for each stanine score capture marginal effects in respect to the omitted category (stanine 9). In the second cognitive and non-cognitive ability scores are treated as a linear continuous variable. The relative advantage with the dummy specification is that it allows marginal effects to differ between different pair of stanines, i.e. the effect going from stanine 1 to 2 is allowed to be different than going from stanine 8 to 9. The relative drawback is the loss of simplicity relatively the linear specification.

[28] Throughout we focus on interpreting results from the logit model specification, whereas results for the linear probability model mainly serve as a reference. Thus, unless stated, interpretations pertain to the logit model specifications.

[29] Note here that the linear specification captures the average differences in coefficients for the "dummy" specification.

of high IQ individuals), but still of considerable economic magnitude. Worth to note here is that the corresponding marginal effects, based on the linear probability model with a dummy specification for cognitive ability (column 3), are more in line with those in Grinblatt et al. (2011), indicating a 23.3 percentage lower likelihood for participation among low-cognitive (stanine 1) individuals than in comparison to high-cognitive (stanine 9) individuals.

In Table VII corresponding results (as in Table VI) are reported, now including non-cognitive ability, both in terms of a "dummy" specification (column 1-4) and a linear specification (column 5-8).

[Table VII about here.]

Starting with non-cognitive ability, the results indicate that participation is monotonically increasing also in non-cognitive ability (significant at the 1% level). This holds for both the "dummy", as well as the linear specification. In terms of size, the marginal effects from the "dummy" specification imply that participation among those with the lowest non-cognitive ability (stanine 1) is on average 6.3% lower than compared to individuals with the highest non-cognitive ability (stanine 9). The likelihood for participation increases on average with approximately one percentage point per stanine point increase in non-cognitive ability, as can also be seen from the linear specification of non-cognitive ability (column 5). In regard to cognitive ability, now in a model conditioning also on non-cognitive ability, results are similar to those reported in Table VI, i.e. participation increases monotonically with increasing cognitive skills. In terms of sizes, these are comparable to our previous results.

For our regression control variables, results are similar (in terms of signs and significance) for the models reported in Table VI and VII. Most variables attain expected signs and are significant at the 1% level. For example, income and wealth both affect participation positively. A one unit (million SEK) increase in income increases the likelihood of participation with 1.5%, while similarly for wealth with 0.5%. Participation further increases for individuals with a higher educational degree, with an economical educational orientation, who are older (belonging to the older cohort born in 1963), are married, who work with a financial profession and for those holding mutual funds.

A major finding indicated by the above results is that non-cognitive ability seems to play an equally important role in influencing participation as cognitive ability. The results further confirm the results in Grinblatt et al. (2011), now also conditioning on a measure of non-cognitive ability. Our results, i.e. that we obtain similar effects from cognitive ability also when controlling for non-cognitive ability, further imply that the argument that the measurement of cognitive ability may be influenced by individuals' non-cognitive skills (and thereby constitute an important conditioning variable in studies of cognitive ability), see e.g. Brunello and Schlotter (2011), do not seem to be of major concern in the current context.

B. Risk Preference Versus Non-Preference Driven Effects

Given that we do not explicitly control for individuals' risk preferences, it is hard based on the above analysis, to determine to what extent cognitive and non-cognitive ability affect through their effect on risk preferences or through non-

preference driven mechanisms, i.e. by affecting subjective expectations in regard to stock market participation. In the most trivial case, cognitive and non-cognitive ability simply serves as drivers (in our analysis proxies) of individuals risk tolerance and imply that individuals that do not like risk do not participate. To provide evidence upon the issue, we re-run the models reported in Table VII, now including the proxy for individuals' risk preferences. The results from these regressions are reported in Table VIII.

[Table VIII about here.]

As can be seen from the table, most results are similar to those earlier reported, now also when controlling for individuals' risk preferences. Cognitive and non-cognitive ability both retain their monotonically increasing (significant at the 1% level) relationship with participation, while the proxy controlling for risk preferences is highly significant (at the 1% level). This is a striking result. If we assume that the proxy for risk aversion capture most of the variation between individuals' risk preferences, the interpretation of the other variables now pertain mainly to non-preference driven effects. Thus, the effects from cognitive and non-cognitive ability may now be interpreted as related to, for example, the formation of subjective expectations. This interpretation is broadly in line with Grinblatt et al. (2011) and Calvet et al. (2007) in that cognitive ability improve individuals' ability to screen, process, and analyze information, i.e. that the quality of financial decision making improves, leading to both more accurate predictions of expected returns and risks associated with participation, as well as a higher belief in these estimates (a higher precision in the estimates). In terms of non-cognitive ability, one interpretation is that more emotional stable individuals' (higher non-cognitive ability) form more accurate and precise expectations due to being less affected by anxiety, leading to a higher likelihood for participation. Another plausible explanation to the found non-preference driven effect from non-cognitive ability is that the measure, related to the personality dimension neuroticism, capture individuals' self-confidence (Caliendo et al., 2011). Thus, individuals' with a higher self-esteem are more likely to participate. This is consistent with the literature on overconfidence among investors, e.g. Odean (1998).

An interesting point to note is that the average increase in participation for each stanine point increase in both cognitive and non-cognitive ability (based upon the linear specifications for abilities reported in Table VIII, column 5) becomes larger when controlling for risk aversion, i.e. the estimates of marginal effects for cognitive and non-cognitive ability are significantly higher in the model controlling for risk preferences. One way to interpret this is that the results captured when not controlling for individuals' risk preferences (Table VII, column 5) are the average of the effects of cognitive and non-cognitive ability on both risk preferences and the effect through the non-preference channel. Given that the non-preference driven effects (reported in Table VIII, column 5) increases when controlling for effects going through risk preferences, i.e. by including the control for risk aversion, this then imply that the average effects going through risk preferences are smaller. This is interesting since it tentatively imply that the influence of cognitive and non-cognitive ability on individuals' participation through the non-preference channel is, at least, as high as that through affecting risk preferences.

To tentatively study the influence of cognitive and non-cognitive abilities on individuals risk preferences, we regress these variables on our proxy for individuals' risk aversion (the parental proportion of risky assets). The results from this regression are reported in Table IX.

[Table IX about here.]

As indicated in the table, both cognitive and non-cognitive ability is positively correlated (significant at the 1% level) with the individuals' measure of risk preferences, i.e. a relatively higher cognitive and non-cognitive ability is associated with higher proportion of risky assets and lower risk aversion. The negative correlation found between risk aversion and cognitive ability is consistent with the findings in Frederick (2006), Dohmen et al. (2010), Beauchamp, Cesarini and Johannesson (2011) and between risk aversion and non-cognitive ability (neuroticism) with the findings in Andersson et al. (2011). In terms of other controls we note that a higher educational attainment, an educational orientation towards the economic area, a higher income, a higher wealth, being married, belonging to the older cohort (born in 1963), all affect risk aversion adversely.

Overall the results tentatively indicate that cognitive and non-cognitive ability also is an important factor in affecting risk preferences. Given that risk preferences are found to be an important influencing factor on the decision to participate (in our earlier analysis above), this indicates that cognitive and non-cognitive ability affect the decision to own stocks both through an effect on risk preferences, but also trough non-preference driven effects.

C. Participation Among "High-Low" Versus "Low-High" Cognitive and Non-Cognitive Ability Individuals

Two groups of particular interest are (i) individuals with high cognitive and low non-cognitive ability and (ii) individuals with low cognitive and high non-cognitive ability. Individuals' with high cognitive ability may know what to do, but fail in execution due to poor non-cognitive skill, while those with strong non-cognitive skills may engage in activities not in line with their cognitive ability. Based on Table V (unconditional) participation rates within these groups of individuals' indicate that they to a higher (lower) degree participate than individuals with low-low (high-high) cognitive and non-cognitive ability. To test whether this holds also conditional on other controls we run a logit model including dummies for different combinations of cognitive and non-cognitive ability. To economize, abilities have each been regrouped into three categories: Low (stanine 1-3), medium (stanine 4-6) and high (stanine 7-9). A summary of the main variables of interest are reported in Table X, while estimates for the full model is reported in Table AII in Appendix A.

[Table X about here.]

The results confirm the pattern found in Table V, now also in a model conditioning on controls.[30] For low-cognitive individuals participation increases with 3.51%, increasing non-cognitive ability from low to high; for medium-cognitive ability individuals' participation increases with 5.57%, increasing non-cognitive

[30] Note here that this model specification control for individuals' risk aversion and we thus interpret results mainly as non-preference driven effects.

ability from low to high; for high-cognitive ability individuals' participation increases with 8.91%, increasing non-cognitive ability from low to high. This indicates that the change (increase) in participation from increasing non-cognitive ability becomes larger with increasing cognitive ability, or the reverse, that the effect of limitations in non-cognitive ability (comparing with the highest level) on participation is the most severe for those with relatively higher cognitive ability. For low-non-cognitive individuals participation increases with 2.58%, increasing cognitive ability from low to high; for medium-non-cognitive ability individuals' participation increases with 6.19%, increasing cognitive ability from low to high; for high-non-cognitive ability individuals' participation increases with 7.98%, increasing cognitive ability from low to high. This indicates a similar pattern in that the change (increase) in participation from increasing cognitive ability becomes larger with increasing non-cognitive ability, or the reverse, that the effect of limitations in cognitive ability (comparing with the highest level) on participation is the most severe for those with relatively higher non-cognitive ability. Overall, the results in Table X confirm that the effects from limitations in cognitive and non-cognitive abilities are of similar size and of similar importance for individuals' participation.

D. Affluent Individuals

A common explanation for non-participation is the presence of fixed participation costs (e.g. Haliassos and Bertaut, 1995; Vissing-Jorgensen, 2003). This has, for example, empirically been supported by the high correlation between wealth and participation in cross-sectional data (e.g. Guiso et al., 2008). The explanation does, however, not explain non-participation among those affluent in wealth (Vissing-Jorgensen, 2003; Curcuru et al., 2005; Campbell, 2006; Curcuru et al., 2009). While results in Grinblatt et al. (2011) suggest that limitations in cognitive ability and Guiso et al. (2008) that low levels of trust, at least partly, explain non-participation also among the affluent, we study here the role of non-cognitive ability. In Table XI participation rates distributed over cognitive and non-cognitive abilities based upon the top 10% of individuals (annually) in regard to wealth and income distributions, respectively, are shown.[31]

[Table XI about here.]

As indicate in the table, participation rates increases (unconditional) in both cognitive and non-cognitive ability for both samples. In general, participation is the highest for individuals in the "high-high" cognitive-non-cognitive category, while lowest for those in the "low-low" category. For those in the "high-low" categories, participation is in between these rates. These figures, thus, confirm that a similar pattern (as for the main sample) in regard to cognitive and non-cognitive abilities exist also among the affluent in wealth (income). Strikingly, the difference in participation rates between individuals in the "high-high" versus the "low-low" categories are 26.6% (21.9%) based on the wealth (income) restricted sample. Behind these figures lies a 12.3% (14.9%) average (over all levels of non-cognitive ability) higher rate of participation for individuals' with a high compared to low

[31] Given that the sample size reduces when restricting the sample to the top wealth and income deciles, we aggregated stanine 1–3 into Low, 4-6 into medium, and 7–9 into high cognitive and non-cognitive ability.

cognitive ability and a 15.1% (8.4%) average (over all levels of cognitive ability) higher rate of participation for individuals' with a high compared to low non-cognitive ability for the wealth (income) restricted sample. This indicates that also among the affluent cognitive and non-cognitive abilities, both, are important drivers of participation.[32]

In Table XII a summary of the main results for the different combinations of cognitive and non-cognitive ability for the top 10% in the income and wealth distributions, respectively, based on logit regressions are displayed.[33]

[Table XII about here.]

Based on the wealth restricted sample (Panel A) participation is significantly (at the 1% level) higher for individuals with combinations of cognitive and non-cognitive ability above the lowest level (the omitted category). Participation is, for example, 27.36% higher for wealthy individuals in the "high-high" category compared to wealthy individuals in the "low-low" category. Interesting to note is that for medium- and high-cognitive ability individuals' participation increases (significant at the 1 % level) with 7.89%, comparing individuals with low and high non-cognitive skills. Thus, limitations in non-cognitive ability explains part of why even smart (high cognitive) and wealthy do not always participate. For medium- and high-non-cognitive ability individuals' participation increases (although not significant) with 5.19% and 0.35%, comparing individuals with low and high cognitive skills. Comparing these changes to the former (when changing non-cognitive ability over medium- and high-cognitive ability individuals) indicate tentatively that non-cognitive ability may be of even greater importance than cognitive ability for participation among individuals affluent in wealth.

A similar analysis of the income restricted sample (Panel B) indicates a somewhat differing picture. Even if the average participation rate among individuals in the "high-high" cognitive and non-cognitive ability category participate 28.16% more than those in the "low-low" category (significant at the 1% level), not all combinations are significantly different than the omitted category. In particular, the average participation rates among individuals with medium cognitive and low non-cognitive, high cognitive and low non-cognitive, low cognitive and medium non-cognitive and low cognitive and high non-cognitive ability are not significantly different than the omitted "low-low" category.[34] For medium- and high-cognitive ability individuals' participation increases (although not significant) with 15.5% and 11.6%, respectively, comparing individuals with low and high non-cognitive skills, while for medium- and high-non-cognitive ability individuals' participation increases (although not significant) with 19.08% and 11.18%, comparing individuals with low and high cognitive skills. Interpreting these

[32] Worth noting is the difference in the number of observations in the different cognitive-non-cognitive categories. The relatively larger proportion of observations in the "low-low" category for the sample based on wealth, compared to that based on income, indicates a higher representation of "low-low" cognitive-non-cognitive individuals in the top decile of wealth, compared to the similar based on income. This is likely a reflection of that cognitive and non-cognitive abilities are stronger determinates of income (a labor market outcome) than of wealth (that can also be inherited).

[33] The results from the regressions are given in Appendix A - Table A-III and A-IV for the income restricted sample; Table A-V and A-VI for the wealth restricted sample.

[34] Note, however, that the average effect of cognitive and non-cognitive ability in the linear specification in Table A-V in Appendix A (column 5) indicate that both are significant at the 1% and 5% level.

changes (even though not significant) indicate a comparable role of cognitive and non-cognitive ability in explaining non-participation among those affluent in income.

Summarizing the analysis of those affluent in income and wealth indicate that limitations in both cognitive and non-cognitive ability seem to explain non-participation among the affluent. Overall, the evidence points towards that the effect of limitations in non-cognitive ability, at least, seem of equal importance to that of cognitive ability. Comparing the results over the wealth and income restricted samples indicate that theses are composed of different individuals and that the effect of cognitive and non-cognitive ability on participation among these individuals seem to differ. A likely explanation can be found in Table XI. A comparison of the number of observations in each cell indicate that there are a substantial larger amount of "low-low" observations and a substantial lower number of "high-high" observations in the wealth restricted sample. This is most likely due to the fact that wealth may be inherited, while income to a greater extent is a function of cognitive and non-cognitive ability (see e.g. Hanes and Norlin, 2011 and Lindqvist and Vestman, 2011).

IV. Conclusions

In this paper we add new evidence about the importance of individuals' non-cognitive skills, i.e. personality traits, as a significant influence on individuals' stock market participation. The results, based on a composite measure of non-cognitive skills capturing mainly the personality dimensions neuroticism and extraversion, complement the findings in Guiso et al. (2008), who find trust (a personality characteristics related the personality dimension agreeableness) to be an important driver for participation. Given that non-cognitive skills are heterogeneously distributed for all levels of wealth, this also adds to the explanation of non-participation among those affluent in wealth. It further, also contributes to explaining non-participation among those affluent in both cognitive ability and wealth, i.e. among those who are "smart" and rich. Strikingly, the direct effect of non-cognitive ability on participation is of similar magnitude as that of cognitive ability, which is found to be of significant order both in our study and in that by Grinblatt et al. (2011).

In terms of cognitive ability, our results confirm those in Grinblatt et al. (2011), now also conditioning on a measure of non-cognitive ability, a direct proxy for risk aversion, as well as educational controls at the individual level. This is interesting since it both indicates that Grinblatt et al. (2011) are successful in indirectly conditioning on the omitted relationship between participation and risk aversion, as well as in that it confirms the importance of accounting for cognitive ability in explaining participation both in general and for those affluent in wealth and income.

Given the nascent interest in integrating economic decision theory with personality theory (Andersson et al. 2011; Guios and Sodini, 2013) the results within the paper provide an interesting contribution. Given that non-cognitive ability (our composite measure of personality traits) retains explanatory value of significant size also when controlling for risk preferences, this confirms the

findings in Andersson et al. (2011), now on a larger sample of individuals' based on data for actual financial choices. In the current paper, our conclusion is that personality traits (non-cognitive ability) and cognitive ability both are important determinants of both risk preferences, as well as in affecting through non-preference driven effects, e.g. in the formation of subjective expectations about the risk-return trade-off associated with participation.

At a higher level, the results within the paper are interesting since they indicate that the cognitive and non-cognitive test scores, obtained from tests during enlistment to military service early in life (at age 18-19), have predictive power for financial behavior later in life. This is in line with results within labor market research, e.g. Hanes and Norlin (2011) and Lindqvist and Vestman (2011), indicating its predictive power for labor market outcomes, such as unemployment and wage.

On a final note, the inclusion of both cognitive and non-cognitive ability in a joint study, reveal an interesting avenue for future research. Given that both abilities are heterogeneously distributed over individuals, one can a priori suspect that individuals' with high cognitive ability, but poor non-cognitive skills and individuals' with strong non-cognitive abilities, but with low cognitive skills, are in particular prone to suffer behavioral biases. High-cognitive individuals with limitations in non-cognitive skills may know what to do but fail in execution, while low-cognitive ability individuals with strong non-cognitive skills may participate in activities above their capabilities, i.e. for example due to overconfidence, rendering poor financial outcomes. The effect of cognitive and non-cognitive ability on financial performance and behavioral biases is studied in a parallel paper (Gyllenram, Hanes and Hellström, 2013).

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TABLES

Table I: Participation Rates and the Distributions of Cognitive and Non-Cognitive Ability Scores

Panel A: Average Participation Rates

Year	2000	2001	2002	2003	2004	2005	2006	2007	Average
	32.39%	33.23%	35.50%	34.69%	33.76%	31.82%	30.78%	30.27%	32.81%

Panel B: Distributions of Cognitive and Non-Cognitive Ability Scores

Sample	1	2	3	4	5	6	7	8	9	N
Theoretical stanine distribution	4.0%	7.0%	12.0%	17.0%	20.0%	17.0	12.0%	7.0%	4.0%	
Cognitive Ability Score - Full sample	2.7%	7.8%	11.4%	15.4%	23.7%	16.3%	11.9%	7.1%	3.7%	*104,419*
Non-Cognitive Ability Score - Full sample	1.9%	5.9%	10.6%	17.6%	24.0%	18.9%	13.7%	5.9%	1.5%	*101,264*
Cognitive Ability Score - Main sample	2.5%	7.2%	10.8%	14.9%	24.3%	16.8%	12.4%	7.3%	3.9%	*96,025*
Non-Cognitive Ability Score - Main sample	1.7%	5.6%	10.4%	17.6%	24.2%	19.2%	13.9%	6.0%	1.5%	*96,025*
Cognitive Ability Score - Income restricted sample	0.2%	1.2%	3.3%	7.4%	19.7%	21.52%	21.0%	15.71%	9.9%	*18117*
Non-Cognitive Ability Score - Income restricted sample	0.3%	1.4%	3.4%	10.2%	19.9%	23.7%	24.4%	12.9%	3.6%	*18117*
Cognitive Ability Score - Wealth restricted sample	0.8%	3.4%	6.42%	10.8%	22.5%	19.9%	17.1%	11.9%	7.1%	*18099*
Non-Cognitive Ability Score - Wealth restricted sample	0.8%	3.0%	6.58%	14.0%	22.8%	21.8%	19.2%	9.3%	2.5%	*18099*

Notes. In total we have information about cognitive ability scores for 104,419 individuals and information about non-cognitive ability scores for 101,264 individuals. When we run our main regressions we have 96,025 individuals left. Income restricted sample correspond to the individuals in the top 10% of the income distribution; wealth restricted sample correspond to the individuals in the top 10% of the wealth distribution.

Table II: Mean Socioeconomic Characteristics by Stock Market Participation 2000-2007

		Stock Market Participant	
	All	Yes	No
Cognitive ability	5.030	5.58	4.760
Non-cognitive ability	5.05	5.49	4.84
risk8proxy	0.172	0.211	0.153
Mutual funds	47.0%	65.2%	37.7%
Educational attainment			
1	0.2%	0.1%	0.3%
2	11.3%	6.6%	13.6%
3	36.6%	28.3%	40.6%
4	17.9%	18.2%	18.3%
5	15.6%	20.0%	13.45%
6	17.4%	26.2%	13.1%
7	1.0%	1.5%	0.7%
Economic education	9.4%	12.9%	7.7%
Income (thousand sek)	260,554	315,951	233,502
Wealth (thousand sek)	356,947	742,342	168,745
Other demographics			
Born in sweden	94.1%	.94.2%	.94.1%
Married	32.7%	36.2%	31.0%
Cohabiter	18.3%	18.2%	18.4%
Kids	54.5%	56.6%	53.5%
Born 1963	51.5%	54.4%	50.1%
Occupation			
Enterpreneur	8.42%	11.1%	7.1%
Finance proffessional	1.9%	3.3	1.2%
Unemployed	11.2%	6.7%	13.4%
Number of observations	823,134	270,027	553,057

Notes. In this table we include all observations for which we know if the individuals are participating on the stock market or not a given year. We include 104,312 individuals' and 823,134 observations in total. We do not exclude individuals that have missing values for one or many of the variables. These individuals are later excluded in the analyses. This means that the number of observations used for computing the different means can differ because some variables have more missing observations than others.

Table III: Mean Socioeconomic Characteristics by Cognitive Ability Score 2000-2007

	Cognitive Ability Score									
	1	2	3	4	5	6	7	8	9	All
Stock market participation	11.9%	17.1%	22.2%	26.9%	33.3%	38.9%	43.3%	47.0%	49.0%	*32.8%*
Non-Cognitive ability Score	2.941	3.738	4.335	4.781	5.147	5.492	5.730	5.950	6.058	5.054
Mutual funds	26.0%	33.1%	38.6%	43.0%	47.6%	52.0%	54.2%	56.9%	60.2%	47.0%
Educational attainment										
1	2.1%	0.8%	0.4	0.2%	0.1%	0.0%	0%	0%	0%	0.2%
2	35.6%	28.5	21.2%	15.0%	8.6%	4.8%	2.9%	1.4%	0.7%	0.1%
3	48.4%	53.1%	54.6%	51.4%	41.3%	27.6%	16.5%	7.9%	3.0%	36.6%
4	11.9%	13.8%	16.2%	19.2%	22.0%	20.4%	17.3%	12.2%	7.9%	17.9%
5	1.4%	2.4%	4.7%	8.2%	15.1%	22.9%	27.8%	29.5%	25.4%	156.%
6	0.6%	1.3%	2.9%	6.0%	12.6%	23.4%	33.8%	45.3%	55.4%	17.4%
7	0.0%	0.0%	0.0%	0.1%	0.2%	0.8%	1.9%	3.6%	7.6%	1.0%
Economic orientation	2.8%	4.1%	6.5%	8.8%	11.5%	12.8%	11.1%	8.7%	6.4%	9.4%
Income	157,593	190,277	209,633	227,943	251,416	286,543	315,492	352,688	379,680	260,554
Wealth	97,244	155,648	209,232	264,965	321,359	428,641	500,358	629,755	765,859	356,946
Other demographics										
Born in sweden	84.6%	92.8%	94.0%	94.8%	95.1%	94.8%	94.8%	93.2%	93.0%	94.1%
Married	21.1%	23.5%	27.7%	29.7%	32.3%	36.0%	38.3%	41.5%	43.4%	32.7%
Cohabiter	16.4%	20.5%	21.4%	21.3%	19.8%	17.5%	15.0%	12.4%	9.8%	18.3%
Kids	46.5%	52.3%	55.1%	55.7%	55.5%	55.4%	54.3%	53.4%	50.9%	54.5%
Born 1963	36.7%	49.7%	52.5%	51.8%	52.0%	52.8%	52.0%	52.1%	51.5%	51.5%
Occupation										
Enterpreneur	5.1%	7.0%	8.5%	9.0%	9.1%	8.8%	8.2%	7.7%	7.0%	8.4%
Finance proffessional	0.3%	0.5%	0.7%	1.0%	2.0%	2.9%	2.9%	2.8%	2.4%	1.9%
Unemployed	26.2%	17.3%	13.7%	11.5%	10.1%	9.3%	8.6%	8.1%	7.6%	11.2%
Number of observations	22,392	64,245	93,578	127,192	195,553	133,589	97,306	57,632	30,097	823,134

Notes. Notes. The number of observations in each cognitive ability group does not quite add up to the total number of observations in the "All" column. This is because we miss information on cognitive ability for a few individuals. But those individuals are still included in the mean for all individuals as long as we have information about the variable in question. In total we have cognitive ability scores for 104,107 but the total numbers of individuals for which we know if they are participating on the stock market or not a given year are 104,312.

Table IV: Mean Socioeconomic Characteristics by Non- Cognitive Ability Score 2000-2007

	Non-Cognitive Ability Score									
	1	2	3	4	5	6	7	8	9	All
Stock market participation	11.9%	17.8%	21.6%	28.4%	33.3%	38.6%	42.7%	46.7%	47.7%	*32.8%*
Cognitive ability Score	3.186	3.596	4,082	4.711	5.078	5.486	5.933	6.302	6.720	5.030
Mutual funds	22.5%	29.7%	36.7%	44.2%	49.0%	52.0%	54.3%	55.2%	54.7%	*47.0%*
Educational attainment										
1	2.1%	0.8%	0.4%	0.2%	0.1%	0.0%	0.0%	0.0%	0%	0.2%
2	33.0%	27.0%	20.6%	14.2%	9.7%	6.1%	3.9%	2.8%	2.1%	11.3%
3	43.1%	45.2%	46.6%	43.8%	40.3%	32.0%	22.7%	18.0%	13.3%	36.6 %
4	11.5%	13.6%	15.9%	17.7%	19.0%	19.2%	18.9%	17.0%	15.2%	17.9%
5	5.4%	6.4%	8.4%	12.4%	15.4%	20.2%	22.8%	22.5%	24.7%	15.6%
6	4.8%	6.7%	7.5%	11.2%	14.6%	21.3%	29.9%	37.6%	42.0%	17.4%
7	0.1%	0.3%	0.4%	0.6%	0.8%	1.2%	1.7%	2.1%	2.7%	1.0%
Economic orientation	4.1%	4.7%	5.9%	7.6	9.1%	11.3%	13.4%	13.7%	14.3%	9.4%
Income	134,129	169,842	200,725	233,283	256,631	287,683	325,527	358,643	401,872	260,554
Wealth	101,265	163,423	202,988	284,772	363,323	408,693	525,925	555,086	775,778	356,947
Other demographics										
Born in sweden	89.9%	90.4%	93.4%	94.9%	95.0%	94.9%	94.0%	93.8%	92.4%	94.1%
Married	16.8%	19.7%	24.1%	29.4%	33.7%	36.9%	39.9%	43.4%	47.7%	32.7%
Cohabiter	14.8%	16.1%	17.5%	18.7%	19.6%	18.9%	18.0%	16.3%	15.0%	18.3%
Kids	40.2%	44.1%	48.6%	52.7%	56.5%	57.7%	58.5%	59.1%	61.2%	54.5%
Born 1963	42.4%	47.4%	51.0	55.0%	55.1%	52.2%	49.4%	49.9%	52.3%	51.5%
Occupation										
Enterpreneur	5.7%	6.8%	7.4%	8.2%	8.9%	9.3%	8.6%	8.8%	9.6%	8.4%
Finance proffessional	0.4%	0.6%	0.8%	1.1%	1.7%	2.5%	3.3%	3.6%	4.7%	1.9%
Unemployed	37.0%	25.0%	16.4%	11.3%	8.7%	7.8%	7.6%	7.3%	7.2%	11.2%
Number of observations	14,970	46,821	84,710	141,040	191,594	150,622	109,027	46,533	11,391	823,134

Notes. The number of observations in each non-cognitive ability group does not quite add up to the total number of observations in the "All" column. This is because we miss information on non-cognitive ability for a few individuals. But those individuals are still included in the mean for all individuals as long as we have information about the variable in question. In total we have cognitive ability scores for 100,964 individuals but the total numbers of individuals for which we know if they are participating on the stock market or not a given year are 104,312.

Table V: Participation by Combinations of Cognitive and Non-Cognitive Ability Scores, 2000-2007

Non-Cognitive Ability Score	Cognitive Ability Score: 1	2	3	4	5	6	7	8	9
1	7.2%	12.0%	10.6%	11.5%	19.5%	15.9%	13.0%	22.1%	16.0%
2	12.7%	14.4%	17.7%	17.7%	19.6%	21.1%	27.7%	30.6%	31.8%
3	10.5%	16.2%	16.8%	21.1%	26.5%	26.6%	30.4%	33.2%	37.1%
4	15.0%	17.1%	22.8%	24.5%	29.5%	35.1%	36.2%	42.6%	41.9%
5	13.1%	19.4%	24.0%	29.6%	33.2%	37.6&	41.7%	44.4%	48.2%
6	18.8%	21.1%	28.0%	30.8%	37.2%	42.3%	45.7%	47.5%	50.1%
7	12.6%	26.3%	28.2%	32.1%	38.5%	44.3%	49.2%	51.2%	52.9%
8	No obs.	26.0%	33.2%	30.8%	43.3%	46.9%	50.3%	53.8%	54.6%
9	No obs.	34.4%	41.0%	38.6%	44.6%	44.3%	49.4%	52.2%	56.0%

Notes. We compute: *Number of participant (ones)/Number of participants + number of non-participants (zeros)* for every possible combination of cognitive and non-cognitive ability. The table includes all observations for which we have both cognitive ability scores and non-cognitive ability scores and for which we know if the individuals are participating on the stock market or not. Since we look at 8 periods this means that each individual can be counted up to 8 times. 100759 individuals are included and we have 795158 observations in total.

Table VI: Cognitive Ability Scores and Stock Market Participation

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Cognitive ability score					0.0109***	0.0004	0.0323***	0.0007
1	-0.0730***	0.0034	-0.2324***	0.0100				
2	-0.0663***	0.0029	-0.1985***	0.0080				
3	-0.0586***	0.0026	-0.1618***	0.0075				
4	-0.0512***	0.0025	-0.1284***	0.0072				
5	-0.0394***	0.0022	-0.0849***	0.0069				
6	-0.0278***	0.0020	-0.0519***	0.0070				
7	-0.0160***	0.0019	-0.0246***	0.0072				
8	-0.0058***	0.0019	-0.0051	0.0078				
Mutual Fund	0.0166***	0.0005	0.0569***	0.0009	0.0189***	0.0006	0.0569***	0.0009
Educational Attainment	0.0114***	0.0004	0.0328***	0.0009	0.0133***	0.0005	0.0326***	0.0008
Economic orientation	0.0116***	0.0009	0.0425***	0.0029	0.0133***	0.0010	0.0438***	0.0029
Income	0,0153***	0.0011	0.0494***	0.0028	0.0176***	0.0012	0.0490***	0.0028
Net-wealth	0.0049***	0.0002	0.0165***	0.0005	0.0057***	0.0002	0.0165***	0.0005
Other Demographics								
Born in Sweden	-0.0003	0.0011	0.0034	0.0041	-0.0006	0.0005	0.0044	0.0041
Married	0.0014***	0.0005	0.0016	0.0012	0.0017***	0.0006	0.0062	0.0012
Cohabiter	0.0028***	0.0006	0.0062***	0.0013	0.0032***	0.0005	0.0062***	0.0013
Kids	0.0000	0.0004	-0.0011	0.0011	0.0001	0.0005	-0.0011	0.0011
Born 1963	0.0120***	0.0007	0.0421***	0.0025	0.0133***	0.0008	0.0424***	0.0025
Occupation								
Entrepreneur	0.0046***	0.0005	0.0137***	0.0014	0.0053***	0.0006	0.0137***	0.0014
Finance Professional	0.0055***	0.0012	0.0235***	0.0036	0.0063***	0.0013	0.02369***	0.0036
Unemployed	-0.0003	0.0005	-0.0004	0.0011	-0.0004	0.0006	-0.0005	0.0011
Year 2001	0.0030***	0.0004	0.0061***	0.0009	0.0033***	0.0004	0.0061***	0.0009
Year 2002	0.0130***	0.0005	0.0272***	0.0009	0.0145***	0.0005	0.0272***	0.0009
Year 2003	0.0087***	0.0004	0.0178***	0.0009	0.0097***	0.0005	0.0178***	0.0009
Year 2004	0.0037***	0.0004	0.0067***	0.0009	0.0040***	0.0004	0.0068***	0.0009
Year 2005	-0.0065***	0.0004	-0.0157***	0.0009	-0.0074***	0.0005	-0.0156***	0.0009
Year 2006	-0.0126***	0.0005	-0.0294***	0.0009	-0.0142***	0.0006	-0.0293***	0.0009
Year 2007	-0.0162***	0.0006	-0.0379***	0.0009	-0.0183***	0.0006	-0.0379***	0.0009
Wald chi2	22306.06				21284.18			
R2			0.1116				0.1113	
Constant			0.2177				-0.0371	

Notes. N=819579 n=103948 . Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table VII: Cognitive and Non-Cognitive Ability Scores and Stock Market Participation

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Cognitive ability score					0.0108***	0.0004	0.0248***	0.0008
1	-0.0697***	0.0038	-0.1685***	0.0105				
2	-0.0660***	0.0031	-0.1527***	0.0082				
3	-0.0605***	0.0029	-0.1294***	0.0077				
4	-0.0551***	0.0028	-0.1086***	0.0074				
5	-0.0422***	0.0025	-0.0713***	0.0070				
6	-0.0301***	0.0024	-0.0449***	0.0071				
7	-0.0170***	0.0023	-0.0207***	0.0073				
8	-0.0170***	0.004	-0.0048	0.0078				
Non-cognitive Ability Score					0.0103***	0.0004	0.0248***	0.0008
1	-0.0632***	0.0049	-0.1675***	0.0140				
2	-0.0549***	0.0040	-0.1350***	0.0116				
3	-0.0514***	0.0038	-0.1212***	0.0111				
4	-0.0419***	0.0037	-0.0868***	0.0107				
5	- 0.0324***	0.0036	-0.0599***	0.0106				
6	-0.0200***	0.0035	-0.0311***	0.0107				
7	-0.0105***	0.0037	-0.0150	0.0108				
8	0.0024	0.0037	0.0077	0.0114				
Mutual Fund	0.0206***	0.0006	0.0561***	0.0009	0.0234***	0.0007	0.0562***	0.0009
Educational Attainment	0.0129***	0.0005	0.0292***	0.0009	0.0148***	0.0005	0.0292***	0.0009
Economic orientation	0.0134***	0.0011	0.0386***	0.0030	0.0154***	0.0013	0.0393***	0.0030
Income	0.0180***	0.0014	0.0447***	0.0028	0.0210***	0.0015	0.0444***	0.0028
Net-wealth	0.0061***	0.0003	0.0162***	0.0005	0.0070***	0.0003	0.0162***	0.0005
Other Demographics								
Born in Sweden	-0.0009	0.0015	0.0023	0.0042	-0.0015	0.0016	0.0028	0.0042
Married	0.0014**	0.0006	0.0004	0.0012	0.0015**	0.0007	0.0004	0.0012
Cohabiter	0.0034***	0.0007	0.0057***	0.0014	0.0038***	0.0008	0.0057***	0.0014
Kids	-0.0002	0.0006	-0.0017	0.0011	-0.0002	0.0006	-0.0017	0.0011
Born 1963	0.0145***	0.0009	0.0405***	0.0025	0.0159***	0.0010	0.0406***	0.0025
Occupation								
Entrepreneur	0.0054***	0.0007	0.0128***	0.0014	-0.0063***	0.0008	0.0128***	0.0014
Finance Professional	0.0065***	0.0015	-0.0003***	0.0036	0.0074***	0.0017	0.0226***	0.0036
Unemployed	-0.0003	0.0006	0.0062***	0.0012	-0.0003	0.0007	-0.0004	0.0012

(Continued)

Table VII: Cognitive and Non-Cognitive Ability Scores and Stock Market Participation *(Continued)*

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Year 2001	0.0037***	0.0005	0.0277***	0.0009	0.0041***	0.0005	0.0062***	0.0009
Year 2002	0.0165***	0.0006	0.0277***	0.0009	0.0182***	0.0006	0.0277***	0.0009
Year 2003	0.0110***	0.0005	0.0182***	0.0009	0.0122***	0.0006	0.0182***	0.0010
Year 2004	0.0047***	0.0005	0.0073***	0.0009	0.0052***	0.0006	0.0073***	0.0009
Year 2005	-0.0080***	0.0005	-0.0150***	0.0009	-0.0090***	0.0006	-0.0150***	0.0009
Year 2006	-0.0155***	0.0006	-0.0287***	0.0009	-0.0176***	0.0007	-0.0287***	0.0009
Year 2007	-0.0201***	0.0007	-0.0372***	0.0010	-0.0227***	0.0008	-0.0372***	0.0010
Wald chi2	22975.36				21608.69			
R^2			0.1132				0.1129	
Constant			0.2818				-0.1054	

Notes. N=793206 n=100605. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table VIII: Cognitive Ability, Non-Cognitive Ability, Risk Aversion and Stock Market Participation

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Cognitive ability score					0.0135***	0.0005	0.0240	0.0008
1	-0.0809***	0.0046	-0.1621***	0.0109				
2	-0.0765***	0.0037	-0.1457***	0.0084				
3	-0.0693***	0.0034	-0.1221***	0.0079				
4	-0.0635***	0.0033	-0.1038***	0.0075				
5	-0.0472***	0.0030	-0.0662***	0.0071				
6	-0.0325***	0.0029	-0.0400***	0.0072				
7	-0.0183***	0.0029	-0.01839**	0.0074				
8	-0.0051*	0.0030	-0.0015	0.0079				
Non-cognitive Ability Score					0.0131***	0.0005	0.0241	0.0008
1	-0.0718***	0.0060	-0.1550***	0.0145				
2	-0.0622***	0.0049	-0.1262***	0.0120				
3	-0.0583***	0.0047	-0.1132***	0.0113				
4	-0.0467***	0.0045	-0.0804***	0.0110				
5	-0.0349***	0.0044	-0.0538***	0.0108				
6	-0.0193***	0.0044	-0.0244***	0.0109				
7	-0.0086**	0.0044	-0.0096	0.0110				
8	0.0058	0.0056	0.1163	0.0116				
Mutual Fund	0.0250***	0.0007	0.0553***	0.0009	0.0294***	0.0008	0.0553	0.0009
Educational Attainment	0.0150***	0.0005	0.0275***	0.0009	0.0180***	0.0006	0.0275	0.0009
Economic orientation	0.0159***	0.0014	0.0370***	0.0030	0.0190***	0.0016	0.0378	0.0030
Income	0.0216***	0.0017	0.043***	0.0029	0.0256***	0.0020	0.0427	0.0029
Net-wealth	0.007***	0.0003	0.0158***	0.0005	0.009***	0.0004	0.0158	0.0005
Other Demographics								
Born in Sweden	-0.0011	0.0019	0.0021	0.0044	-0.0018	0.0022	0.0026	0.0044
Married	0.0015**	0.0008	0.0002	0.0013	0.0017*	0.0009	0.0002	0.0013
Cohabiter	0.0038***	0.0009	0.0052***	0.0014	0.0044***	0.0010	0.0053	0.0014
Kids	-0.0002	0.0007	-0.0017	0.0011	-0.0001	0.0008	-0.0017	0.0011
Born 1963	0.0150***	0.0011	0.0344***	0.0011	0.0172***	0.0012	0.0346	0.0026
Occupation								
Entrepreneur	0.0067***	0.0009	0.0126***	0.0260	0.0081***	0.0010	0.0126	0.0014
Finance Professional	0.0086***	0.0019	0.0237***	0.0037	0.0102***	0.0022	0.0238	0.0037
Unemployed	-0.0008	0.0008	-0.0010	0.0012	-0.0010	0.0009	-0.0011	0.0012
Risk aversion	0.0796***	0.0028	0.1558***	0.0139	0.0921***	0.0031	0.1557	0.0054

(Continued)

Table VIII: Cognitive Ability, Non-Cognitive Ability, Risk Aversion and Stock Market Participation *(Continued)*

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Year 2001	0.0046***	0.0006	0.0063***	0.0009	0.0052***	0.0007	0.0063	0.0009
Year 2002	0.0202***	0.0007	0.0280***	0.0009	0.0231***	0.0008	0.0280	0.0009
Year 2003	0.0135***	0.0006	0.0185***	0.0009	0.0154***	0.0007	0.0185	0.0009
Year 2004	0.0059***	0.0006	0.0076***	0.0009	0.0066***	0.0007	0.0076	0.0009
Year 2005	-0.0096***	0.0007	-0.0146***	0.0009	-0.0112***	0.0008	-0.0146	0.0009
Year 2006	-0.0189***	0.0007	-0.0286***	0.0010	-0.0221***	0.0008	-0.0285	0.0010
Year 2007	-0.0246***	0.0008	-0.0372***	0.0010	-0.0289***	0.0009	-0.0371	0.0010
Wald chi2	23015.06				22033.57			
R^2			0.1159				0.1155	
Constant			0.2559				-0.1120	

Notes. N=757448 n=96025. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table IX: Risk aversion and cognitive and non-cognitive ability

Independent Variables	Coefficients (OLS)	Standard Errors
Cognitive Ability Score	0.0039***	0.0002
Non-Cognitive Ability Score	0.0039***	0.0002
Educational Attainment	0.0119***	0.0003
Economic orientation	0.0082***	0.0009
Income	0.0121***	0.0019
Net-wealth	0.0135***	0.0003
Other Demographics		
Born in Sweden	0.0166***	0.0012
Married	0.0021**	0.0009
Cohabiter	0.0020**	0.0010
Kids	-0.0023***	0.0009
Born 1963	0.0375***	0.0006
Occupation		
Entrepreneur	0.0007	0.0010
Finance Professional	-0.0002	0.0020
Unemployed	-0.0069***	0.0010
R2	0.0232	
Constant	0.0438	

Notes. N=757448 n=96025. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table X: Participation rates for different combinations of cognitive and non-cognitive ability

		Cognitive Ability Score		
		Low	Medium	High
Non-Cognitive Ability Score	Low	-	1.38% (0.92%-1.82%)	2,58% (1.83%-3.34%)
	Medium	1.48% (1.06%-1.90%)	4.49% (4.09%-4.88%)	7.67% (7.13%-8.22%)
	High	3.51% (2.62%-4.39%)	6.95% (6.43%-7.48%)	11.49% (10.79%-12.19%)

Notes. The table illustrates the marginal effects based on the logit model reported in Appendix A, Table A-II. 8 dummy-variables for the different combinations of cognitive and non-cognitive ability are included. Low-low is the omitted category. 95% confidence interval is shown in parenthesis.

Table XI: Participation by Combinations of Cognitive and Non-Cognitive Ability Scores for the top 10% in the wealth respectively income distribution , 2000-2007

		Wealth distribution			Income distribution		
		Cognitive Ability Score					
		Low	Medium	High	Low	Medium	High
Non-Cognitive Ability Score	Low	47.2% (2786)	54.3% (4077)	60.8% (1650)	40.8% (552)	48.2% (1745)	55.2% (1156)
	Medium	56.7% (4936)	63.2% (27093)	70.7% (15708)	45.9% (1869)	55.2% (21158)	61.0% (18968)
	High	64.5% (696)	69.2% (10940)	73.8% (13139)	47.6% (496)	59.0% (14346)	62.7% (21235)

Notes. We compute: *Number of participants (ones)/Number of participants + Number of non-participants (zeros)* for different combinations of cognitive and non-cognitive ability. We only look at those that have net-wealth (income) in the top 10% distribution a given year. The table includes all observations for which we have both cognitive ability scores and non-cognitive ability scores and for which we know if the individuals are participating on the stock market or not. Since we look at 8 periods this means that each individual can be counted up to 8 times. 18890 (18846) individuals are included and we have 81025 (81525) observations in total based on wealth (income). Low includes scores of 1, 2 and 3. Medium includes scores of 4, 5 and 6. High includes scores of 7, 8 and 9. Number of observations is showed in parenthesis. The average participation rate for the whole sample is 65.8% (58.9%) based on wealth (income).

Table XII: Participation rates for different combinations of cognitive and non-cognitive ability for the top 10% in the wealth and income distribution, respectively.

Panel A: Wealth restricted sample.

		Cognitive Ability Score		
		Low	Medium	High
Non-Cognitive Ability Score	Low	-	+18.74% (15.48%-22.01%)	+19.47% (15.35%-23.60%)
	Medium	+21.28% (18.15%-24.42%)	+25.52% (22.63%-28.40%)	+26.47% (23.33%-29.61%)
	High	+27.01% (21.18%-32.84%)	+26.63% (23.44%-29.82%)	+27.36% (24.10%-30.62%)

Panel B: Income restricted sample.

		Cognitive Ability Score		
		Low	Medium	High
Non-Cognitive Ability Score	Low	-	+9.17% (-9.79%-28.14%)	+16.56% (-5.04%-38.15%)
	Medium	+8.91% (-9.73%-27.55%)	+22.93% (6.59%-39.27%)	+27.99% (11.42%-44.55)
	High	+16.98% (-13.09%-47.04%)	+24.67% (8.12%-41.21%)	+28.16% (11.59%-44.74%)

Notes. The table summarizes the marginal effects from the logit regression models reported in Appendix A, Table A-IV and A-VI, based on dummy variable specifications indicating different combinations of cognitive and non-cognitive ability. 95% confidence interval is shown in parenthesis.

APPENDIX A

Table A-I: Variable definitions

Variable	*Variable definitions*
Dependent	
Stock market participation	1=participate in stock market, 0=otherwise
Controls	
Cognitive ability score	Non-cognitive ability score 1-9, 1=low 9=high
Non-cognitive ability score	Cognitive ability score 1-9, 1=low 9=high
Mutual Fund	1=participate in mutual fund market, 0=otherwise
Educaational Attainment	Educational attainment, (level 1-7) 1=Less than 9-years of basic education 2=Exactly 9-years of basic education 3=More than 9 years of basic education but less than 3 years of high school education 4=Exactly 3 years of high school education 5=More than 3 years of high school education but less than 3 years of university education. 6=3 years of university education but less than PhD. 7=PhD
Economic orientation	1=Education within economics or business administration and educational attainment of 3 or higher.
Income	Yearly disposable income, millions of SEK
Net-wealth	Net-wealth, millions of SEX
Born in Sweden	1=if born in Sweden, 0=otherwise
Married	1=if married, 0=otherwise
Cohabiter	1=if living together with a person that he/she have mutual children with but is not married to, 0=otherwise
Kids	1=if have kids, 0=otherwise
Born 1963	1=if born 1963, 0=otherwise
Entrepreneur	1=if entrepreneur, 0=otherwise
Finance Professional	1=if works in the financial sector, 0=otherwise
Unemployed	1=if unemployed, 0=otherwise
Risk aversion	Average of the proportion of risky assets held by the mother and the father in 1999.

Table A-II: Regressions with dummies for combinations of cognitive and non-cognitive ability

Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Combinations of Cognitive and Non-Cognitive Ability Scores				
- Low Cog. - Medium Non-cog.	0.0148***	0.0021	0.0496***	0.0058
- Low Cog. - High Non-cog.	0.0351***	0.0045	0.1042***	0.0122
- Medium Cog. - Low Non-cog.	0.0137***	0.0023	0.0466***	0.0063
- Medium Cog. - Medium Non-cog.	0.0449***	0.0020	0.1286***	0.0050
- Medium Cog - High Non-cog.	0.0696***	0.0026	0.1745***	0.0060
- High Cog. - Low Non-cog.	0.0258***	0.0038	0.0824***	0.0107
- High Cog. - Medium Non-cog.	0.0767***	0.0028	0.1836***	0.0060
- High Cog. - High Non-cog.	0.1149***	0.0036	0.2365***	0.0065
Mutual Fund	0.0238***	0.0007	0.0556***	0.0009
Educational Attainment	0.0159***	0.0005	0.0309***	0.0009
Economic orientation	0.0156***	0.0013	0.0385***	0.0030
Income	0.021***	0.0016	0.0446***	0.0029
Net-wealth	0.0069***	0.0003	0.0159***	0.0005
Other Demographics				
Born in Sweden	-0.0006	0.0018	0.0030	0.0044
Married	0.0016**	0.0007	0.0005	0.0013
Cohabiter	0.0036***	0.0008	0.0053***	0.0014
Kids	-0.0001	0.0007	-0.0017	0.0011
Born 1963	0.0147***	0.0010	0.0355***	0.0026
Occupation				
Entrepreneur	0.0065***	0.0008	0.0130***	0.0014
Finance Professional	0.0082***	0.0018	0.0241***	0.0037
Unemployed	-0.0007	0.0008	-0.0008	0.0012
Risk aversion	0.0767***	0.0026	0.1582***	0.0054
Year 2001	0.0043***	0.0006	0.0062***	0.0009
Year 2002	0.0192***	0.0007	0.0277***	0.0009
Year 2003	0.0128***	0.0006	0.0182***	0.0009
Year 2004	0.0055***	0.0006	0.0072***	0.0009
Year 2005	-0.0093***	0.0006	-0.0152***	0.0009
Year 2006	-0.0183***	0.0007	-0.0291***	0.0010
Year 2007	-0.0237***	0.0008	-0.0378***	0.0010
Wald chi2	22841			
R2			0.1149	
Constant			-0.0061	

Notes. N=757448 n=96025. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table A-III: Regressions for the top 10% in the wealth distribution

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Cognitive ability					0.0090***	0.0021	0.0087***	0.0022
- Low	-0.0550***	0.0105	-0.0486***	0.0132				
- Medium	-0.0089*	0.0053	-0.0156**	0.0077				
Non-Cognitive Ability					0.0141***	0.0023	0.0153***	0.0022
- Low	-0.2248***	0.0087	-0.0952***	0.0125				
- Medium	-0.0116**	0.0052	-0.0233***	0.0075				
Mutual Fund	0.0657***	0.0052	0.0833***	0.0034	0.0749***	0.0067	0.0835***	0.0034
Educational Attainment	0.0287***	0.0030	0.0358***	0.0027	0.0307***	0.0036	0.0339***	0.0028
Economic orientation	0.0226***	0.0064	0.0351***	0.0080	0.0272***	0.0071	0.0358***	0.0080
Income	0.0180***	0.0055	0.0191***	0.0057	0.0188***	0.0061	0.0183***	0.0057
Net-wealth	0.0052***	0.0008	0.0059***	0.0008	0.0058***	0.0010	0.0059***	0.0008
Other Demographics								
Born in Sweden	0.0215**	0.0097	0.0243**	0.0121	0.0264**	0.0110	0.0257**	0.0121
Married	0.0039	0.0047	0.0081*	0.0047	0.0038	0.0052	0.0081*	0.0047
Cohabiter	0.0042	0.0057	0.0073	0.0054	0.0045	0.0064	0.0075	0.0055
Kids	0.0075*	0.0045	0.0053	0.0044	0.0086*	0.0050	0.0053	0.0044
Born 1963	0.0242***	0.0057	0.0359***	0.0071	0.0308***	0.0071	0.0361***	0.0071
Occupation								
Entrepreneur	0.0011	0.0038	0.0018	0.0036	0.0012	0.0042	0.0017	0.0036
Finance Professional	0.0116	0.0079	0.0203**	0.0089	0.0136	0.0087	0.0204**	0.0089
Unemployed	0.0037	0.0050	0.0052	0.0047	0.0032	0.0057	0.0048	0.0048
Risk aversion	0.1504***	0.0144	0.1981***	0.0138	0.1713***	0.01812	0.1970***	0.0138
Year 2001	-0.0037	0.0035	-0.0023	0.0030	-0.0026	0.0039	-0.0023	0.0030
Year 2002	0.0145***	0.0036	0.0099***	0.0031	0.0163***	0.0041	0.0100***	0.0031
Year 2003	0.0027	0.0036	-0.0002	0.0031	0.0031	0.0040	-0.00009	0.0031
Year 2004	-0.0111***	0.0037	-0.0122***	0.0032	-0.0123***	0.0042	-0.0120***	0.0032
Year 2005	-0.0418***	0.0042	-0.0391***	0.0033	-0.0464***	0.0049	-0.0389***	0.0033
Year 2006	-0.0630***	0.0049	-0.0589***	0.0035	-0.0698***	0.0058	-0.0586***	0.0035
Year 2007	-0.0782***	0.0055	-0.0748***	0.0037	-0.0868***	0.0065	-0.0745***	0.0037
Wald chi2	3504.45				1805.68			
R2			0.0707				0.0698	
Constant			0.3391				0.1735	

Notes. n=18099 N=76985. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table A-IV: Regressions with dummies for combinations of cognitive and non-cognitive ability, top 10% of the wealth distribution

Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Combinations of Cognitive and Non-Cognitive Ability Scores				
- Low Cog. - Medium Non-cog.	0.2128***	0.0160	0.0767***	0.0222
- Low Cog. - High Non-cog.	0.2701***	0.0298	0.1143***	0.0385
- Medium Cog. - Low Non-cog.	0.1874***	0.0166	0.0475**	0.0232
- Medium Cog. - Medium Non-cog.	0.2552***	0.0147	0.1083***	0.0190
- Medium Cog. - High Non-cog.	0.26627***	0.0163	0.1318***	0.0205
- High Cog. - Low Non-cog.	0.1947***	0.0210	0.0350	0.0299
- High Cog. - Medium Non-cog.	0.2647***	0.0160	0.1268***	0.0205
- High Cog. - High Non-cog.	0.2736***	0.0166	0.1480***	0.0209
Mutual Fund	0.0622***	0.0056	0.0833***	0.0034
Educational Attainment	0.0272***	0.0032	0.0359***	0.0027
Economic orientation	0.0211***	0.0060	0.0351***	0.0080
Income	0.0168***	0.0052	0.0191***	0.0057
Net-wealth	0.0049***	0.0008	0.0059***	0.0008
Other Demographics				
Born in Sweden	0.0197**	0.0090	0.0245**	0.0121
Married	0.0035	0.0044	0.0081*	0.0047
Cohabiter	0.0039	0.0054	0.0073	0.0055
Kids	0.0072*	0.0042	0.0053	0.0043
Born 1963	0.0238***	0.0057	0.0359***	0.0071
Occupation				
Entrepreneur	0.0011	0.0036	0.0018	0.0036
Finance Professional	0.0110	0.0074	0.0203**	0.0089
Unemployed	0.0033	0.0047	0.0052	0.0048
Risk aversion	0.1420***	0.0153	0.1981***	0.0138
Year 2001	-0.0022	0.0033	-0.0023	0.0030
Year 2002	0.0136***	0.0035	0.0098***	0.0031
Year 2003	0.0025	0.0034	-0.00020	0.0031
Year 2004	-0.0105***	0.0035	-0.0122***	0.0032
Year 2005	-0.0392***	0.0042	-0.0391***	0.0033
Year 2006	-0.0591***	0.0051	-0.0589***	0.0035
Year 2007	-0.0733***	0.0057	-00748***	0.0037
Wald chi2	2594.08		0.1903	
R2			0.0708	
Constant				

Notes n=18099 N=76985. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table A-V: Regressions for the top 10% in the income distribution

	Cognitive ability Dummy Specification				Linear-cognitive ability specification			
Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Cognitive ability					0.0233***	0.0061	0.0079***	0.0024
- Low	-0.1674***	0.0470	-0.0539***	0.0172				
- Medium	-0.0446***	0.0179	-0.0164**	0.0072				
Non-Cognitive Ability					0.0120**	0.0057	0.0056**	0.0022
- Low	-0.1350***	0.0418	-0.0534***	0.0157				
- Medium	-0.0109	0.0168	-0.0074	0.0069				
Mutual Fund	0.1349***	0.0081	0.0742***	0.00342	0.1355***	0.0081	0.0743***	0.0034
Educational Attainment	0.1104***	0.0070	0.0409***	0.0029	0.1092***	0.0071	0.0403***	0.0030
Economic orientation	0.0964***	0.0182	0.0410***	0.0081	0.1013***	0.0183	0.0423***	0.0081
Income	0.0306**	0.0120	0.0134**	0.0063	0.0300**	0.0121	0.0130**	0.006
Net-wealth	0.0514***	0.0034	0.0214***	0.0011	0.0515***	0.0034	0.0214***	0.0011
Other Demographics								
Born in Sweden	-0.0236	0.023	-0.0065	0.0109	-0.0214	0.0239	-0.0057	0.0109
Married	-0.0170*	0.0010	-0.0083*	0.0049	-0.0171*	0.0100	-0.0083*	0.0049
Cohabiter	-0.0066	0.0131	-0.0038	0.0063	-0.0064	0.0132	-0.0038	0.0063
Kids	-0.0159	0.0098	-0.094**	0.0048	-0.0157	0.0099	-0.0093*	0.0048
Born 1963	-0.0868***	0.0179	-0.0311***	0.0071	-0.0863***	0.0179	-0.0309***	0.0071
Occupation								
Entrepreneur	-0.0142	0.0133	-0.0056	0.0064	-0.0144	0.0133	-0.0056	0.0064
Finance Professional	0.0346**	0.0168	0.0187**	0.0084	0.0355**	0.0168	0.0189**	0.0084
Unemployed	0.0724	0.0836	0.0248	0.0376	0.0711	0.0841	0.0244	0.0376
Risk aversion	0.3830***	0.0369	0.1365***	0.0139	0.3844***	0.0370	0.1366	0.0139
Year 2001	0.0104	0.0071	0.0055	0.0036	0.0104	0.0072	0.0055	0.0036
Year 2002	0.0606***	0.0075	0.0294***	0.0036	0.0609***	0.0075	0.0294***	0.0036
Year 2003	0.0214***	0.0074	0.0106***	0.0037	0.0216***	0.0074	0.0106***	0.0037
Year 2004	-0.0174***	0.0075	-0.0081**	0.0037	-0.0172**	0.0076	-0.0080**	0.0037
Year 2005	-0.0848***	0.0080	-0.0410***	0.0038	-0.0849***	0.0080	-0.0409***	0.0038
Year 2006	-0.1476***	0.0089	-0.0733***	0.0040	-0.1478***	0.0089	-0.0732***	0.0040
Year 2007	-0.1742***	0.0098	-0.0868***	0.0042	-0.1744***	0.0097	-0.0866***	0.0042
Wald chi2	2480.82		0.3329		2446.11			
R2			0.0737				0.0733	
Constant							0.23339	

Notes. n=18117 N=78000. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

Table A-VI: Regressions with dummies for combinations of cognitive and non-cognitive ability, for the top 10% of the income distribution

Independent Variables	Marginal Effects	Standard Errors	Coefficients (OLS)	Standard Errors (OLS)
Combinations of Cognitive and Non-Cognitive Ability Scores				
Low Cog. - Medium Non-Cog.	0.0891	0.0951	0.0304	0.0394
Low Cog. - High Non-Cog.	0.1698	0.1534	0.0618	0.0513
Medium Cog. - Low Non-Cog.	0.0918	0.0968	0.0232	0.0401
Medium Cog. - Medium Non-Cog.	0.2293***	0.0834	0.0747**	0.0353
Medium Cog. - High Non-Cog.	0.2467***	0.0844	0.0831**	0.0358
High Cog. - Low Non-Cog.	0.1656	0.1101	0.0494	0.0437
High Cog. - Medium Non-Cog.	0.2799***	0.0845	0.0923***	0.0359
High Cog. - High Non-Cog.	0.2816***	0.0846	0.0974***	0.0359
Mutual Fund	0.1348***	0.0081	0.0742***	0.0034
Educational Attainment	0.1101***	0.0071	0.0408***	0.0029
Economic orientation	0.0962***	0.0182	0.0409***	0.0081
Income	0.0306***	0.012	0.0134**	0.0063
Net-wealth	0.0514***	0.0034	0.0214***	0.0011
Other Demographics				
Born in Sweden	-0.0237	0.0237	-0.0065	0.0110
Married	-0.0170*	0.0100	-0.0083*	0.0049
Cohabiter	-0.0066	0.0131	-0.0038	0.0063
Kids	-0.0159	0.0098	-0.0094**	0.0048
Born 1963	-0.0869***	0.0179	-0.0312***	0.0071
Occupation				
Entrepreneur	-0.0142	0.0133	-0.0056	0.0064
Finance Professional	0.0345**	0.0168	0.0186**	0.0084
Unemployed	0.0726	0.0837	0.0248	0.0376
Risk-Proxy	0.3827***	0.0369	0.1366***	0.0139
Year 2001	0.0103	0.0071	0.0055	0.0036
Year 2002	0.0605***	0.0074	0.0294***	0.0036
Year 2003	0.0213***	0.0074	0.0106***	0.0037
Year 2004	-0.0174**	0.0075	-0.0081**	0.0037
Year 2005	-0.0848***	0.0080	-0.0410***	0.0038
Year 2006	-0.1475***	0.0089	-0.0733***	0.0040
Year 2007	-0.1740***	0.0098	-0.0868***	0.0042
Wald chi2	2483.69			
R2			0.0737	
Constant			0.2347	

Notes n=18117 N=78000. Significance levels: ***p<0.01 **p<0.05 *p<0.10.