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## Immigrant-native differences in stockholding: The role of cognitive and non-cognitive skills

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Hamburg Institute  
of International  
Economics

# Immigrant-Native Differences in Stockholding – The Role of Cognitive and Non-Cognitive Skills

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HWWI Research

Paper 164

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# Immigrant-Native Differences in Stockholding – The Role of Cognitive and Non-Cognitive Skills

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## Abstract

This paper provides new evidence on native-migrant differences in financial behavior by analyzing the role of non-cognitive and cognitive skills. We make use of data from the Health and Retirement Survey (HRS) which is a longitudinal household survey of the older U.S. population containing detailed information about demographic characteristics, financial assets and personality traits of household members. In line with previous studies, we find a substantial gap in stockholding between immigrant and native households. Estimates from a random effects model suggest that cognitive and non-cognitive skills, including personality concepts and economic preferences, are important drivers of stockholding and explain part of the differences between natives and immigrants. These findings are supported by results from a Blinder-Oaxaca decomposition analysis. Our paper therefore delivers first evidence that differences in non-cognitive and cognitive skills contribute to the explanation of the financial market participation gap between natives and immigrants.

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*Keywords:* Stockholding, Immigrants, Personality traits, Decomposition

*JEL Codes:* D14, G02, G11, J61

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## 1. Introduction

Most OECD countries are experiencing ongoing immigration and a growing number of foreign-born inhabitants. The top destination country of international migration flows is still the US which has reached a stock of almost 40 million foreign born residents according to the latest census in 2010. A well-established fact is that the top immigration receiving countries have in common that immigrants often face adverse economic outcomes compared to the native born population. This holds not only true for labor markets, health, housing, and educational investment, but also for financial markets which are a crucial element for the socio-economic integration of immigrants.

While the study of labor market outcomes between natives and immigrants has a long tradition in economics, the analysis of corresponding differences in financial outcomes has received less attention for many years. However, in recent years, the literature aiming to describe and explain differences in wealth accumulation between natives and foreign-born has been strongly growing (see among others Amuedo-Dorantes and Pozo, 2002; Hao, 2004; Cobb-Clark and Hildebrand, 2006; Bauer et al., 2011; Love and Schmidt, 2014). The studies have shown that differences in education, family composition, income, and time in the host country are the most important factors in explaining the wealth gap. Moreover, the studies suggest that differential patterns in asset holdings are an additional factor driving the differences in wealth accumulation between natives and immigrants.

As a reaction, a different strand of the literature developed and focused on participation in financial markets as a potential factor driving the differences in wealth accumulation. Among others, Osili and Paulson (2006) have highlighted a large gap in financial market participation between natives and immigrants in the US. Education, family composition, location and income have shown to be significant drivers of the gap (Rhine and Greene, 2006; Osili and Paulson, 2006). Moreover, immigrants are less likely to hold risky assets than natives. This holds even after controlling for differences in net wealth, education, family size and time in the host country (Haliassos et al., 2014).

In recent years, triggered by the integration of psychological concepts into economics, several economists have started to analyze the role of non-cognitive skills for financial behavior. For example, Hong et al. (2004) and Heimer (2014) showed that sociable people are more likely to hold stocks. Other works have shown that locus of control (Salamanca et al., 2013; Cobb-Clark et al., 2013) the Big Five personality traits (Brown and Taylor, 2014) and optimism (Puri and Robinson, 2007) matter for holding risky assets.

Our paper combines these two strands of the literature and provides first evidence on the role of non-cognitive skills in explaining differences in stockholding between natives and immigrants. We make use of data from the Health and Retirement Survey (HRS) which is a representative, longitudinal sample of the older U.S. population. Besides information about demographic characteristics and financial assets of the household it provides detailed data on a variety of personality traits. This allows us to construct a rich set of variables measuring cognitive and non-cognitive-skills as well as economic preferences. In a first step, we document a substantial gap in stockholding at the extensive margin between natives and immigrants. This is in so far remarkable, as we compare older natives with older immigrants who spent most of their life in the US. In a second step, we estimate a random effect probit

model and conduct a nonlinear Oaxaca-Blinder decomposition to analyze the determinants of the stockholding gap. Our estimates suggest that non-cognitive as well as cognitive skills are important drivers of stockholding behavior and explain a significant part of the differences between native and immigrants. Therefore, our analysis delivers new insights into the drivers of the immigrant-native wealth gap and contributes to the explanation of the stockholding puzzle.

The paper is organized as follows: Section 2 reviews the relevant literature. Section 3 describes the data used and provides first descriptive statistics, while Section 4 presents our empirical results. Section 5 concludes the paper.

## **2. Related Literature**

Our paper contributes to two strands of literature. The first strand analyzes the differences between natives and immigrants with respect to wealth accumulation and portfolio choices. The second investigates the role of cognitive and non-cognitive traits and their impact on financial behavior.

Thanks to the increased availability of micro data, there is a growing literature on native-migrant differences in wealth accumulation. For example, Cobb-Clark and Hildebrand (2006) utilize household data from the Survey of Income and Program Participation (SIPP) to compare U.S. native and foreign born wealth. Wealth is found to be strikingly higher for single and couple native households. Comparing wealthier households this gap increases. Moreover, immigrants' overall net wealth and its financial and housing components differ by country of origin and year of arrival, respectively. Hao (2004) also makes use of the SIPP to analyze differences in wealth accumulation between natives and immigrants. She finds that levels of net worth as well as its components are segregated by country of origin, ethnicity and nativity. Including adult time since immigration immigrants are able to overtake natives after 22 years. Hao (2004) further highlights that spatial segregation affects wealth negatively for both natives and immigrants. Amuedo-Dorantes and Pozo (2002) instead use data from the 1979 Youth Cohort of the National Longitudinal Surveys to investigate the saving behavior of natives and immigrants. They find lower wealth accumulation among young immigrants in the U.S. Moreover, immigrants have lower precautionary savings than natives. The authors acknowledge that they cannot rule out that the latter is driven by non-observable remittances of immigrants. In an earlier paper, Carroll et al. (1999) make use of a sub-sample of the US census and provide evidence on a savings gap between immigrant groups of different origin and natives in the U.S. However, as home country savings patterns differ from their U.S. destination outcomes, they conclude that the immigrant savings patterns cannot be attributed to cultural savings attitudes. In a more recent work Love and Schmidt (2014) use the Health and Retirement Study (HRS) and an annualized comprehensive wealth measure to compare retirement preparation between natives and immigrants. They find that immigrants hold less overall wealth, while they also consume their savings more slowly over time.

In a cross-country comparison Bauer et al. (2011) investigate the wealth gap between natives and immigrants in Australia, the US, and Germany. They demonstrate that most of the gap in Germany and the United States is driven by educational and demographic characteristics, while income differences do not play a major role in both countries.

Opposed to that, the wealth gap in Australia increases as soon as they control for differences in endowment. Given their higher educational attainment, immigrants to Australia therefore differ in the translation of education in wealth. To summarize, there are substantial wealth differences between immigrants and natives in the US and other OECD countries.

In addition, a number of studies have highlighted differences in financial market participation between natives and immigrants. For instance, Rhine and Greene (2006) stress that there are big differences in the share of unbanked individuals between natives and immigrants in the United States. Among immigrants the share of individuals without any bank account varies between 17 to 50% by country of origin. The authors conclude that the likelihood of being unbanked for immigrants is positively associated with poverty-level income and family size, while it decreases with education, wealth and income. Osili and Paulson (2006) found a six to eight percentage point lower likelihood to own checking and savings accounts for immigrants in the US, using SIPP data. This gap is very persistent although it decreases with time spent in the U.S. While half of the gap remains unexplained, the main drivers of the explained gap are income, educational attainment and location. As a possible explanation for the residual gap, they suggest unobserved preferences, personality and remittances. As a side finding, they report an immigrant-native gap for risky asset demand of roughly six percentage points. Using the country-of-origin information of immigrants from the same data source, Seto and Bogan (2013) find that the risky asset holding gaps vary significantly by home country. Especially immigrants from countries with presumably lower information costs show higher similarity with US natives, e.g. countries with international financial market integration, informational exchange, same language and cultural proximity.<sup>12</sup> Using Swedish data, Haliassos et al. (2014) test for cultural predispositions to explain differences in owning stocks, debts or a home. Analyzing the immigrant-native gaps for different cultural groups, they find a persistent unexplained share. Moreover, this so-called "cultural predisposition" decreases in length of stay in host country and increases in years of home experience.

Regarding the role of personal skills, the literature has identified several important factors for participating in risky financial markets. In a seminal paper, Christelis et al. (2010) have shown that cognitive skills besides classical determinants, like income (Vissing-Jorgensen, 2002), wealth (Guiso et al., 2002) and education (Campbell, 2006), ease the access to financial markets.<sup>3</sup> Using data from the Survey of Health, Ageing and Retirement in Europe (SHARE) for eleven European countries they find that the propensity to invest in stocks, either directly or indirectly, is positively associated with mathematical and verbal skills. Grinblatt et al. (2011) add to this finding by showing that there is a positive and robust relationship between IQ and stock market participation, using mandatory Finnish army IQ test scores and wealth register data.

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<sup>1</sup>Osili and Paulson (2008) used the same set of information and combined it with institutional indices on the home country level. They find a positive relation between institutional quality and holding stocks and conclude in favor of persistent informal institutions.

<sup>2</sup>Chatterjee and Zahirovic-Herbert (2014) found supporting evidence on financial market participation gaps for the younger US population using NLSY79 data.

<sup>3</sup>Other important determinants highlighted in the literature are background risk and demographic characteristics (Guiso et al., 2002), trust or social capital (Guiso et al., 2008) and health (Rosen and Wu, 2004).

While it seems obvious that cognitive skills play an important role via information processing, learning and decision-making, non-cognitive skills like personality and motivation should play an important role, too (Borghans et al., 2008). First evidence on the predictive power of non-cognitive skills focused on labor and social outcomes (e.g. Heckman and Rubinstein, 2001)<sup>4</sup>, whereas early evidence in the context of portfolio choice has been documented by Hong et al. (2004). They found social interaction, which is closely linked to the personality trait of Extraversion, to be positively related with stock market participation among an older U.S. population (HRS). This is in line with the suggestion of Andersen and Nielsen (2011), who suggest to extend the concept of participation costs to behavioral or psychological traits.

Further evidence on the intersection of personality traits and portfolio behavior is comparatively small and often trait-specific. Using the British Household Panel Survey (BHPS), Brown and Taylor (2014) study the relationship between risky asset demand and the Big Five personality traits and find significant effects, which vary by trait and asset. A measure of optimism, derived from the U.S. Survey of Consumer Finance (SCF) increases the likelihood to hold stocks and save (Puri and Robinson, 2007). While moderate optimism is related to reasonable financial behavior, extreme optimism is not related to prudent behavior. In an earlier study, Barber and Odean (2001) showed that overconfidence explains gender differences in investment. Salamanca et al. (2013) analyze the relationship between locus of control and the extensive and intensive margin of household risky asset demand using the Dutch Central Bank Household Survey (DHS). The estimates indicate that locus of control has a positive marginal effect on the demand for risky assets at both the extensive and intensive margin. An interesting suggestion is the transmission channel of variance perception. Cobb-Clark et al. (2013) support the importance of locus of control for portfolio choice by showing its impact on savings decisions in Australia.<sup>5</sup> Using the HRS, Bucciol and Zarri (2015) find that especially self-centered personality traits promote risk-taking. Moreover, they suggest that preferences can act as a transmission channel for Agreeableness to affect risk-taking.

A closely related and already established concept of non-cognitive traits is captured by economic preferences (e.g. time or risk preference). These concepts have a long tradition in decision modeling (e.g. Cocco et al., 2005), but have also been shown to be valuable in predicting a range of economic and financial outcomes, like owning stocks (e.g. Dohmen et al., 2011). Despite its close relation, it is fruitful to include both measures, traits and preferences, into an analysis, as Becker et al. (2012) only found a low association between them. Moreover, both measures act complementary in predicting economic outcomes.

To the best of our knowledge, our paper is one of the first studies that combines the two presented strands of literature by analyzing the role of personality traits in explaining native-migrant differences in financial behavior.<sup>6</sup> In

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<sup>4</sup>There is considerable correlation between cognitive and non-cognitive skills. Certain personality traits foster behavior in education or even cognitive ability tests (Almlund et al., 2011)

<sup>5</sup>The savings rate gap is especially pronounced for the wealthier households, whereas in terms of wealth accumulation the differences is most important for the less wealthy counterparts.

<sup>6</sup>In labor market research a small literature analyzes the role of personality traits in explaining differences in labor market outcomes between



particular, we present new evidence on the risky asset holding gap between natives and immigrants in the US and the cognitive and non-cognitive personality measures.

### 3. Data and Descriptive Statistics

#### 3.1. Data

The Health and Retirement Study (HRS) is a longitudinal household survey of the older U.S. population, collecting detailed information about topics like health, income, wealth and retirement. See HRS (2015). After the first interview of households between the age of 51 and 61 in 1992 (HRS cohort 1931-1941), these are re-interviewed on a biannual basis. In 1998 the HRS added two older (AHEAD, CODA) and one younger cohort (War Babies), so that, by then, the survey population covered respondents older than 50 (born before 1948). Young refresher cohorts were added in 2004 (Early Boomers) and 2010 (Mid Boomers). For our empirical analysis we use the waves from 1998 to 2010 and include all households older than 50.<sup>7</sup> For a description of the HRS, see Smith (1995).

In the HRS, information on financial assets, net worth and income are provided at the household level, while characteristics like demographics, education, labor market outcomes and health are reported individually. We limit our analysis to couple households as it enables us to study different degrees of immigration background. As this requires a systematic way to deal with individual information of each spouse, we derive individual information from the financial respondent of the household. These are defined as being the main financial decision-taker, and are identified in each wave. This implies that the financial respondent of a household can change over time. We further limit our analysis to households who participated in each survey since entering the HRS. Ultimately, we drop household years with missing information on stockholding or one of our explanatory variables. This leaves us with an unbalanced panel of 3622 households and 20005 observations. Hence, the average number of household observations lies between five and six.

We measure the immigration background of a household by the birthplace of the financial respondent and his or her spouse. Having a common birthplace other than the United States classifies a household as having an immigration background. In other words, we define a household as being an immigrant household if both partners are born abroad. Natives households are defined as those with both partners being born in the U.S.<sup>8</sup>

One of our key contributions lies in using information on non-cognitive skills. Again, the respective information is collected on the financial respondent level. Starting in 2006, data on non-cognitive skills have been collected in a

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natives and immigrants. See for example the work of Hanes and Norlin (2011) who investigate the relationship between personality traits and the immigrant-native earnings gap in Sweden.

<sup>7</sup>More specifically we supplement the RAND HRS Version M. It is a consistent, imputed and longitudinal version of the HRS. For more details, see Chien et al. (2013). Data availability of cognitive and non-cognitive skills drives the choice of included cohorts. We include individuals from all available cohorts in 1998 as well as the refresher cohort Early Baby Boomers from 2004. The small number of AHEAD respondents as well as the exclusion of the 2010 Mid Boomers stems from the missing information on economic preferences.

<sup>8</sup>The HRS contains information on the main language of the household. If native households report any other language than English, they are most likely second generation immigrants. In order to avoid an attenuation of the immigration gap we exclude this group of households.

so-called, "Psychosocial Lifestyle Questionnaire". Among others, the questionnaire addresses concepts of personality psychology, like Perceived Mastery and Perceived Constraints (Locus of Control), Dispositional Optimism and Pessimism and the Big Five personality traits<sup>9</sup>. We follow the instructions for variable generation given by Smith et al. (2013) and average the scores of the underlying questions.<sup>10</sup> As Piatek and Pinger (2015) point out, averaging has the drawback of weighting all answers equally. We therefore also conduct a robustness check with data-driven weights (see section 5). All generated indices are standardized and dichotomized around the median, following Cobb-Clark et al. (2013).

As we have pointed out earlier, economic preferences act complementary to non-cognitive skills in predicting financial market outcomes. We include two individual economic preferences from the main HRS questionnaire. Preferences of risk are derived from a hypothetical income gamble (Barsky et al., 1997) and time preferences are based on the reported financial planning horizon (Lusardi, 1998).<sup>11</sup> A household is defined as being risk averse, if the financial respondent reports the most risk averse answer category. The household is categorized as having low time preference or being patient, if he plans ahead more than 5 years. Since both measures are not reported on a regular basis we take the average of the two latest available observations of the household.<sup>12</sup> Our economic preferences are therefore by definition time constant. This definition is in line with recent evidence on preference stability. While Sahm (2012) found variation of risk aversion over time, she also showed interpersonal stability. Dohmen et al. (2011) shows that risk aversion is relatively stable in different contexts. For evidence on temporal stability of time preference, see Meier and Sprenger (2015).

The other key contribution lies in the related concept of cognitive skills. Being part of the core questionnaire, we include individual cognitive measures of (episodic) memory, mental status and numeracy (see e.g. Smith et al., 2010). Following Smith et al. (2010), memory captures fluid intelligence, numeracy proxies the concept of crystallized intelligence and mental status combines both parts of intelligence. Memory is an average of short- and medium-term recall ability of a word list and is reported on a regularly basis. Mental status combines tasks like naming the president, date and counting backwards. As mental status scores are more or less uniformly good under the age of 65, the HRS only asks them to new interviewees and respondents older than 65. For younger respondents, we impute missing values with their entry information. These , partially, time-varying measures are standardized over the pooled sample. Information on numeracy is documented from 2002 on by two or, given they answered at least one question correctly, three questions. Here we follow the strategy, adopted for economic preferences and average the latest available information and impute missing values with the latest available entry. Our measure of numeracy is therefore assumed

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<sup>9</sup>The Big Five personality traits capture different facets of personality at the broadest level of abstraction. The traits are Neuroticism, Agreeableness, Extraversion, Conscientiousness and Openness (to experience). For details, see Almlund et al. (2011).

<sup>10</sup>Smith et al. (2013) summarize the related psychological literature and report Cronbachs Alpha.

<sup>11</sup>While financial planning horizons proxy a preference, they are also related to financial resources and cognitive abilities. A proper control for these factors is necessary.

<sup>12</sup>For risk preferences only respondents under 65 are contacted in these waves. We impute missing values by the latest non-missing value of earlier waves.

to be constant.<sup>13</sup> Time-constant specification of cognitive and non-cognitive skills in the context of our sample is in line with the empirical evidence on cognitive and non-cognitive skills. Whereas IQ reaches stability already during middle childhood, and cognitive processing slowly declines after late adulthood, many personality traits reach their most stable rank-order stability between the age of 50 to 70 (Borghans et al., 2008). Cobb-Clark and Schurer (2013) deliver evidence on the stability of two of our personality traits of interest. They find locus of control and the Big Five personality traits to change only modestly in the short and medium-run, while reports of the very old show higher volatility. In the absence of major life transition, also optimism has been shown to be a stable trait (Carver and Scheier, 2014). For an overview of methodological issues including identification and endogeneity, see the work by Borghans et al. (2011).

### 3.2. Descriptive Statistics

Table 1 reports summary statistics on selected characteristics of natives and immigrants in our sample. With respect to our binary dependent variable stockholding, defined as having a positive net value of stocks, mutual funds and investment trusts, we find a substantial and significant difference between immigrants and natives.<sup>14</sup> While 40% of the latter holds stocks in their portfolio, only 23% of immigrants possess stocks.

Cognitive skills turn out to be significantly higher among the group of natives. For example, while natives answer 1.7 of 3 numeracy answers correctly, immigrants achieve only a score of 1.46. The table further shows significant differences in non-cognitive skills between the two groups of interest. On average, immigrants report lower Perceived Mastery and higher Perceived Constraints. Together, these characteristics describe the personality trait of having an external locus of control. In other words, immigrants are less likely to believe that they can control their own destiny than natives do. The concepts of Dispositional Optimism and Pessimism are on average both more pronounced for the group of immigrants. As Carver and Scheier (2014) point out, it is still an outstanding question if the presence of optimism is different from the absence of pessimism. Further, both concepts can have potentially negative effects on outcomes, e.g. via optimistic ignorance. Turning to the Big Five personality traits, Neuroticism, or so-called emotional instability, is significantly less frequent among natives. While both groups are comparable in terms of Agreeableness, the group of natives show on average significantly higher Extraversion, Conscientiousness and Openness to experience. Put differently natives are on average more outgoing, thorough and curious than immigrants. According to the subset of economic preferences, we find a slightly higher share of immigrants to report the highest level of risk aversion. Finally, natives are more likely to have a long-term financial planning horizon. While these differences could be driven by cultural differences, they could also be the result of immigrant self-selection.

When it comes to demographics, table 2 shows that the age composition of immigrants and natives is very similar. Looking at the different age categories, there seems to be a fairly symmetric unimodal distribution peaking at the age group between 60 and 70. Immigrants in the HRS tend to be more often male, less likely to be black, have

<sup>13</sup>If the average amount of correct answers lies between two numbers, the indicator is rounded.

<sup>14</sup>Throughout the article we refer to this aggregated measure as holding stocks.

more children and live in larger households than natives do. A few words about the background of immigrants in our sample: The large majority (75%) of immigrants in our sample have lived in the US for more than 27 years. On average, immigrants have spent roughly 35 years in the US and entered the country by the age of 31. Therefore, our sample differs strongly from the SIPP data in which approximately half of the foreign-born have immigrated to the US within ten years before the survey was conducted (Osili and Paulson, 2008).

Table 2 further exhibits that natives and immigrants differ in terms of educational attainment. While about 38% of the immigrants have no high school degree, the corresponding share among natives is only 15%. In contrast, in both groups roughly one quarter of the respondents attained a college degree or more. Consequently, having attained a high school degree or some college is more common in the group of natives. In terms of labor market participation, immigrants are less often retired and more often unemployed than native-born respondents. The latter difference is with 6 percentage points not negligible.

In line with the existing educational and labor market differences, there are also significant income differences between the two groups. On average, immigrants earn approximately two thirds of the income of natives. Regarding wealth, the gap between natives and immigrants is even a bit more pronounced. The wealth gap, measured as the financial wealth of immigrants as a percentage of the respective value for natives, is about 63%. In this way, our figures are comparable to those reported in studies using SIPP data (Cobb-Clark and Hildebrand, 2006; Osili and Paulson, 2008) which also find substantial income gaps and even larger wealth differences between immigrants and native-born. This is in so far remarkable, as the HRS sample contains only elderly Americans, while the SIPP covers the whole age range among US adults. Furthermore, our data uncovers a substantial gap in home-ownership between natives and immigrants. Finally, the table shows that poor health, which is self-reported, is much more widespread among the immigrant group.

First descriptive evidence about differences in stockholding between natives and immigrants is provided in figure 1. The upper figure shows, that the share of respondents who hold stocks is almost twice as high among natives than among immigrants. The lower graph in figure 1 shows that the overall gap in stockholding between natives and immigrants is not driven by particular waves, but can be observed at any point in time although the magnitude of the gap varies slightly across waves.

Figure 2 provides some first insights about the role of cognitive, personality traits and economic preferences in explaining differences in stock-holding between natives and immigrants. For each group of characteristics, the figure shows two components. The first two upper graphs show that stock-holding is positively associated with cognitive skills, measured as memory and numeracy. In particular, among those with good memory and those being able to apply simple numerical concepts the share of stockholders is higher than among those with less good memory and numeracy skills. This holds true for both immigrants and natives. Given the fact that memory and numeracy are on average less good among immigrants (see table 1), the picture emphasizes the need to control for both cognitive skills in our analysis. Moreover, the graph indicates that both factors play different roles for immigrants and natives. For example, having good memory seem to matter more for immigrants than for natives.

As the two middle graphs show, the pattern is similar for non-cognitive skills. The share of respondents who hold stocks is much higher among those with low Perceived Constraints than among those who have high Perceived Constraints. For Neuroticism, one factor of the Big Five which is associated with being risk averse, the pattern is very similar. Having low Neuroticism is positively associated with holding stocks. Both relations hold true for both natives and immigrants. Like in the case of cognitive skills, the distribution of traits differs among natives and immigrants (see table 1). Again, the graphs suggest that the influence of both personality traits between native and immigrants differ. Finally, the two lower graphs illustrate that risk and time preferences matter for stockholding, whereas the importance seem to differ for natives and immigrants. Figure 2 therefore indicates that cognitive and non-cognitive skills are important factors for explaining differences in stockholding behavior between natives and immigrants.

#### 4. Empirical Analysis

In this section, we analyze the described gap in stockholding between natives and immigrants. First, in Section 4.1 we provide results from a random effects probit model. In Section 4.2, we conduct a Blinder-Oaxaca decomposition to gain further understanding about the different factors behind the stockholding gap.

##### 4.1. Random Effects Model

To get first insights about the relation between cognitive and non-cognitive skills and the native-immigrant gap in stockholding we estimate a random effects probit model of the following form:

$$StockHold_{it} = \beta_0 + \beta_1 X_{it}^{Cog} + \beta_2 X_{it}^{NonCog} + \beta_3 X_{it}^{Dem} + \beta_4 X_{it}^{Edu} + \beta_5 X_{it}^{Lab} + \beta_6 X_{it}^{Hea} + \beta_7 X_{it}^{Inc} + Y_t + R_r + \lambda_i + \epsilon_{it}, \quad (1)$$

where  $StockHold_{it}$  is a dichotomous variable taking the value of one if a respondent  $i$  holds stocks at time point  $t$ , and 0 otherwise.  $X_{it}^{NonCog}$  is a vector of non-cognitive skills including a variety of personality traits (Perceived Mastery/Constraints, Dispositional Optimism/Pessimism and the Big Five) and economic preferences (risk aversion and financial planning horizon). Cognitive skills, including measures of memory, mental status and numeracy, enter the equation via  $X_{it}^{Cog}$ . The vectors  $X_{it}^{Dem}$ ,  $X_{it}^{Edu}$ ,  $X_{it}^{Lab}$ ,  $X_{it}^{Hea}$  capture demographic, educational, labor market and health characteristics of respondent  $i$ .  $X_{it}^{Inc}$  stands for a variety of variables measuring the income and wealth of a respondent.<sup>15</sup> The corresponding impact of each characteristic on stockholding is captured by  $\beta_1$  to  $\beta_7$  and  $\beta_0$  is the regression constant.  $Y_t$  and  $R_r$  are wave and regional fixed effects.<sup>16</sup>  $\lambda_i$  and  $\epsilon_{it}$  are the individual random and the idiosyncratic components of the error term. Both are assumed to be uncorrelated with our explanatory variables.<sup>17</sup> The

<sup>15</sup>Capital income is deducted from total household income in order to avoid endogeneity. For the same reason, stockholding wealth is deducted from total financial wealth. All financial variables have been deflated to the 1992 level of the Consumer Price Index of Urban Consumers provided by the Bureau of Labor Statistics. Throughout the empirical analysis income and wealth are transformed via the hyperbolic sine transformation.

<sup>16</sup>These are the four main HRS census regions Northeast, Midwest, South and West. Two observations of regions other than these have been removed from the sample.

<sup>17</sup>In Section 5 we relax the assumption of no correlation between random effects and independent variables by using the framework of Mundlak (1978).

corresponding results of our benchmark regression are reported in Table 2. To ease interpretation, we report average marginal effects.

We start with a parsimonious specification in column 1, in which we control only for wave and regional fixed effects. Doing so, we find that immigrants are 23.3 percentage points less likely to hold stocks than natives. This is a substantial difference and is much larger than the unconditional gap in previous studies on immigrant-native stockholding differences in the US based on working age individuals (see among others Osili and Paulson, 2006 and Chatterjee and Zahirovic-Herbert, 2014). Therefore, it is remarkable that we still find such substantial differences at the end of the working life and beyond. Moreover, since most of our immigrants have spent many years in the US we would have expected to see assimilation in financial behavior.

In our second specification, we control for basic demographic characteristics like age, gender, marital status, race and the number of children. Further we control for differences in household size. It becomes obvious that adding these explanatory variables neither affects the significance nor the size of the immigrant coefficient, although it can explain some of the variation in stockholding among respondents. This provides first suggestive evidence that the difference in stockholding between native and immigrants is not driven by demographic differences between the two groups. We will investigate this further in the following section in which we conduct a detailed decomposition analysis of stockholding.

In the third column, we add information on cognitive skills to our empirical model. As a result, the immigrant coefficient decreases by approximately 2.6 percentage points, but remains highly significant. Overall, cognitive skills have a positive effect on stockholding. Especially increased numerical abilities lead to substantial gains in the likelihood to hold stocks. Answering one instead of zero questions correctly is associated with an increase in the likelihood to hold stocks by 14.1 percentage points.

Column 4 extends the underlying model by non-cognitive skills.<sup>18</sup> As a consequence, the immigrant coefficient decreases in size by 2.9 percentage points. The estimated coefficients for non-cognitive skills resemble the results of our descriptive analysis. On average low Perceived Mastery and high Perceived Constraints, which imply an external locus of control, decrease the likelihood of stockholding. Interestingly, Dispositional Optimism and Pessimism have a significant negative association with stockholding. Among the Big Five personality traits, significance and sign of estimated coefficients are trait specific. While Neuroticism, Agreeableness and Conscientiousness have a significant positive effect on stockholding, Agreeableness is negatively related to holding stocks. The fact that the coefficients measuring the influence of cognitive skills are lower than in column 2 indicates that personality traits affect performance in cognitive tasks (Borghans et al., 2011). Finally, coefficients of both economic preferences are statistically different from zero, whereas low time preference promotes and risk aversion decreases financial market participation.

In column 5 and 6 we augment our model with variables measuring educational background and labor market

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<sup>18</sup>As has been pointed out by the literature on cognitive and non-cognitive skills, different concepts can capture similar underlying personality traits. This can cause multicollinearity problems. However, in our case variance inflation factors are on such a low level (less than of 5, respectively 4, if we abstract from numeracy) that it is very unlikely out that our estimates suffer from multicollinearity.

participation of our respondents. Both have the effect that the immigrant coefficient decreases in magnitude. However, even after controlling for skills and labor market characteristics we find that immigrants are 13.6 percentage points less likely to hold stocks than natives. As expected, as cognitive traits and personality traits have been shown to be good predictors for educational attainment, their estimated coefficients decrease in magnitude (Borghans et al., 2008). The immigrant-native stockholding gap shrinks further to 12.1 percentage points when we control for total wealth (income, wealth and home-ownership) in column 7. This finding suggests that wealth and income disparities are important factors in explaining differences in stockholding behavior between natives and immigrants. However, we still find cognitive factors, personality traits and economic preferences to predict stockholding. All factors remain significantly different from zero and keep their signs. Irrespective of their decrease in magnitude, the overall marginal effects are still remarkable. For example, having the personality trait of increased conscientiousness or being more thorough, increases the likelihood to own stocks by 6.6 percentage points.

Finally, we add an indicator for self-reported poor health in column 8. This channel adds only little explanatory power to our model since health is correlated with most of our demographic and income variables. Moreover, our variables of interest and the gap remain robust to this last extension of the model.

To summarize, our random effects model shows that non-cognitive traits, including economic preferences are significant and important factors in explaining stockholding behavior. The same holds true for cognitive abilities. Our estimates deliver first evidence that cognitive skills and personality traits contribute to the explanation of the stockholding gap between natives and immigrants.

#### 4.2. *Oaxaca-Blinder Decomposition*

Further insights about the stockholding gap between immigrants and natives and its different determinants can be provided by decomposition techniques. In contrast to the previous empirical exercise, decomposition analysis allows us to break down differences in financial behavior between the two groups into endowment and estimated coefficients. In other words, it enables us to isolate the part of the gap which is driven by differences in observable characteristics between the two groups from the part which is due to differences in the influence of those characteristics on stockholding. For example, in our case, it could be that the influence of educational attainment on stockholding varies between natives and foreign-born, since the transferability of human capital between countries is limited. As a consequence, the impact of having a tertiary education would differ between both groups. For other characteristics, including non-cognitive skills, effects could also vary between natives and immigrants. For these reasons, we decided to conduct a Blinder-Oaxaca decomposition.

Given the binary nature of our dependent variable, we apply a non-linear, pooled, two-way decomposition approach following the general framework by Yun (2004).<sup>19</sup> As displayed by equation (2) the group mean differences between  $Y_A$  and  $Y_B$  (in our case stockholding rates of native and immigrants) can be decomposed into characteristics

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<sup>19</sup>Yun (2004) shows that the linear Blinder-Oaxaca Decomposition is a special case of his general framework.

$\Delta X$  and coefficient effects  $\Delta\beta$ . Due to their observational nature, characteristics effects are also called the "explained gap", while coefficients effects are referred to as the "unexplained gap". The decomposition makes use of the independent characteristics of natives  $X_A$  and immigrants  $X_B$  as well as of coefficients from group-specific regressions  $\beta_A$  and  $\beta_B$ . The functional non-linear relationship of our underlying probit framework is conceptualized by the cumulative standard normal distribution  $\Phi$ . In line with Yun (2004) the overbars represent the respective sample averages.

$$\bar{Y}_A - \bar{Y}_B = \underbrace{[\overline{\Phi(X_A\beta_A)} - \overline{\Phi(X_B\beta_A)}]}_{\text{characteristics effect } \Delta X} + \underbrace{[\overline{\Phi(X_B\beta_A)} - \overline{\Phi(X_B\beta_B)}]}_{\text{coefficients effect } \Delta\beta} \quad (2)$$

As Yun (2004) points out the decomposition can be extended to the detailed level. Each variable contribution is calculated by weighing the aggregate explained and unexplained gap. The underlying weights  $W_{\Delta X}^i$  and  $W_{\Delta\beta}^i$  are derived from a first-order Taylor extension around the functional value at the mean characteristics. Equations (3) and (4) make clear that the sum of all contributions add up to the aggregate decomposition.

$$\bar{Y}_A - \bar{Y}_B = \sum_{i=1}^K W_{\Delta X}^i [\overline{\Phi(X_A\beta_A)} - \overline{\Phi(X_B\beta_A)}] + \sum_{i=1}^K W_{\Delta\beta}^i [\overline{\Phi(X_B\beta_A)} - \overline{\Phi(X_B\beta_B)}] \quad (3)$$

$$\sum_{i=1}^K W_{\Delta X}^i = \sum_{i=1}^K W_{\Delta\beta}^i = 1 \quad (4)$$

In order not to over- or undervalue any of the two groups we obtain a non-discriminatory coefficient from a pooled regression, augmented by a group indicator dummy (Jann, 2008). Throughout our decomposition analysis standard errors are clustered at the level of the financial respondent.<sup>20</sup> The corresponding results are provided in table 4.

In line with our previous results, we find that natives are significantly more likely to hold stocks than immigrants.<sup>21</sup> The estimates in column 1 further show that more than two thirds of this gap can be attributed to differences in observable characteristics between natives and immigrants. This leaves an unexplained gap of about 30 percent which can be either due to differences in the influence of observed characteristics, discrimination or unobservable differences between the two groups.

Column 2 und 3 provide details about the different components of the explained and unexplained part of the stockholding gap. The estimates suggest that the most important reason for differences in stockholding are differences in wealth and income between natives and immigrants. These have been illustrated in Section 2.2. Differently speaking,

<sup>20</sup>While it has been pointed out by Oaxaca and Ransom (1999), that the choice of the benchmark of categorical regressors affects the detailed decomposition, we refrain from normalizing regressors like educational attainment. Following the argument of Fortin et al. (2011) we acknowledge the desirability of invariance but choose to maintain simple interpretability and comparability across studies.

<sup>21</sup>In contrast to table 3, the reported estimates are not marginal effects. The magnitude of the gap obtained from the random effects model is very close to the one obtained running a decomposition analysis.



natives are more likely to hold stocks due to their superior income and wealth.<sup>22</sup> However, we refrain from making any statements about causality at this point. It could be the case that the wealth of natives is higher, because they have higher stockholding rates.

In spite of that, the decomposition further indicates that education contributes to the explanation of the observed stockholding differences. About 20 percent of the explained gap is due to the superior educational attainment of natives. The positive effect of education on stockholding can be either working through a cost reduction of stock market participation (Campell, 2006) or through a reduction of misperception and ignorance by information (Haliassos and Bertaut, 1995). Differences in reported health status seem only to play a minor role for the native-migrant gap in stockholding. With respect to demographics, differences in characteristics do not affect our gap of interest. While the number of children and household members explains some part of the observed gap, it is noteworthy, that race differences do not play a role for the stockholding gap.

Finally, the decomposition delivers support for the influential role of personality traits and cognitive skills in explaining differences in the stockholding. Our estimates indicate that about 10 percent of the explained gap in stockholding is driven by differences in non-cognitive skills and roughly 12 percent by differences in cognitive skills. Our finding is in line with Christelis et al. (2010) who highlighted that the propensity to invest in stocks is strongly associated with cognitive skills. It further complements the work of Heckman et al. (2006) and others who have shown that cognitive and non-cognitive skills are influential drivers for labor market outcomes and behavior.

In particular, we find differences in numerical abilities to be the largest contributor to the explained gap among cognitive factors. In other words, if immigrants would have the same (higher) numeracy as natives, the stockholding gap would shrink. Among non-cognitive skills we have opposing effects. As immigrants show on average higher scores of emotional instability, which is positively related to stockholding, its contribution to the gap is negative. Hence, equalizing immigrant's degree of Neuroticism with their native counterpart would increase the gap. The opposite relation holds for Conscientiousness. Finally, a main factor driving the stockholding gap are differences in the financial planning horizon. Having a positive impact on stockholding, a shift of the time preference of immigrants to the long-term, would result in a decreasing gap.

When it comes to the unexplained part of the gap, we find differences in the influence of region and health. Regarding the latter, our estimates imply that the health status plays a larger role for immigrants than for native respondents. In particular, being of bad health has a much larger influence on holding stocks for immigrants than it has for natives. This is likely to be driven by the lower insurance coverage among immigrants. In our sample, 33% of the immigrants have an employer-sponsored insurance, while the corresponding share among natives is almost 45%. For other non-governmental insurances the relative difference is even larger: 10% of immigrants are covered by a health insurance other than government, employer-provided, or long term care insurance, while 18% of natives have

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<sup>22</sup>The positive correlation between stock market participation, income and wealth is one of the stylized facts of household finance (Campell, 2006; Haliassos and Bertaut, 1995).

such an insurance. As a consequence, sickness and age-related disease are likely to have a larger financial impact for immigrants and by this reduce stockholding. The finding that regional factors play a different role for immigrants and natives can be explained with spatial segregation. Among others Bartel (1989) has shown that immigrants in the US are more geographically concentrated than natives and tend to settle within ethnic enclaves. Natives and immigrants living in the same census region, e.g. Northeast, are therefore likely to live in different places within the region. The positive coefficient of the unexplained regional factor suggests that immigrants live in environments that have a less favorable access to financial services and infrastructure than the areas in which natives live. Moreover this is in line with the finding that home-country institutions have a more persistent effect on metropolitan immigrant stockholding if they live in ethnic enclaves (Osili and Paulson, 2008). Looking at the detailed contribution of cognitive and non-cognitive skills to the unexplained gap, we find returns to numeracy and financial planning horizon to differ significantly between natives and immigrants. In both cases, the positive effect on stockholding seems to be less pronounced for immigrants. This implies that an adaption of immigrants to native returns would lead to an increase in the stockholding gap.

## 5. Additional Results

So far we have compared stockholding behavior of immigrant couples with those of native couples and found significant differences, both in terms of likelihood of stockholding and in terms of determinants of stockownership. From labor market studies like the one by Meng and Gregory (2005) we know that interethnic couples tend to perform better in terms of economic outcomes than couples that consist of two immigrants. In other words, being married to a native reduces the gap in labor market outcomes between natives and immigrants. In the following we will test whether this assimilation pattern can also be observed in the context of stockholding. However, in contrast to Meng and Gregory (2005) we do not address that interethnic marriage is an endogenous choice. We therefore cannot make any statements about the causal impact of interethnic marriage on stockholding. Table 6 provides results from a decomposition analysis comparing native households with all immigrant households, including mixed households. The latter are defined as having one immigrant, being the financial respondent, and one native adult household member. The estimation follows the approach outlined in Section 4. Indeed, we find that the stockholding gap is lower than the one in our benchmark regression. Adding mixed couples to our sample reduces the gap by approximately 6 percentage points. We therefore observe, like in the labor market, that interethnic couples are more similar to natives than endogenous immigrant couples. A further difference to our benchmark results is that the unexplained gap is smaller and non-significant. This implies that the influence of the various determinants of stockholding does not differ between immigrants and natives any more. A comparison with the estimates in table 5 suggest that interethnic couples are less affected by spatial segregation and limited health insurances than households with two immigrant partners.

Next, we focus on Hispanic immigrants who compromise the largest ethnicity within our sample of immigrant

households.<sup>23</sup> Table 7 shows decomposition results for native and immigrant households with two Hispanic partners. <sup>24</sup> We find a very large gap of 36 percentage points between native and Hispanic households. Two thirds of this gap is explained by differences in observable characteristics between the two groups. Like in our benchmark regression, differences in education, cognitive and non-cognitive skills and wealth are the most influential factors in explaining the gap. Furthermore, differences in the demographic structure also contribute to the explanation of the gap. The breakdown of the unexplained part indicates that, in contrast to our benchmark, non-cognitive skills, education and wealth seem to play different roles for Hispanic immigrants than for natives when it comes to stockholding.

To investigate this further it is instructive to compare Hispanic immigrants with natives of Hispanic origin. Doing so, reduces our sample significantly leaving us with less than 1,200 observations. The corresponding results are provided in table 7. We find a gap in stockholding which is very similar to the one found in our benchmark results comparing all immigrants with all natives. The same holds true for the size of the explained gap, and its different components. This reassures us that our benchmark results are not biased by missing controls for ethnicity. The coefficients of the unexplained part further indicate that non-cognitive skills, education and wealth indeed play slightly different roles for natives and immigrants among Hispanics. Having good cognitive skills and being wealthy seem to matter more for natives, while being educated seems to have a slightly larger association with stockholding for immigrants. However, given the small sample size, these results are far from being conclusive.

Next we explore the role of occupations. As we know from the labor market literature, immigrants and natives are likely to work in different occupations - even in cases in which they have similar education attainment. This occupational segmentation could be another factor explaining why we observe differences in stockholding between the two groups. The results in table 9 show that considering differences in the occupational distribution adds only little explanatory power to our model. <sup>25</sup> Differently speaking, the size of the explained gap does not increase when considering occupations. Most important, our main results continue to hold. The detailed composition delivers a positive and significant occupation coefficient suggesting that the superior occupational distribution of natives drives part of the stockholding gap. However, adding occupations to our model slightly reduces the size of our skill coefficients. The fact that we find a positive and significant occupation coefficient in the unexplained part indicates that natives had better jobs even within a particular occupational group.

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<sup>23</sup>The group of respondents, who declare themselves to be Hispanic or Latino are not mutually exclusive to the prior ethnic groups. The classification into Black/African American, White/Caucasian and Other is independent of the classification into Hispanic/Latino.

<sup>24</sup>Due to data limitations, we had to adjust some of our control variables. As the majority of Hispanic immigrants lives in the Southern and Western U.S. census region, our new regional omitted category is Northeast/Midwest. Further, the very small number of respondents over 80 requires the merging of our top coding with the category older than 70. Since the majority of Hispanics has lower educational attainment, there is no variation in stockholding in the base category. We therefore reduce our education indicator into having a higher degree than high school. The same problem and solution applies to our numeracy index. Here we create a dummy variable indicating more than 1 of three correct answers.

<sup>25</sup>Specifically, the respondent is asked to report the occupation with the longest tenure. Due to incomplete information on occupation, the sample size is slightly reduced. Occupations for which we do not observe any migrants are dropped from the sample. Moreover, we merge all occupations related to service as well as operators and armed forces, respectively, and arrive at ten occupation categories.

Finally, we conducted a series of tests to assess the robustness of our empirical findings. At first, we relax the assumption of our random effects probit model of no correlation between the random effects and controls. A first relaxation of this assumption was proposed via the correlated random effects framework by Mundlak (1978). In order to check if our results are biased by a certain correlation structure, we include mean values of each time-varying control to our regression. Specifically, we apply a backwards selection of mean controls. Due to convergence issues we do not cluster our standard errors. We obtain a smaller but still sizeable significant gap of 8.3 percentage points. Moreover, the coefficient estimates of our variables of interest remain stable and significant predictors of having stocks. The number of quadrature points determines, at least partially, the accuracy of the approximation procedure. In order to check for accuracy, we reran the benchmark regression analysis for different numbers of quadrature points. Our results remain stable compared to our baseline choice of twenty integration points.

In our benchmark regression, we limited our sample to respondents with complete information. However, missing information could differ systematically between natives and immigrants. While the share of removed observations is comparable for both groups throughout most variables, there is a considerable difference with respect to non-cognitive personality traits. While roughly 8% of the natives do not answer the corresponding questions, which are asked in a separate leave-behind questionnaire, 24% of the immigrants supply incomplete information. Hence, we run a set of regressions with dummies indicating the lack of information on personality scores. As a result, we obtain a slightly larger stockholding gap. Most importantly, the estimates confirm the important role of cognitive and non-cognitive skills. In fact, treating missing values as an own category increases the part of the gap explained by cognitive and non-cognitive skills.

So far, our non-cognitive indices weigh all underlying responses equally. Following the suggestion of Piatek and Pinger (2015), we create alternative data-driven weights based on principal component analysis. Specifically, we extract one principal component per psychological concept. Due to the requirement of full answer coverage, our sample and the risky asset holding gap shrinks. While regression coefficients remain stable according to their relative significances and levels, the unexplained gap becomes insignificant. Nevertheless, the relative importance of cognitive and non-cognitive skills remains rather stable.

Another robustness check involves the correction for sampling design. We conduct a conservative robustness check by using sampling weights, supplied by the HRS. Specifically, we run a weighted pooled probit regression and decomposition analysis. Again we calculate standard errors clustered on the household level. The relative importance and significance of cognitive and non-cognitive factors remains stable, whereas the gap decreases overall and the unexplained gap is not significantly different from zero.

Last but not least, we test the robustness of our results by using alternative measures of our cognitive and non-cognitive factors. Our results remain unaffected when we standardize our time-varying cognitive skills yearly, including all levels of risk aversion and time preference. The same holds true when we model non-cognitive traits in a linear manner.

## 6. Conclusions

There is growing empirical evidence about differences between natives and immigrants in financial behavior. Almost all studies highlight an inferior wealth accumulation of immigrants compared to natives. Recent works suggest that one reason is a low participation in stock markets. Our paper provides new evidence about the immigrant-native gap in stockholding in the older U.S. population and sheds light on the determinants of the differences. Doing so, we are, to the best of our knowledge, the first who explicitly incorporate cognitive as well as non-cognitive characteristics.

Our empirical analysis uncovers a substantial gap in stockholding between natives and immigrants. This is a remarkable finding as we focus on individuals older than 50 years and compare natives with immigrants who have lived in the US for most of their working life. The gap is even larger than the one found in studies using samples of younger respondents in the US. This implies a lack of financial assimilation over time. One potential explanation could be selective outmigration of immigrants. Future research is needed to test whether and why differences in financial behavior between natives and immigrants increase over the life cycle.

Our random effects estimations show that cognitive and non-cognitive skills are important drivers of stockholding. Moreover, they are able to explain part of the differences between native and immigrants. This is supported by a decomposition analysis in which we break down differences in stockholding between the two groups into endowment and estimated coefficients. In terms of cognitive skills, we find that part of the gap is driven by lower numerical skills, memory skills and less intact mental status of immigrants. With respect to non-cognitive skills, differences in time preferences are the most influential factor in explaining the gap. In particular, lower stockholding is partly driven by a shorter planning horizon of immigrants relative to natives. Nonetheless, the most important factors in explaining the gap are wealth, income and education differences. Finally, our estimates of the unexplained gap suggest that health and location have different effects on stockholding for immigrants than for natives. This is likely to be driven by low insurance rates among immigrants and ethnic residential clustering.

Our paper provides new insights about the role of cognitive and non-cognitive skills for stockholding and their contribution in explaining the high non-participation of immigrants in stock markets. Doing so, we deliver novel explanations for the stockholding puzzle which is an immanent feature of financial markets in Western societies. In particular, in times of demographic change and growing immigration, it is crucial to deepen our understanding of why immigrants participate in stock markets even more rarely than natives do.

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Figure 1: Unconditional Holding Gap

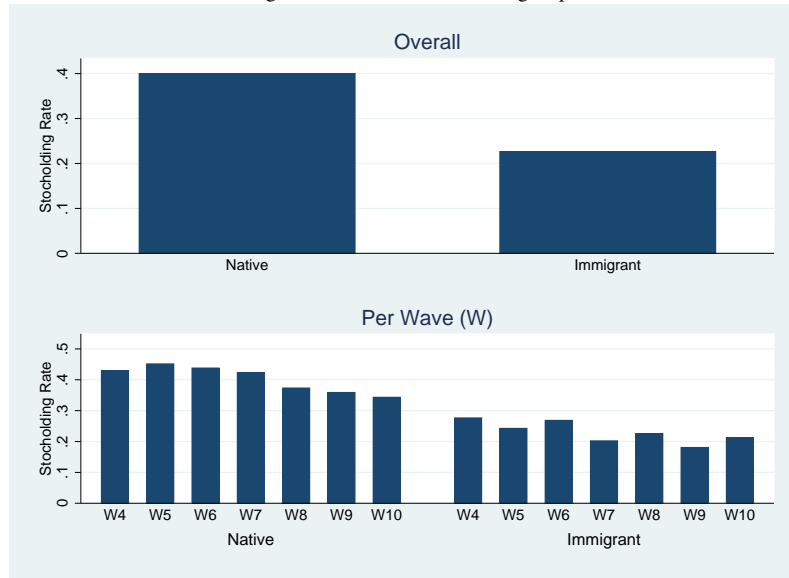


Figure 2: Conditional Holding Gap

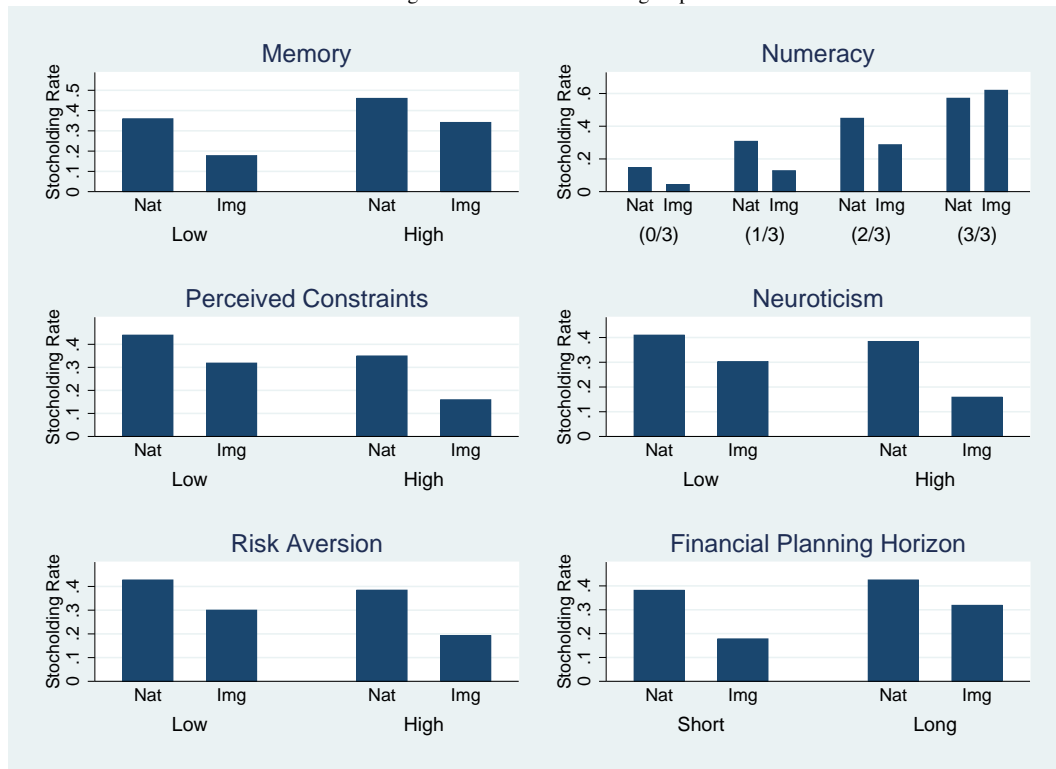


Table 1: Mean Difference Table - Risky Assets, Cognitive and Non-Cognitive Traits

	Natives	Immigrants	Difference	P-Value
Holding Stocks	0.40	0.23	0.17	0.00
<i>Cognitive Skills</i>				
Memory	0.08	-0.19	0.26	0.00
Mental Status	0.06	-0.23	0.30	0.00
Numeracy (0/3)	0.07	0.15	-0.08	0.00
Numeracy (1/3)	0.32	0.33	-0.01	0.48
Numeracy (2/3)	0.46	0.44	0.02	0.21
Numeracy (3/3)	0.15	0.08	0.07	0.00
<i>Non-Cognitive Skills (Personality Traits)</i>				
Perceived Mastery	0.47	0.41	0.06	0.00
Perceived Constraints	0.44	0.58	-0.14	0.00
Dispositional Optimism	0.49	0.64	-0.15	0.00
Dispositional Pessimism	0.43	0.67	-0.24	0.00
Neuroticism	0.37	0.53	-0.16	0.00
Extraversion	0.47	0.42	0.06	0.00
Agreeableness	0.42	0.40	0.02	0.17
Conscientiousness	0.46	0.38	0.08	0.00
Openness	0.43	0.35	0.09	0.00
<i>Non-Cognitive Skills (Economic Preferences)</i>				
Financial Planning Horizon (>5 Years)	0.51	0.40	0.11	0.00
Highest Risk Aversion	0.63	0.68	-0.05	0.00
Observations	18897	1108	20005	
Individuals	3408	214	3622	

Table 2: Mean Difference Table - Controls

	Natives	Immigrants	Difference	P-Value
<i>Demographics</i>				
Age 50-60	0.29	0.27	0.02	0.15
Age 61-70	0.42	0.43	-0.01	0.66
Age 71-80	0.25	0.27	-0.02	0.17
Age 80+	0.03	0.03	0.01	0.36
Male	0.60	0.67	-0.07	0.00
Ethnicity: White/Caucasian	0.91	0.74	0.17	0.00
Ethnicity: Black / African American	0.09	0.06	0.03	0.00
Ethnicity: Other	0.01	0.20	-0.19	0.00
Children (Number)	3.29	3.67	-0.38	0.00
Household Members (Number)	2.39	3.02	-0.63	0.00
<i>Education</i>				
Education: Less Than High School	0.10	0.36	-0.25	0.00
Education: GED	0.05	0.02	0.03	0.00
Education: High School	0.33	0.22	0.11	0.00
Education: Some College	0.24	0.15	0.08	0.00
Education: College And More	0.28	0.25	0.03	0.02
<i>Labor Market</i>				
Unemployed/ Not In Labor Force	0.08	0.14	-0.06	0.00
Retired	0.43	0.40	0.03	0.05
Household Financial Wealth	220083.64	138208.53	81875.11	0.00
Household Income	44536.75	30367.42	14169.33	0.00
House Ownership	0.93	0.81	0.13	0.00
<i>Health Status</i>				
Self-Rated Poor Health	0.17	0.31	-0.14	0.00
Observations	18897	1108	20005	
Individuals	3408	214	3622	

Table 3: Random Effects Probit: Holding Stocks

Holding Stocks	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Immigrant	-0.233*** (0.0189)	-0.233*** (0.0243)	-0.207*** (0.0273)	-0.178*** (0.0289)	-0.136*** (0.0313)	-0.136*** (0.0311)	-0.121*** (0.0314)	-0.120*** (0.0313)
<i>Cognitive Skills</i>								
Memory			0.0272*** (0.00546)	0.0234*** (0.00517)	0.0166*** (0.00489)	0.0173*** (0.00488)	0.0157*** (0.00487)	0.0154*** (0.00488)
Mental Status			0.0286*** (0.00768)	0.0252*** (0.00719)	0.0157** (0.00679)	0.0159** (0.00678)	0.0154** (0.00672)	0.0152** (0.00671)
Numeracy (1/3)			0.141*** (0.0206)	0.142*** (0.0239)	0.111*** (0.0309)	0.113*** (0.0307)	0.108*** (0.0308)	0.108*** (0.0309)
Numeracy (2/3)			0.287*** (0.0225)	0.258*** (0.0256)	0.169*** (0.0326)	0.172*** (0.0324)	0.161*** (0.0324)	0.159*** (0.0325)
Numeracy (3/3)			0.483*** (0.0353)	0.413*** (0.0359)	0.239*** (0.0404)	0.243*** (0.0402)	0.231*** (0.0397)	0.229*** (0.0398)
<i>Non-Cognitive Skills (Personality Traits)</i>								
Perceived Mastery				0.0467** (0.0203)	0.0593*** (0.0188)	0.0593*** (0.0187)	0.0543*** (0.0182)	0.0536*** (0.0181)
Perceived Constraint				-0.0555*** (0.0203)	-0.0351* (0.0188)	-0.0358* (0.0187)	-0.0324* (0.0181)	-0.0312* (0.0181)
Dispositional Optimism				-0.0331* (0.0201)	-0.0326* (0.0183)	-0.0329* (0.0182)	-0.0302* (0.0177)	-0.0309* (0.0176)
Dispositional Pessimism				-0.0632*** (0.0207)	-0.0292 (0.0189)	-0.0294 (0.0188)	-0.0245 (0.0182)	-0.0235 (0.0182)
Neuroticism				0.0402** (0.0188)	0.0392** (0.0172)	0.0388** (0.0171)	0.0400** (0.0166)	0.0417** (0.0166)
Extraversion				0.0301 (0.0204)	0.0324* (0.0185)	0.0325* (0.0185)	0.0308* (0.0180)	0.0298* (0.0180)
Agreeableness				-0.0974*** (0.0202)	-0.0767*** (0.0187)	-0.0761*** (0.0187)	-0.0697*** (0.0181)	-0.0690*** (0.0181)
Conscientiousness				0.0828*** (0.0188)	0.0711*** (0.0172)	0.0725*** (0.0172)	0.0660*** (0.0167)	0.0652*** (0.0167)
Openness				0.00650 (0.0199)	-0.0230 (0.0182)	-0.0227 (0.0182)	-0.0217 (0.0177)	-0.0217 (0.0177)
<i>Non-Cognitive Skills (Economic Preferences)</i>								
Financial Planning Horizon ( $\geq 5$ Years)				0.151*** (0.0182)	0.124*** (0.0167)	0.124*** (0.0166)	0.111*** (0.0162)	0.110*** (0.0162)
Highest Risk Aversion				-0.0341* (0.0186)	-0.0264 (0.0171)	-0.0272 (0.0170)	-0.0273* (0.0165)	-0.0275* (0.0165)
Demographics	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education	No	No	No	No	Yes	Yes	Yes	Yes
Labor Market	No	No	No	No	No	Yes	Yes	Yes
Household Finances	No	No	No	No	No	No	Yes	Yes
Health Status	No	No	No	No	No	No	No	Yes
Observations	20,005	20,005	20,005	20,005	20,005	20,005	20,005	20,005
Number of Cluster	3,622	3,622	3,622	3,622	3,622	3,622	3,622	3,622
Pseudo R-Squared	0.019	0.0335	0.0478	0.0569	0.0699	0.0705	0.0758	0.0761

Robust Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 4: Non-Linear Blinder-Oaxaca Decomposition: Detailed

	(1)	(2)	(3)
	Overall	Explained	Unexplained
Native	0.401*** (0.00705)		
Immigrant	0.226*** (0.0233)		
Difference	0.175*** (0.0243)		
Explained	0.125*** (0.0189)		
Unexplained	0.0495*** (0.0175)		
Demographics		0.0105 (0.00816)	0.00769 (0.0242)
Cognitive Skills		0.0152*** (0.00396)	-0.0394 (0.0275)
Non-Cognitive Skills		0.0119** (0.00479)	0.0148 (0.0239)
Education		0.0260*** (0.00694)	-0.00731 (0.0106)
Labor Market		-0.000672 (0.00128)	0.00243 (0.00694)
Household Finances		0.0527*** (0.00775)	-0.000606 (0.0296)
Health		0.00516*** (0.00177)	0.0107* (0.00562)
Wave		0.00148 (0.000983)	0.0161 (0.0114)
Region		0.00306 (0.00334)	0.0187* (0.0109)
Constant			0.0263 (0.0559)
Observations	20,005	20,005	20,005

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 5: Non-Linear Blinder-Oaxaca Decomposition: Detailed (Non-Cognitive and Cognitive Factors)

VARIABLES	(1) Explained	(2) Unexplained
<i>Cognitive Factors</i>		
Memory	0.00274** (0.00115)	0.000257 (0.00102)
Mental Status	0.00441** (0.00180)	0.00240 (0.00190)
Numeracy (1/3)	-0.000506 (0.00180)	-0.0190* (0.0111)
Numeracy (2/3)	0.00146 (0.00289)	-0.0170 (0.0145)
Numeracy (3/3)	0.00712** (0.00292)	-0.00599* (0.00363)
<i>Non-Cognitive Factors (Personality Traits)</i>		
Perceived Mastery	0.00136 (0.00104)	0.00418 (0.00630)
Perceived Constraints	0.00144 (0.00153)	0.00138 (0.00832)
Dispositional Optimism	0.00271 (0.00168)	-0.0140 (0.00962)
Dispositional Pessimism	0.00296 (0.00259)	0.00752 (0.00970)
Neuroticism	-0.00461** (0.00191)	0.00479 (0.00715)
Extraversion	0.00102 (0.000892)	0.0123 (0.00750)
Agreeableness	-0.000691 (0.00124)	-0.00707 (0.00697)
Conscientiousness	0.00259* (0.00141)	0.00251 (0.00547)
Openness	-0.00140 (0.00108)	0.00632 (0.00629)
<i>Non-Cognitive Factors (Economic Preferences)</i>		
Financial Planning Horizon ( $\geq 5$ Years)	0.00560*** (0.00214)	-0.0142** (0.00682)
Highest Risk Aversion	0.000892 (0.000765)	0.0111 (0.00991)
Observations	20,005	20,005

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 6: Non-Linear Blinder-Oaxaca Decomposition: Including Mixed Couples

	(1)	(2)	(3)
	Overall	Explained	Unexplained
Native	0.401*** (0.00705)		
Immigrant	0.293*** (0.0219)		
Difference	0.109*** (0.0230)		
Explained	0.0865*** (0.0156)		
Unexplained	0.0220 (0.0175)		
Demographics		0.00908 (0.00553)	0.0158 (0.0216)
Cognitive Skills		0.0109*** (0.00310)	-0.0423 (0.0314)
Non-Cognitive Skills		0.00672* (0.00352)	0.0680 (0.0422)
Education		0.0138** (0.00555)	-0.00261 (0.0115)
Labor Market		0.000681 (0.00106)	0.00146 (0.00531)
Household Finances		0.0367*** (0.00612)	0.00204 (0.0288)
Health		0.00425*** (0.00141)	0.0109 (0.00721)
Wave		0.00194** (0.000781)	0.00337 (0.00904)
Region		0.00248 (0.00279)	0.00702 (0.0104)
Constant			-0.0417 (0.0581)
Observations	20,615	20,615	20,615

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 7: Non-Linear Blinder-Oaxaca Decomposition: Detailed (Hispanic Immigrants - Native Gap)

	(1)	(2)	(3)
	Overall	Explained	Unexplained
Native	0.401*** (0.00696)		
Immigrant	0.0409*** (0.0133)		
Difference	0.360*** (0.0150)		
Explained	0.241*** (0.0152)		
Unexplained	0.120*** (0.0121)		
Demographics		0.0283*** (0.00603)	0.0835*** (0.0268)
Cognitive Skills		0.0344*** (0.00584)	0.0120 (0.00864)
Non-Cognitive Skills		0.0173*** (0.00648)	0.0957*** (0.0178)
Education		0.0332*** (0.00492)	-0.0107*** (0.00389)
Labor Market		-0.00151 (0.00202)	-0.0205** (0.00870)
Household Finances		0.103*** (0.0105)	0.0265* (0.0147)
Health		0.0116*** (0.00328)	0.00818 (0.00685)
Wave		0.00254* (0.00137)	0.0228** (0.0104)
Region		0.0122*** (0.00332)	0.00464 (0.0113)
Constant			-0.102*** (0.0393)
Observations	19,510	19,510	19,510

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1



Table 8: Non-Linear Blinder-Oaxaca Decomposition: Detailed (Hispanic Sample)

	(1)	(2)	(3)
	overall	explained	unexplained
Native	0.216*** (0.0305)		
Immigrant	0.0407*** (0.0115)		
Difference	0.175*** (0.0326)		
Explained	0.127*** (0.0313)		
Unexplained	0.0488** (0.0205)		
Demographics		0.00903 (0.00760)	0.0427* (0.0249)
Cognitive Skills		0.0117 (0.00975)	0.00146 (0.00410)
Non-Cognitive Skills		0.0413** (0.0165)	0.0424* (0.0227)
Education		0.0150* (0.00855)	-0.00616* (0.00374)
Labor Market		0.00145 (0.00499)	-0.0138 (0.00855)
Household Finances		0.0546*** (0.0141)	0.129** (0.0656)
Health		0.00711 (0.00482)	0.000688 (0.00500)
Wave		0.00104 (0.00114)	0.00761 (0.00945)
Region		-0.0148 (0.0100)	0.00468 (0.0118)
Constant			-0.159* (0.0834)
Observations	1,164	1,164	1,164

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 9: Non-Linear Blinder-Oaxaca Decomposition: Detailed (Including Occupations)

VARIABLES	(1) overall	(2) explained	(3) unexplained
Demographics		0.00975 (0.00844)	0.00439 (0.0280)
Cognitive Skills		0.0118*** (0.00335)	-0.0279 (0.0372)
Non-Cognitive Skills		0.00984** (0.00492)	0.0241 (0.0261)
Education		0.0218*** (0.00650)	-0.00180 (0.0130)
Labor Market		-0.000297 (0.00128)	0.00343 (0.00775)
Household Finances		0.0481*** (0.00761)	-0.00466 (0.0319)
Health		0.00452*** (0.00171)	0.00928* (0.00561)
Occupation		0.0130*** (0.00390)	0.0378** (0.0174)
Wave		0.000980 (0.00100)	0.0202 (0.0133)
Region		0.00541 (0.00349)	0.0232* (0.0124)
group_1	0.410*** (0.00737)		
group_2	0.237*** (0.0230)		
difference	0.173*** (0.0241)		
explained	0.125*** (0.0199)		
unexplained	0.0480*** (0.0178)		
Constant			-0.0400 (0.0725)
Observations	18,122	18,122	18,122

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table A.1: Description of Dependent Variable and Controls

Variable	Description	Values
Holding Stocks	Household owns a positive net value of stocks, mutual funds and investment trusts	US-Dollar (1992 CPI-U)
<i>Demographics</i>		
Immigrant	Respondent and Spouse are born outside the U.S.	No = 0, Yes = 1
Age (i)	Respondent is in age group i, i=50-60,61-70,70-80,80+	No = 0, Yes = 1
Male	Respondent is male	No = 0, Yes = 1
Ethnicity (i)	Respondent has Ethnicity i (i=White/Caucasian, Black/African American, Other)	No = 0, Yes = 1
Children	Children in Household (Number)	0,1,...,N
Household Size	People living in household (Number)	1,2,...N
<i>Education</i>		
Education (i)	Respondent attained education i, i=less than high school, GED, high school, some college and college and more	No = 0, Yes = 1
<i>Labor Market</i>		
Unemployed/Not in Labor Force	Respondent is unemployed or not part of the labor force	No = 0, Yes = 1
Retired	Respondent is retired	No = 0, Yes = 1
<i>Household Finances</i>		
Household Financial Wealth	Total net financial non-housing wealth (excl. stock wealth)	US-Dollar (1992 CPI-U)
Household Income	Total household income (excl. capital income)	US-Dollar (1992 CPI-U)
House Ownership	Household owns a primary residence of positive value	No = 0, Yes = 1
<i>Health Status</i>		
Self-Rated Poor Health	Respondent rates his current health as fair or poor	No = 0, Yes = 1
<i>Region and Wave</i>		
Region (i)	Respondent lives in U.S. census region i, i=Northeast, Midwest, South, West	No = 0, Yes = 1
Wave (i)	Respondent information from HRS wave i, i=4(1998),...,10(2010)	No = 0, Yes = 1

Table A.2: Description of Cognitive and Non-Cognitive Variables

Variable	Description	Values
<i>Cognitive Skills</i>		
Memory	Respondent average recall score of short and medium-term word lists	Standardized Index
Mental Status	Respondent total answer score of serial 7's, backward counting from 20 and naming objects, date and President/Vice-President	Standardized Index
Numeracy (i)	Respondent answers i of three numeracy questions correctly, $i=0,...,3$	No = 0, Yes = 1
<i>Non-Cognitive Skills (Personality Traits)</i>		
Perceived Mastery	Top half of standardized average respondent scores on five Mastery statements (Strongly Disagree (1), ..., Strongly Agree (6))	No = 0, Yes = 1
Perceived Constraints	Top half of standardized average respondent scores on five Constraints statements (Strongly Disagree (1), ..., Strongly Agree (6))	No = 0, Yes = 1
Dispositional Optimism	Top half of standardized average respondent scores on three Optimist statements (Strongly Disagree (1), ..., Strongly Agree (6))	No = 0, Yes = 1
Dispositional Pessimism	Top half of standardized average respondent scores on three Pessimist statements (Strongly Disagree (1), ..., Strongly Agree (6))	No = 0, Yes = 1
Neuroticism	Top half of standardized respondent scores on four Neuroticism statements (A lot (1), ..., Not at all (4))	No = 0, Yes = 1
Extraversion	Top half of standardized respondent scores on five Extraversion statements (A lot (1), ..., Not at all (4))	No = 0, Yes = 1
Agreeableness	Top half of standardized respondent scores on five Agreeableness statements (A lot (1), ..., Not at all (4))	No = 0, Yes = 1
Conscientiousness	Top half of standardized respondent scores on five Conscientiousness statements (A lot (1), ..., Not at all (4))	No = 0, Yes = 1
Openness	Top half of standardized respondent scores on seven Openness statements (A lot (1), ..., Not at all (4))	No = 0, Yes = 1
<i>Non-Cognitive Skills (Economic Preferences)</i>		
Financial Planning Horizon ( $\geq 5$ Years)	Respondent plans finances at least five years ahead	No = 0, Yes = 1
Highest Risk Aversion	Respondent reports highest degree of risk aversion in hypothetical income gamble	No = 0, Yes = 1

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