Hedging, stock market participation and portfolio choice*.

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May 18, 2003

Abstract

We test whether hedging motives can explain stock market participation and portfolio choice using portfolio data. We use a unique dataset of Swedish investors that contains information broken down at the investor level and into various components of wealth, investor income, tax positions and investors' demographic characteristics. Portfolio holdings are identified at the stock level. This allows us to measure the extent to which investors deliberately tilt their portfolio away from the market portfolio in order to hedge their non-financial income risk. We provide evidence that investors do not engage in hedging, but invest in stocks with which they are familiar in terms of geographical or professional proximity. We rationalize this in terms of "familiarity" and we provide evidence of it. We show that familiarity-based investment allows investors to earn higher returns than they would have otherwise earned if they had hedged.

JEL classification: **G11,G14.**

Keywords: **Asset pricing, portfolio decision, hedging.**

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1 Introduction

One of the main questions in finance is why people participate in the stock market and what determines their portfolio choices. The theoretical literature proposes hedging motives as an important driving force. Investors hold risky financial assets in order to offset their non-financial income risk. This stands in stark contrast with anecdotal evidence that suggests that investors, far from selecting an optimal portfolio, pick individual stocks on the basis of heuristics and stock familiarity. The lack of good-quality data on stock holdings, broken down at the investor level, and the scarcity of information about investors' overall assets, wealth and income have made it almost impossible to test the competing explanations.

We bridge this gap by directly focusing on the extent to which investors actively hedge non-financial income risk and by investigating the relation between portfolio choice and investors' different sources of non-financial income. We study the determinants of stock market participation and portfolio decision. In particular, we use portfolio data to quantify the degree to which investors deliberately tilt their portfolios away from the market portfolio in order to hedge their non-financial risk. This allows us to distinguish hedging from other portfolio-choice motives and to control for spurious cross-sectional correlation, such as the one between non-financial income and overall stock returns that naturally exists before any portfolio choice is made.

We use a new and unique dataset that allows us to inspect the *individual components of the investor's overall portfolio and relate them to his non-financial income.* This is, to our knowledge, the first paper to combine individual portfolio holding data with comprehensive information on all the components of non-financial household wealth. Moreover, the fact that we are able to observe the behavior *of the same investor* over time, confers to the data a *complete panel dimension* that allows us to control for past portfolio choices and returns.

The dataset contains a representative sample of the Swedish population and has information on the wealth of the investors, broken down into their components (cash, equity holdings, mutual funds, real estate, loans, bonds and other assets). We also have available the income and the tax position of the investors as well as their demographic characteristics. We can therefore identify the returns of the separate components of the investor's portfolio, as well as all the other sources of income of the investor, *including real estate.* Finally, the data contain detailed information on demographic and employment characteristics of the investors. This allows us to analyze the different sources of *heterogeneity in investor behavior.*

We show that investors, in general, do not deliberately hedge. Quite the contrary, investors deviate from the market portfolio in order to buy stocks that are more correlated with their non-financial income. We explain this by formulating an alternative hypothesis about portfolio choice based on "familiarity" or investor's proximity to the stock. Portfolio

choices are driven by professional and geographical proximity as well as by holding period-based familiarity. We also report evidence of how demographic, professional and wealth heterogeneity affects portfolio strategies. In particular, when we classify investors on the basis of wealth, we identify some evidence of hedging only for the high-wealth investors.

Moreover, we document that different strategies - i.e., hedging and familiarity-based investment - differ in terms of their profitability/costs. The portfolios of investors who hedge are characterized by lower returns than those of familiarity-based investors.

The remainder of the paper is articulated as follows. In Section 2, we relate our contribution to the existing literature. We lay out the testable restrictions in Section 3. In Sections 4 and 5, we describe the datasets we use and the construction of the variables. In Section 6, we discuss the econometric issues and the methodology we employ. In Section 7, we report the results of the tests of hedging versus familiarity and provide evidence for the familiarity hypothesis. We study the cost of the hedging- and familiarity-based strategies in Section 8. A brief conclusion follows.

2 Relation with the previous literature

2.1 Theory ahead of measurement

There exists a vast theoretical literature that analyzes portfolio choice in the presence of non-financial income. Non-financial income is modelled as "endowed exposure" that affects the desired financial exposure (Campbell, 2000). Non-financial income may include labor income (Campbell 2000, Davis and Willen, 2000a, 2000b, Haliassos and Michaelides, 2002, Haliassos and Hassapis, 2003) and entrepreneurial income (Polkovnichencko, 19999, Heaton and Lucas, 2000b). Different theories have provided different channels through which non-financial income may affect portfolio choice. If non-financial income is perceived as riskless, it should induce HARA investors to increase their investment in risky assets (Merton, 1971, Bodie, Merton and Samuelson 1992, Jagannathan and Kocherlakota, 1996, Heaton and Lucas, 1997). This has been defined as the "level effect".

If, however, non-financial income is perceived as risky, it should also affect portfolio choice by "changing people's tolerance for stock market risk" (Heaton and Lucas, 2000a). Background risk reduces risk taking for investors with DARA utility (Pratt and Zeckhauser, 1997, Kimball, 1993, Gollier and Pratt, 1996). An increase in the variance of the permanent (non-financial) income shocks lowers the investment in risky assets (Elmendorf and Kimball, 1999, Koo, 1995, Guiso, Jappelli and Terlizzese, 1996). This effect - labelled "variance effect" - links the decision to invest in risky assets to the riskinness of the non-financial component of the investor's overall portfolio.

If investment in risky assets is done in order to hedge, the key variable to study should

be the correlation between financial and non-financial risk. The higher this correlation, the lower the incentive to participate and to hold risky assets (Heaton and Lucas, 2000a). In particular, a positive correlation between labor income shocks and stock returns should reduce the investment in risky assets, while a negative correlation should increase it (Viceira, 2001). We define this latter effect, relating the investment decision to the correlation between financial risk and non-financial risk, as the "correlation effect".

At the empirical level, however, a definitive assessment of the way investors react to non-financial risk and manage their portfolios in order to account for it has, until now, eluded the literature. The results have been partial and often contradictory. For example, Vissing-Jørgensen (2002a) shows evidence of a mean and variance effect of labor income on portfolio choice, but finds no evidence that investment in risky assets is affected by the correlation between labor income and the return on risky assets. Heaton and Lucas (2000a) report considerable heterogeneity in exposure to background risk and show that households with greater exposure tend to hold a smaller share of stocks in their portfolio. Heaton and Lucas (2000b) show the existence of a significant positive correlation between equity returns and the income of self-employed persons, while Cocco, Gomes and Maenhout (1999) find a very low correlation between labor income and stock returns. Guiso, Jappelli and Terlizzese (1996) and Guiso and Jappelli (1998), find evidence of correlation between background risk and portfolio choice.

2.2 Shortcomings of previous empirical studies

We think that the disparity in the aforementioned empirical results is due to five limitations: the lack of information on individual portfolio composition, the use of the theoretical restrictions embedded in a single-asset framework, the use of aggregated data, the problem of inference based on survey data without a proper panel structure and the lack of information about real estate. Given that these represent the areas where our contribution is greater, we consider them in more detail.

- The first limitation is related to the *lack of information on individual portfolio composition*. The literature has typically not used individual portfolio data to test for hedging. It has, instead, employed the overall market return as a proxy for the returns on the financial portfolio the investor uses to hedge his non-financial risk. To use the aggregate stock market return as a proxy for the investor's portfolio return implicitly assumes that the investor holds a well diversified portfolio. This is not an innocuous assumption as, in fact, investors concentrate their investments in very few stocks. This has been clearly documented, for example, by Goetzmann and Kumar (2001) who report a very low degree of diversification, for a representative sample of individual accounts held with a large US broker.[1]

[1] Also, Grinblatt and Kelhorju (2000, 2001a, 2001b), using Finnish data, show that the average investor

If investors do not hold the market portfolio, two main implications follow. First, the direct inspection of the relation between risk taking and the actual (i.e., based on the investor's selected portfolio) correlation between non-financial income and financial income becomes critical in assessing the correlation effect. Second, the direct analysis of why investors tilt their portfolios away from the market portfolio provides additional information on the desire to hedge. In fact, hedging would require them to induce a more negative correlation between their non-financial and financial income than they would get by directly investing in the market portfolio.

Moreover, the actual correlation between the financial components of the portfolio and the non-financial ones is itself relevant in order to understand the variance effect. Indeed, in the case of stochastic non-financial income, the variance of non-financial income reduces the investment in risky assets only if the correlation between financial and non-financial income is positive or close to zero (Heaton and Lucas, 1997, Cocco, Gomes and Maenhout, 1999, Viceira, 2001). A negative correlation makes it more attractive to invest in risky assets as it reduces the risk of the overall portfolio (Haliassos, 2002). In terms of stock market participation, the decision to enter the stock market in order to hedge is predicated on a negative correlation between non-financial risk and financial risk, (Calvet, Gonzalez-Eiras and Sodini, 2002). If this correlation is negative, stock market participation should increase with the variance of non-financial income. Therefore, the tests of hedging have to be designed in order to properly account for the fact that the hypothesized impact of the variance effect on portfolio choice depends on the correlation between financial and non-financial income.

This suggests that a more direct approach, based on the analysis of the individual portfolio components is required. This would be based on the observation of the *correlation between the portfolio returns of an individual investor and his non-financial income.* However, since the original studies of Lease, Lewellen and Schlarbaum (1974), the use of data disaggregated at the stock level in the analysis of portfolio investment has petered out. Only recently, Barber and Odean (2000, 2001, 2002), Goetzmann and Kumar (2001) and Odean (1998, 1999) have studied what determines the decision to invest in a particular stock and the influence of behavioral biases (e.g., the disposition effect and the diversification puzzle). They rely on a dataset that contains accurate information on all the trades and holdings of individual investors with a big discount broker, detailed at the stock level. However, this information, while disaggregated at the stock level, is available *only on a subset of the entire stock-portfolio of the investors.*[2]

holds a very undiversified portfolio.

[2] Grinblatt and Kelloarji (2000, 2001a, 2001b) study investors' trading behavior with a dataset that contains, for the first time, the entire stock holdings of the investors. However, they focus their analysis on issues such as geographical preferences and momentum trading, without considering the overall dimension of the portfolio problem. Nor do they consider the correlation with the other sources of wealth. In fact, in all these studies, *information on other sources of income of the investor - i.e., labor income, entrepreneurial income - is not*

- The second limitation is the *use of the theoretical restrictions embedded in a single-asset framework*. If investors have more than one risky asset to choose from and hold more than one asset, the restrictions that are generated by a standard single-asset portfolio model are not robust. For example, an investor facing two stocks, one positively correlated to his non-financial income and one negatively related to it, may either buy the stock that is negatively correlated with his financial income or sell the one that is positively related to it. This implies that the standard tests of hedging relating holdings of risky assets to the variance of the non-financial risk and to its correlation with the financial assets, have to be redefined Moreover, in a multi-asset framework a direct test can be designed that directly looks at the risk profile of the investor's portfolio. We will elaborate more on this crucial issue in the following sections.

- The third limitation is *the use of aggregated data*. Most of the existing analyses are carried out at the aggregate level. That is, investors' professional or wealth heterogeneity is largely ignored. Only Davis and Willen (2000a, 2000b) have recently considered data disaggregated by occupations. They use the Current Population Survey to characterize the correlations between labor income innovation and aggregate equity returns. They find that, at the aggregate level, there is no correlation between income innovations and equity returns. At a disaggregated level, instead, they show that a "portfolio formed on firm size is significantly correlated with income innovations for several occupations, and so are selected industry-level equity portfolios". Moreover, they document a surprising heterogeneity in the covariance structure between asset returns and labor income shocks for different synthetic persons defined in terms of education, sex and birth cohort. This suggests that aggregate evidence may be misleading and that we have to bring the analysis to the disaggregated level, investigating the hedging for different classes of investors.

- The fourth limitation is related to the *use of survey data without a panel structure*. All the empirical literature that has focused on the relationship between portfolio choice and income risk has relied on survey data that do not trace *the same investor* over time.[3] This does not allow for a proper *panel dimension* and makes it difficult to identify the unexpected income shocks and to address issues of spurious correlation. Moreover, it does not allow us to control for the impact of past portfolio performance on the investor's choice. Therefore, income effects, trend-chasing motivations and stock-performance tracking become observationally equivalent.

- Finally, one dimension of investor's choice has often been ignored: *real estate*. While labor and entrepreneurial income have been thoroughly analyzed, very little evidence exists

available. This makes it impossible to study the correlation between financial and non-financial income.

[3] The only exception is Vissing-Jorgenson (2000a, 2000b). However, the time series dimension for investor's holding information is only of two years.

on the interaction between real estate income and portfolio allocation. There is evidence that real estate wealth affects consumer spending (Case, Quigley and Shiller, 2001) and there is some evidence of causality running from the stock market to the real estate market, (Okunev, Wilson and Zurbruegg, 2000). However, no direct estimate of the trade-off between real estate and stock investment in the investor's overall portfolio has been attempted, nor have tests of portfolio choice *controlled* for it. This is all the more important considering the size of the investor's overall wealth that is tied up in real estate.

In this paper we improve the analysis in all the aforementioned dimensions. That is, we use individual portfolio information to quantify the extent to which investors hedge. We design and implement tests based on the direct observation of the risk profile of the investor's financial portfolio. We exploit information on demographic and employment characteristics of the investors as well as information on their level and sources of wealth to study the heterogeneity in investor behavior. We use, for the first time, a panel of where the same investors are traced over time, in terms of both portfolio choices and income, wealth, demographic and occupational characteristics. Finally, we will properly account for real estate.

3 Testable hypotheses

We now consider the testable restrictions we will focus on. All the restrictions are defined at the individual investor level. However, in order to keep the notation simple, we will always omit the subscript that refers to the individual investor. Standard portfolio theory in the presence of non-financial income risk delivers two sets of testable implications: one in terms of market participation and the other in terms of portfolio choice.

H1: Stock market participation hypothesis.

H1.A: The correlation hypothesis of stock market participation.

Stock market participation is larger for investors displaying a more negative correlation between non-financial income and the market portfolio.

H1.B: The variance hypothesis of stock market participation.

If the correlation between non-financial income and the market portfolio is positive, stock market participation decreases with the variance of non-financial income.

If the correlation between non-financial income and the market portfolio is negative, stock market participation increases with the variance of non-financial income.

These hypotheses require the analysis of both the correlation and the variance effect. Let us consider the following reduced form:

$$P = \beta_1 Var_y + \gamma_1 Corr_{y,m} + \boldsymbol{\delta}_1 \mathbf{F}_1, \tag{1}$$

where P is the probability of stock market participation of the investor, Var_y is the riskiness of his non-financial income (i.e., labor and entrepreneurial income) and $Corr_{y,m}$ is the correlation between his non-financial income and the market portfolio. The vector F_1 stacks all the other control variables.[4]

Given that different variables are included as controls in the different restrictions, we will use a different subscript to define the vector of controls in each of them. Note that at this stage we adopt the standard approach in the literature of considering the return on the market portfolio as a proxy for investor's potential financial income. In the next section we will directly focus on the actual financial portfolio of the investor. The reason we use the market portfolio at this stage is due to the fact that the estimation of equation 1 will require us to define the set of risky financial assets for both the households who participate in the stock market and the ones who do not. For the latter, the actual holdings of risky financial assets are not defined. Therefore, the market portfolio represents a parsimonious proxy of the investment opportunity available in the financial market.

If market participation is motivated by hedging, it should be directly related to the benefits that accrue from hedging. Hedging allows investors to reach the highest expected return compatible with their overall (i.e., financial and non-financial) risk. The more the market and the non-financial income of the investor are negatively related, the more accessing the stock market allows the investor to reduce his overall risk. Therefore, investors who are more likely to participate are those with a more negative correlation between their non-financial income and overall stock market. This implies that $\gamma_1 < 0$ (Calvet, Gonzalez-Eiras and Sodini, 2002).

Theory does not provide us with a clear guidance about the sign of β_1. In general, the literature assumes that $\beta_1 < 0$ (Kimball, 1993, Koo, 1995, Guiso, Jappelli and Terlizzese, 1996, Gollier and Pratt, 1996, Pratt and Zeckhauser, 1997, Elmendorf and Kimball, 1999, Heaton and Lucas, 2000a, Vissing-Jørgensen, 2002a). This intuition rests on a positive or very low correlation between non-financial and financial income. If, however, we assume such correlation to be negative and non-financial risk to be spannable by financial assets, stock market participation should be positively affected by the non-financial risk of the portfolio. Indeed, the more uncertain the non-financial part of an investor's portfolio is, *all else equal*, the more likely he is to enter the market. This implies that $\beta_1 > 0$. In order to test this hypothesis we will consider both the general case, and the case where we control for the sign of the correlation between market portfolio and investor's non-financial income.

At the level of portfolio choice, the analysis is more complex. Indeed, in a single-asset

[4]For example, variables meant to capture the myopic hedging portfolio in the case of i.i.d. returns or, in general, the mean variance portfolio and the other determinants of portfolio choice not related to hedging non-financial income risk (Merton 1971).

framework, there is a unequivocal relationship between portfolio choice and both the variance of non-financial income and the correlation of financial and non-financial income (Merton, 1971, Viceira, 2001). However, this relationship becomes ambiguous in a multi-asset framework. We therefore depart from the standard literature and we build a set of restrictions that directly relate hedging to the *actual* portfolio composition. These restrictions are based on the multi-asset portfolio choice literature. A detailed derivation of these restrictions is reported in the Appendix. We will provide here the restrictions and the main intuition behind them.

H2: Portfolio choice hypothesis: the risk profile of the financial portfolio.

H2.A: The risk profile of the financial portfolio should be tilted towards assets with a negative correlation with the non-financial income of the investor and away from assets with a positive correlation.

H2.B: The tilt in the risk profile of the financial portfolio should be positively related to the variance of the non-financial income and to the covariance between the different sources of non-financial income.

Let us consider the two restrictions separately. Restriction H2.A is the standard one that underpins the concept of "covariance effect" we mentioned before. We start with this so as to relate to the existing literature. The intuition is the following. Holding financial assets would allow the investor to hedge only if such assets are negatively related to his non-financial risk.[5] Ideally, if the investor wants to hedge and his non-financial risk is spannable by financial assets, he will choose stocks that are negatively related to his non-financial risk. This will induce a negative correlation between the investor's financial and non-financial income.

However, a possible criticism of quantifying hedging on the basis of the actual correlation between financial and non-financial income is that this measure may be affected by the preexisting correlation between stocks and investor's non-financial income. For example, it is possible that, on average, the investor's income is negatively related to the stocks available on the market. In this case, a negative correlation between the non-financial income of the investor and his portfolio would not be evidence of deliberate hedging if such a correlation *is less negative than that between the investor's non-financial income and the market portfolio.* Indeed, in the case the investor would actually be increasing the exposure to his non-financial risk by deliberately holding stocks more related to his non-financial income.

We therefore need a measure that proxies for hedging or the extent to which investors actively pursue a negative correlation between financial and non-financial income that differs from the one embedded in the correlation between investors' non-financial income and the

[5] We are considering hedging and not mere portfolio diversification. This is achievable by increasing the number of assets to invest in.

market. We will call this measure "index of hedging". It quantifies the extent to which the investor's portfolio differs from the market portfolio in terms of correlation (covariance) with his non-financial risk. In the following we will consider indexes of hedging built using differences in correlations and indexes of hedging built using differences in covariances. Let us define $Corr_{y,p}$ ($Cov_{y,p}$) as the correlation (covariance) between investor's non-financial income and his financial portfolio and $Corr_{y,m}$ ($Cov_{y,m}$) as the correlation (covariance) between investor's non-financial income and the market portfolio. We consider two alternative indexes of hedging:

$$\Gamma = Corr_{y,m} - Corr_{y,p} \text{ and } \Delta = Cov_{y,m} - Cov_{y,p}. \tag{2}$$

These measures track, at the investor level, the difference between two correlations (covariances). The first is the correlation (covariance) between his non-financial income and the overall *market* ($Corr_{y,m}$ or $Cov_{y,m}$). The second is the correlation (covariance) between his non-financial income and *his* financial portfolio ($Corr_{y,p}$ or $Cov_{y,p}$). The correlation (covariance) between the investor's non-financial income and the market portfolio represents the extent to which a strategy based on holding the market portfolio would help the investor to diversify away his non-financial risk. It is a benchmark that can be used to assess the strategy of the investor. Γ (Δ) proxies for the change in correlation (covariance) induced by the investor's portfolio choice and quantifies the extent to which he deviates from a strategy. It is positive in the case of hedging and captures the contribution of the portfolio choice to the reduction of the investor's overall risk. That is, restriction H2.A. requires: $\Gamma > 0$ ($\Delta > 0$).

Therefore, hypothesis H2.A can be recast in terms of either the correlation between financial and non-financial income or the covariance between financial and non-financial income. The advantage of using the correlation is that it is measure-free, that is, it is a standardized variable that is not affected by the size of the investment. This is particularly handy if we want to assess the impact of hedging on portfolio choices over times and across investors (i.e., restriction H3). On the other hand, the standard intertemporal portfolio model with multiple assets provides sharper restrictions when they are cast in terms of covariances (i.e., restriction H2.B). In the Appendix, we will provide a more elaborate discussion of this point. We will construct indexes of hedging for both sources of non-financial risk: labor and entrepreneurial risk.[6]

Let's now consider the restriction H2.B. If we assume that the investor has two sources of non-financial income (Y_z and Y_x, or labor and entrepreneurial income), and a level of wealth

[6]The first index is the difference between the correlation (covariance) of the investor's labor income and the market and the correlation (covariance) of his labor income and his financial portfolio. The second one is the difference between the correlation (covariance) of the investor's entrepreneurial income and the market and the correlation (covariance) of his entrepreneurial income and his financial portfolio.

W, this restriction can be expressed as:

$$\Delta_z^* = Y_z Var_{Y_z} + Y_x Cov_{Y_z,Y_x} + \Theta_z \tag{3}$$

where $\Theta_z = -(Y_z + Y_x)\sum_{j=1}^{n} \Omega_{S_j} * Cov_{S_j,Y_z}$ and $\Omega_{S_j} = \frac{(\mu_{s_j} - r)'}{(1-\gamma)\sigma_{s_j}^2}$. S_j, μ_{s_j} and $\sigma_{s_j}^2$ are, respectively, the price, the mean and the variance of the *jth* risky asset. Also, we have that $\Delta_z^* = \Delta_z * W$. In the Appendix we report a detailed derivation of equation 3. The intuition is the following. The investor will actively hedge more (i.e., will increase Δ_z or actively tilt his portfolio towards assets negatively correlated to his non-financial income), the higher the risk of the non-financial income (Var_{Y_z}) and the higher the covariance between his non-financial sources of income (Cov_{Y_z,Y_x}). Indeed, if the other non-financial sources of income are negatively related one another, they should already provide a hedge. This should reduce the demand of financial hedging.

Hedging is also related to the assets' mean/variance ratios. An asset that is positively correlated to the non-financial income of the investor (Cov_{S_j,Y_z}), but has a high expected mean/variance ratio ($\Omega_{S_j} = \frac{Mean/Variance\ Ratio}{(1-\gamma)}$), will reduce hedging. Indeed, in this case hedging would be expensive as it requires to forego the gains implied by the high mean/variance ratio. We can therefore recast the testable restriction H.2.A. as:

$$\Delta_z^* = \beta_2 Y_z Var_{Y_z} + \gamma_2 Y_z Cov_{Y_z,Y_x} + \zeta_2 \Theta_z + \boldsymbol{\delta_2} \mathbf{F}_2, \tag{4}$$

where $\mathbf{F}_2$ is a vector of control variables. Hedging requires that $\beta_2 > 0$, $\gamma_2 > 0$ and $\zeta_2 > 0$.

The alternative hypothesis - the case where the investor deliberately chooses stocks that are correlated with his non-financial income - implies that the investor buys more of the stocks that are "closer" to him - i.e., covary with his non-financial sources of income. For lack of a better definition, we will call this behavior - opposite to hedging - "familiarity-based investment". We do not take a stance on the reason for this behavior. It may be due either to better information on the particular stock (Merton, 1987, Hau, 2001, Shapiro, 2002) or to some behavioral heuristics (Coval and Moskowitz, 1999, 2001, Huberman, 2001). A recent paper (DeMarzo, Kaniel and Kremers, 2002) provides a first modelization that rationally explains investors' bent for familiarity. We will consider familiarity as the alternative hypothesis.

H3: Portfolio choice hypothesis: the investment in risky assets.

If investors increase their holdings of risky assets in order to hedge, we expect the amount invested in the risky assets to be negatively related to the correlation between investor's financial and non-financial income.

A standard theoretical portfolio choice model based on one single risky asset, where non-financial risk is spannable, posits, *all else equal*, a negative correlation between the investor's

holding of the financial asset and the correlation between such an asset and his non-financial income (Merton, 1971, Viceira, 2000). If there are multiple risky assets, however, the story is more complicated. Indeed, the investor may hedge by increasing his holdings of the assets that are negatively related to his non-financial income, as well as by reducing his holdings of the assets that are positively related to his non-financial income. Therefore, the decision to hedge may actually involve either an increase in assets (that are negatively correlated with non-financial income) or a reduction in assets (that are positively correlated with non-financial income).

Another way of seeing this is that, if the amount invested in the risky assets is *negatively* related to the correlation between investor's financial and non-financial income, investors *buy risky assets to hedge* and sell them to carry out familiarity-based investments. This implies that a high investment in stocks can be considered evidence of the fact that investors increase their holdings to hedge if it is related to a negative correlation between the non-financial and financial components of the investor's overall portfolio. If, on the contrary, the amount of investment in the risky assets is *positively* related to the correlation between investor's financial and non-financial income, investors buy risky assets to carry out familiarity-based investment (and sell them to hedge).

There is also a restriction that relates portfolio choice to the size of the non-financial risk. If the investor uses the financial market to hedge his non-financial risk, the higher his non-financial risk is - i.e., the variance of the non-financial income - the more financial assets he should hold. As it was the case for stock market participation, this restriction holds only if the correlation between the portfolio of the investor and his non-financial income is negative.

To define the empirical analogue of restriction H3, we use the simplified reduced-form, for each investor:

$$h = \beta_3 Var_y + \gamma_3 Corr_{y,p} + \boldsymbol{\delta}_3 \mathbf{F}_3, \tag{5}$$

where h is the aggregate investment in risky assets of the investor and $Corr_{y,p}$ is the correlation between the financial portfolio of the investor and his non-financial income. As in the previous specification, the vector $\mathbf{F}_3$ stacks all the other control variables. If investors *buy to hedge*, we expect that $\gamma_3 < 0$. The sign of β_3, instead, should be positive if $Corr_{y,p} < 0$, and negative otherwise.

Restriction 5 suffers from the same criticism we talked before. That is, there may a mechanical correlation between non-financial income and the risky financial assets. Therefore, a stronger test of H3 would be:

$$h = \beta_3 Var_y + \gamma_3 \Gamma + \boldsymbol{\delta}_3 \mathbf{F}_3, \tag{6}$$

where Γ is the index of hedging as defined before. If investors buy to hedge, we expect $\gamma_3 > 0$.

It is worth noting that these restrictions are even stronger in the (realistic) case of lack of diversification. In Sweden the average investor holds 3 stocks. The high-wealth investors hold on average 5 stocks, while the low-wealth investors only 2.

4 Data description

We use data from different sources. For each investor, we have detailed information on his individual holdings of stocks (broken down at the stock level), mutual funds, bank accounts, real estate and other types of wealth. We also have available information on the different sources of income of the investor provided by the fiscal authorities, as well as his demographic and family characteristics. This information has been matched *at the individual level,* so as to construct a time series of investment and income for each investor. For each stock, we have detailed information on the company and the price, volume and volatility at which it trades. We also use aggregated data on Swedish macro-economic conditions and on the indexes of the real estate market. Let us look at the sources in more detail.

4.1 Individual stockholding

We use the data on individual shareholders collected by Värdepappererscentralen (VPC), the Security Register Center. The data contain both stockholding held directly and on the street name, including holdings of US-listed ADRs. In addition, SIS Ägarservice AB collects information on ultimate owners of shares held via trusts, foreign holding companies and the like (for details see Sundin and Sundquist, 2002).

Our data cover the period 1995-2000. Overall, the records provide information about the owners of 98% of the market capitalization of publicly traded Swedish companies.[7] The data provided by SIS Ägarservice AB were linked by Statistics Sweden with the LINDA dataset described below.

4.2 LINDA

LINDA (Longitudinal INdividual DAtaset for Sweden) is a register-based longitudinal data set and is a joint endeavor between the Department of Economics at Uppsala University, The National Social Insurance Board (RFV), Statistics Sweden, and the Ministries of Finance and Labor. It consists of a large panel of individuals and their household members, which is representative of the population during 1960 to 2000. For each year, information on all family members of the sampled individuals are added to the dataset. Apart from being a panel which is representative of the population in general, the sampling procedure ensures that the data are representative for each year. Moreover, *the same family* is traced over time.

[7] For the median company, we have information about 97.9% of the equity, and in the worst case we have information on 81.6% of market capitalization of the company.

This provides a real time series dimension, in general missing in surveys based on different cohorts polled over time.

The variables available include individual background variables (sex, age, marital status, country of birth, citizenship, year of immigration, place of residence detailed at the parish level, education, profession, employment status), housing information (type and size of housing, owner, rental and occupation status, one-family or several-family dwelling, year of construction, housing taxation value) and tax and wealth information. In particular, the income and wealth tax registers include information on labor income, capital gains and losses, business income and losses, pension contributions, taxes paid and taxable wealth. A detailed description of the dataset is provided by Edin and Fredriksson, (2000) and is available on the web site http://linda.nek.uu.se/.

The tax part deserves more detailed discussion. In Sweden, in addition to usual income taxation, there exists an additional wealth tax which is paid by every investor with net worth in excess of 900,000 SEK (about US$90,000). The taxable wealth includes tax-accessed value of real estate, market value of publicly listed securities, balance of bank accounts and fair value of valuable possessions (including jewelry, cars, antiques, etc.). For the purpose of this paper, we compute the current market value of housing using the tax-accessed value provided by LINDA. We evaluate it at current prices by using the average ratio of market value to tax-accessed value that is provided for each year and county by the Statistics Sweden.[8] For the privately held unlimited liability companies the value of the assets is included in the household's tax return. There is no estimate of market value of privately held limited liability companies that are not listed. However, the data contains an indicator variable for owners of privately held companies. The size of the group is rather small (1.74%-1.91% of the sample depending on a year) and is unlikely to affect our estimates in a significant way. Moreover, for the members of the wealthiest 5,000 families, we have been able to reconstruct their values and to correctly impute it by using information from SIS Ägarservice AB (Sundin and Sundquist, 2002).

The combined LINDA/Shareholding dataset covers the period 1995-2000. The overall sample contains 1,807,602 observations. However, only 1,757,406 observations were used[9]. In addition, we also use 1990-1994 data from LINDA in the implementation of the Carrol and Samwick (1996) procedure to construct the moments of conditional non-financial income. In Table 1 we report some descriptive statistics. In particular, Panel A contains the general demographic characteristics (number of households, members in household, adults in house-

[8] It may lack precision for summer houses if they are located in a county different from the one in which the household is residing, as no information about the location of summer houses is provided.

[9] We exluded the observations for households that were in the sample for less than three years and households with oldest member being younger than 18 years old. Also, it is worth noting that we define as shareholder anyone who has more than 2,000 SEK worth of stock (that is 200 $). This is the definition used by Statistics Sweden.

hold, age of the oldest member of household, percentage of the sample with secondary and higher education). Panels B and C report, respectively, the age and gender distribution of the sample and their wealth and income characteristics, defined in terms of wealth, real estate, labor and entrepreneurial income.

4.3 Firm-level information and other data

In order to derive information on individual security returns (including dividends) and to track the overall market index (SIX Index), we use the SIX Trust Database. For information on the various firm-level characteristics, we use the Market Manager Partners Databases. These two databases are the equivalent of, respectively, CRSP and COMPUSTAT for the US. In addition, Market Manager Partners Databases contain information at the plant level, including the location of the plant (detailed at the level of municipality).

We use the set of Swedish residential real estate indices provided by P. Englund. The indices were computed at the county level and are based on resale value of the properties.[10] The consumer confidence index is provided by Statistics Sweden. Geographical coordinates are supplied by Swedish Postal Service and contain latitude and longitude of Swedish Postal Offices (on 3-digit level).

5 Construction of variables

5.1 Income-related variables

Following the standard approach, we specify investors' portfolio policies in terms of their permanent income, that is the conditional moments the long-term income, as in Heaton and Lucas (2000b). As an additional robustness check, we also replicate our results by using the actual income. Given that the results are consistent, we will report only those based on permanent income. The other results are available upon request.

In order to construct proxies for permanent non-financial income, its variance and its correlation to financial and real estate income, we use the approach of Carrol and Samwick (1997) and Vissing-Jørgensen (2002a). We consider as non-financial income: labor income and entrepreneurial income. In particular, we define the conditional moments of the long-term investor's non-financial income:

$$E(Y_t|Y_{t-1}, X_{t-1}) \text{ and } Var(Y_t|Y_{t-1}, X_{t-1}), \tag{7}$$

where Y_t is the non-financial income of investor i at time t and X_{t-1} are the variables that can be used to predict income next period. We assume that non-financial income follows:

$$\ln Y_t = p_t + \varepsilon_t, \tag{8}$$

[10] The methodology of construction of the indices is described in Englund, Quigley and Redfearn (1998).

$$\begin{aligned} \text{where, } p_t &= g_t + p_{t-1} + \eta_t,\ \varepsilon_t \sim N(0, \sigma_\varepsilon^2),\ \eta_t \sim N(0, \sigma_\eta^2), \\ \text{and } \operatorname{cov}(\varepsilon_t,\ \varepsilon_s) &= 0,\ \operatorname{cov}(\eta_t,\ \eta_s) = 0,\ \text{for each } t \neq s \text{ and } \operatorname{cov}(\varepsilon_t,\ \eta_s) = 0 \text{ for each } t, s. \end{aligned}$$

The variable p_t represents the permanent income component of non-financial income. It has a drift term (g_t) that is known and based on the information available at *t-1*. This allows us to write:

$$\ln Y_t - \ln Y_{t-1} = p_t - p_{t-1} + \varepsilon_t - \varepsilon_{t-1} = g_t + \varepsilon_t - \varepsilon_{t-1} + \eta_t \tag{9}$$

$$\text{or } \ln Y_t = \ln Y_{t-1} + g_t + \varepsilon_t - \varepsilon_{t-1} + \eta_t. \tag{10}$$

This implies:

$$\begin{cases} E(Y_t|Y_{t-1}, X_{t-1}) = Y_{t-1} G_t \exp\{0.5 J_t\} \\ Var(Y_t|Y_{t-1}, X_{t-1}) = J_t = (Y_{t-1} G_t)^2 \exp(J_t)\{\exp(J_t) - 1\}, \end{cases} \tag{11}$$

where $G_t = \exp(g_t)$, $J_t = \sigma_\eta^2 + 2\sigma_\varepsilon^2$ and X_{t-1} is the set of variables usable to predict g_t.

In order to estimate $E(Y_t|Y_{t-1}, X_{t-1})$ and $Var(Y_t|Y_{t-1}, X_{t-1})$, we use income data for the period 1990-2000, with a 5-year rolling window, based on the previous 5 years of data. Following Carrol and Samwick (1997) and Vissing-Jørgensen (2002a) methodology, we regress $\ln Y_t - \ln Y_{t-1}$ on the set of explanatory variables X_{t-1} and use the predicted values of such a regression as an estimate of g_t and the residuals as an estimate of $\eta_t + \varepsilon_t - \varepsilon_{t-1}$.[11] We then use the sample variance to construct $\sigma_\eta^2 + 2\sigma_\varepsilon^2$. To control for measurement and estimation errors, we use instrumental variables. $E(Y_t|Y_{t-1}, X_{t-1})$ and $Var(Y_t|Y_{t-1}, X_{t-1})$ are our measures of income and variance of income (i.e., Y and Var_y). We also construct a measure of the conditional correlation between shocks to log non-financial income ($\eta_t + \varepsilon_t - \varepsilon_{t-1}$) and the log gross stock returns (i.e., $ln(1+R_t)$). Following Vissing-Jørgensen (2002a), given the potential inaccuracy of estimates based on few observations, we calculate the correlation over the entire sample. We consider two financial returns (R_t), the return on the market portfolio (R_{mt}) and the return on the portfolio of the investor ($R_{port,t}$). We analogously construct the covariances. These correlations and covariances correspond to the $Corr_{y,m}$, $Corr_{y,p}$, $Cov_{y,m}$ and $Cov_{y,p}$ we have defined before and that we will use in the estimations. Descriptive statistics of it, are plotted using frequency diagrams of different correlation coefficients in Figures 1 and 2.

5.2 Indexes of familiarity and control variables

Indexes of familiarity

We need a measure that captures the extent to which an investor tilts his portfolio toward assets with which he is more familiar. We will call this "index of familiarity". We consider

[11] The set of variables contained in X_{t-1} are: demographic variables (secondary education, higher education, age, age squared, marriage status, size of the household, number of adults belonging to the household), changes in the demographic variables, industry dummies for the company the investor is working for (e.g., oil industry), dummies for the type of profession of the investor (e.g., doctor), immigration status.

three indexes of familiarity. The first is related to "professional proximity". It is a dummy taking the value 1 if the investor's profession is in the same area of activity as the company whose stock is under consideration, and zero otherwise. We use the one-digit SNI92 codes (similar to SIC codes) to identify the areas of activities. For example, in the case of an investor working in the mining sector holding a stock of a mining company, the dummy would be equal to 1.

The second measure is related to "geographical proximity", that is the proximity between the residence of the investor and the place where the company is located. In particular, we use two different measures: the first one is the logarithm of the inverse of the distance between the ZIP code of the investor and the ZIP code of the closest branch/subsidiary of the company whose stock we consider. As an alternative measure, we use the logarithm of the inverse of the distance between the ZIP code of the investor and the ZIP code of the company headquarter. Given that the results do not differ and the variables are highly collinear, we report only the first specification. These measures are analogous to the one put forward by Coval and Moskowitz (1999, 2001) in the study of geographical preferences in mutual fund investment. The greater the value of the variable, the closer is the investor to the stock.

Finally, we may argue that investors are more likely to be informed about stocks they already own than about stocks that are not yet part of their portfolio. Indeed, once the stock is in the portfolio, investors follow it more closely, reading the reports, paying attention to the earning announcements and actively purchasing information about it. In other words, stockholding may proxy for selective attention and active purchase of (private) information. We therefore construct a variable that proxies for "holding period", based on the time a stock entered the investor's portfolio.

These measures are constructed at the stock level. They are then aggregated across all the stocks of the investor, and weighted by their share in the portfolio. This procedure delivers three measures of familiarity for each investor and time t.

Control variables

We consider six types of control variables: measures of income and wealth, borrowing constraints, demographic variables, professional ability and risk, momentum/stock performance variables and regional and macroeconomic variables.

The *measures of income and wealth* contain the vector of the wealth of the each investor at time t, broken down into its individual components (i.e., financial, real estate and other), as well as measures of income (i.e., labor and entrepreneurial) and overall (i.e., financial and non-financial) capital gains and losses of the each investor at t. We also include the correlation between non-financial income (both labor income and entrepreneurial income) and real estate.

We consider two types of *borrowing constraints*. The first one is the ratio of investor debt

to total income, and the second is the ratio of investor debt to total wealth. Both of them are constructed at the investor level at time t.

The *demographic variables* include: the profession of the investor, his level of education, broken down into high-school and university level, the age of the oldest member of the family of the investor and its value squared. This latter variable is consistent with standard results (Guiso and Jappelli, 2002, Vissing-Jørgensen, 2002a) which find a non-linear relationship between age and the degree of stock market participation.

We also construct variables to account for the *professional ability and risk* of the investor. A first variable proxies for the ability of the investor in his occupation. This is based on the difference between his income and the average income of his profession. The assumption is that the higher the income of the investor relative to the average income of the other investors in the same area, the higher his ability should be. A second variable is a measure of *unemployment risk* that proxies for the probability of being unemployed in the following year. It is the one-year-ahead forecast of a linear probability model where the unemployment status (i.e., 1 if unemployed and zero otherwise) is regressed on demographic variables, measures of income and wealth and regional, geographical and professional dummies.

The *momentum/stock performance variables* are meant to capture the shift in investor's portfolio due to stock market changes or to stock-tracking, momentum or performance-chasing activity of the investor. They are the return and volatility on the market portfolio in the previous twelve months, as well as the returns and volatility on the investor's portfolio in the same period.

The *regional and macroeconomic variables* include an Index of Consumer Confidence and a set of dummies that account for the regional location of the investor as well as the industry in which he works. We consider 8 geographical areas and 10 industries.[12] We also include a Stockholm dummy and a dummy that controls for the immigration status. The Stockholm dummy takes the value of 1 if the investor lives in the capital and 0 otherwise. The immigration status is a dummy that takes the value 0 if all the members of the household are native Swedes, and 1 if at least one member of household immigrated.[13]

6 Econometric issues

We now move on to the econometric issues. We assume that the investment decision takes place in two steps: first, the investor decides whether to enter the stock market (stocks,

[12] Geographical area definitions are based on the *NUTS2* classification for Sweden. An additional dummy for public sector workers is added to the industrial classification of households.

[13] We also tried two alternative specifications. In the first one, we used the sum of the immigration statuses of the members of the household. That is, if two members of the household are immigrants, the variable takes value 2. In a second specification, we used the inverse of the number of years since the oldest immigrant in the household arrived in Sweden. These two alternative specifications deliver results that are qualitatively analogous to those reported. These results are available upon request from the authors.

mutual funds)[14], and then he selects which asset to buy.

Restriction H1

The decision to enter the market can be described as:

$$P_t^* = \alpha_1 + \boldsymbol{\beta}_1 \mathbf{Var}_{\mathbf{Y},t} + \boldsymbol{\gamma}_1 \mathbf{Corr}_{\mathbf{Y},m,t} + \boldsymbol{\delta}_1 \mathbf{F}_{1,t} + \varepsilon_{1,t}, \tag{12}$$

where P_t^* is a latent unobservable variable, $\mathbf{Var}_{\mathbf{Y},t}$ and $\mathbf{Corr}_{\mathbf{Y},m,t}$ represent the hedging variables. They stack the variance of the sources of non-financial income of the investor and their correlations with the market portfolio. $\mathbf{F}_{1,t}$ is the vector of control variables as defined before. Equation 12 is the empirical analogue of restriction 1. We cannot observe P_t^* directly, but we can observe a dummy (P_t) that takes the value of 1 if the investor participates in the financial market and zero otherwise. That is,

$$P_t = 1 \text{ if } P_t^* > 0 \text{ and } P_t = 0 \text{ if } P_t^* \leq 0. \tag{13}$$

We therefore rewrite equation 12 as:

$$P_t = \alpha_1 + \boldsymbol{\beta}_1 \mathbf{Var}_{\mathbf{Y},t} + \boldsymbol{\gamma}_1 \mathbf{Corr}_{\mathbf{Y},m,t} + \boldsymbol{\delta}_1 \mathbf{F}_{1,t} + \varepsilon_{1,t}, \tag{14}$$

where P_t is the observed probability of market participation (i.e., $P_t = 1$ if $P_t^* > 0$). Equation 14 is the selection equation. The probability that the investor enters the financial market is modeled as a normal c.d.f. In order to estimate this probability, we need to consider a bigger dataset based on the whole sample universe: i.e., both the households that hold financial assets and those that do not.

Restrictions H2 and H3

Let us assume that there are two sources of non-financial income (e.g., x and z) so that $\mathbf{Y}_t = [Y_{x,t} Y_{z,t}]'$. The restrictions related to the portfolio decision, *conditional on market participation,* can be represented as:

$$\Delta_{z,t}^* = \alpha_2 + \beta_2 Y_{z,t} Var_{Y_z,t} + \gamma_2 Y_{x,t} Cov_{Y_z,Y_x,t} + \zeta_2 \Theta_{z,t} + \boldsymbol{\delta}_2 \mathbf{F}_{2,t} + \varepsilon_{2,t}, \tag{15}$$

for restriction 4 and,

$$h_t = \alpha_3 + \boldsymbol{\beta}_3 \mathbf{Var}_{\mathbf{Y},\mathbf{t}} + \boldsymbol{\gamma}_3 \boldsymbol{\Gamma}_t + \boldsymbol{\delta}_3 \mathbf{F}_{3,t} + \varepsilon_{3,t}, \tag{16}$$

for restriction 6[15], where h_t is the investment in risky financial assets of the investor and $\mathbf{F}_{2,t}$ and $\mathbf{F}_{3,t}$ are vectors of control variables. In order to have the identification restrictions

[14] We will in general refer to stocks and mutual funds, however, we also include among the risky assets warrants, convertible and risk bonds in general. These, however, represent a very tiny fraction of the actual holdings.

[15] For simplicity we discuss only restriction 6. The specification of restriction 5 is analogous.

required by the Heckman model, we consider control variables in the first stage that do not appear in the second stage.[16] We assume the following error correlation structure:

$$\begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{pmatrix} \sim N \begin{pmatrix} 0, & \sigma_1^2 & \sigma_{12} \\ 0, & \sigma_{12} & \sigma_2^2 \end{pmatrix} \text{ and } \begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{3,t} \end{pmatrix} \sim N \begin{pmatrix} 0, & \sigma_1^2 & \sigma_{13} \\ 0, & \sigma_{13} & \sigma_3^2 \end{pmatrix}, \tag{17}$$

respectively for specifications 15 and 16.

Notice that in equations 15 and 16, the dependent variables (i.e., $\Delta^*_{z,t}$ and h_t) are observable *only conditional on the investor having entered the stock market.* The fact that we do not observe the portfolio choice of the investors who do not participate in the financial market and that such a participation is endogenous, make the standard OLS estimates of equations 15 and 16 biased (Maddala, 1983, Nijman and Verbeek, 1996). This induces a strong selection bias we have to account for in the second stage of the estimation.

To address this issue, we use Heckman's (1979) two-stage procedure. In the first stage, we estimate stock market participation. In the second stage, we include a variable that accounts for the possibility of selection bias at the first stage. This variable is defined as $\lambda_{i,t}$ ("Heckman's lambda") and controls for the problem of omission of variables due to self-selection. We therefore alternatively estimate:for restriction 4 and,

$$\Delta^*_{z,t} = \alpha_2 + \beta_2 Y_{z,t} Var_{Y_z,t} + \gamma_2 Y_{x,t} Cov_{Y_z,Y_x,t} + \zeta_2 \Theta_{z,t} + \boldsymbol{\delta}_2 \mathbf{F}_{2,t} + \theta_2 \lambda_t + \varepsilon_{2,t} \tag{18}$$

for restriction 4 and

$$h_t = \alpha_3 + \boldsymbol{\beta}_3 \mathbf{Var_{Y,t}} + \boldsymbol{\gamma}_3 \boldsymbol{\Gamma}_t + \boldsymbol{\delta}_3 \mathbf{F}_{3,t} + \theta_3 \lambda_t + \mu_3 h_{t-1} + \varepsilon_{3,t}. \tag{19}$$

for restriction 6. The significance of the estimates of θ_s provides a test of the null of no sample selection bias. We will see that in all the specifications, a high degree of significance of θ_s suggests that self-selection is indeed important in the sample. A second modification is the addition of the lagged dependent variable in equation 19. This is done to account for possible feedback effects[17] from past values of the dependent variable.

Given that most of the hedging variables, as well as the parameter $\lambda_{i,t}$, have been generated on the basis of a previous estimation, we need to properly account for the problem of "generated regressors". This problem is exacerbated by the existence of the lagged dependent variable. One way of dealing with it is to use an instrumental variable estimation. The endogeneity issue further complicates the task of finding proper instrumental variables, as only strictly exogenous variables or predetermined ones can be used in the case in which the variables are predetermined. We therefore follow the econometric standard literature (Arellano,

[16] These variables include the set of time and industry dummies as well as the correlations between the market portfolio and investors' sources of non-financial income (i.e., labor income, entrepreneurial income and real estate).

[17] At the aggregate level, market participation, as well as portfolio choice, are a function of asset returns. Asset returns are themselves a function of market demand. Given that we are effectively considering the demand of all the investors in the economy, we expect it to affect stock returns and therefore future demand.

1989, and Kiviet, 1995) and the previous applications to finance (Vissing-Jørgensen, 2002a) and use as instruments a combination of strictly exogenous variables (i.e., demographic variables, industry and time dummies) and the lagged values of the other variables. Specifications 18 and 19 are estimated by using two-stage least squares with consistent variance-covariance matrix.

One potential problem is represented by the proxies for hedging (i.e., $\mathbf{Corr}_{\mathbf{Y},p,t}$ and $\mathbf{\Gamma}_t$) in the specification 19. These are affected by the investor's choice and are therefore endogenous. To address this issue we pursue a two-pronged approach. First, we use an instrumental variable methodology that allows us to control for the potential endogeneity of the variable. Second, we modify the estimation of the second stage of the Heckman's procedure and perform a robustness check based on a the estimation of a system of simultaneous equations. That is, we re-estimate equations 18 and 19 as part of a two-equation system where the proxies for hedging are the dependent variables, jointly with h_t. The results[18] do not differ from the ones derived from the instrumental variable estimation described before.

We perform the analysis at both the individual investor level and the household level. The results based on individual investors do not differ from those based on households, so we will report only the latter. In the following analysis, we consider three different samples: the overall and two sub-samples constructed on the basis of investors' wealth. In particular, we define as high-wealth investors those investors who, in the previous year, paid the wealth tax. We define as low-wealth investors all the others. The high-wealth investors represent approximately 8% of the overall sample.

7 Evidence of Hedging

In order to study the evidence of hedging we proceed as follows. First, we consider the determinants of stock market participation and then we analyze portfolio choice.

7.1 H1: Stock-market participation

We test the relationship between hedging and stock market participation (H1). We recall that the equation that models market participation is:

$$P_t = \alpha_1 + \boldsymbol{\beta}_1 \mathbf{Var}_{\mathbf{Y},t} + \boldsymbol{\gamma}_1 \mathbf{Corr}_{\mathbf{Y},m,t} + \boldsymbol{\delta}_1 \mathbf{F}_{1,t} + \varepsilon_{1,t}. \tag{20}$$

Hedging requires that $\boldsymbol{\gamma}_1 < \mathbf{0}$ and that $\boldsymbol{\beta}_1 > \mathbf{0}$ if $\mathbf{Corr}_{\mathbf{Y},m,t} < \mathbf{0}$ and $\boldsymbol{\beta}_1 < \mathbf{0}$ otherwise. We consider two specifications: in the first $\mathbf{Var}_{\mathbf{Y},t}$ is the variance of the non-financial sources of income. This specification is provided to relate our results to the standard literature (Heaton and Lucas, 2000b and Vissing-Jørgensen, 2002a). In the second specification, we consider

[18] Not reported but available from the authors upon request.

a measure of "adjusted variance", where $\mathbf{Var}_{\mathbf{Y},t}$ is a variable constructed as the product between the variance of non-financial income and a dummy that takes the value 1 if the $\mathbf{Corr}_{\mathbf{Y},m,t} < \mathbf{0}$ and -1 otherwise. In this second specification, we expect that, in the case of hedging, $\boldsymbol{\beta}_1 > 0$, regardless of the sign of $\mathbf{Corr}_{\mathbf{Y},m,t}$.

The results are reported in Table 2, a specification for the general ("Unadjusted Variance") case and a specification for the case of adjusted variance ("Adjusted Variance"). Let us consider, first, the general case. The first thing to note is that the variance of labor income is always negatively related to stock market participation, regardless of the level of wealth of the investors. This suggests that investors in general do not consider the stock market a good hedge against labor income risk. In fact, investors perceive stock market participation as an additional dimension of risk that adds to their non-financial risk, as opposed to a way of diversifying it away.

This interpretation is confirmed by the analysis of unemployment risk. Unemployment risk reduces market participation for all investors, regardless of their level of wealth. The impact of the variance of entrepreneurial income, on the other hand, differs across investors. While it is not significant for the high-wealth investors, it is negative and strongly significant for the low-wealth investors.

The correlation between labor income and overall stock market is negatively related to stock market participation for either class of investors. In other words, on average, the investors who tend to participate more are those with a negative correlation between their labor income and the stock market. This may be seen as evidence in favor of hedging. Overall, these findings provide some evidence in favor of hedging, however, this evidence is mixed and only a direct investigation of portfolio choice may allow us to get a better insight.

If we now consider the specification with adjusted variance, we see that $\boldsymbol{\beta}_1$ is not significant any longer for the overall sample and for the low-wealth investors, while it stays negative for the high-wealth investors. This result rejects the hypothesis of hedging and confirms the fact that investors, in general, do not consider the stock market a good hedge against non-financial income risk.

Let us now briefly consider the other variables, focusing on the specification with unadjusted variance. The first thing to note is the relationship between market participation and the correlation between non-financial income and real estate. There is conflicting evidence. In the case of hedging, we would expect that a positive correlation between non-financial sources of risk (i.e., labor and entrepreneurial income and real estate), by increasing the overall risk concentration of the investor, would also increase his incentive to diversify away such a risk by investing in the stock market. Indeed, this seems to be the case for entrepreneurial income. The correlation between entrepreneurial income and real estate is always positively related to stock market participation. This points in the direction of hedging.

The correlation between labor income and real estate, however, is always negatively related to stock market participation. This goes against hedging and suggests that investors perceive that market participation increases their overall risk. In this case, investors participate more only if their other sources of wealth (i.e., labor income and real estate) are already well diversified (i.e., negatively related).

Both financial and real estate wealth and the (mean) level of labor and entrepreneurial income increase market participation. This holds, in general, for both high-wealth and low-wealth investors.[19]

Capital gains increase stock market participation for the low-wealth investors, while they do not affect the high-wealth ones. There are two possible explanations for this: borrowing constraints or preferences for different components of wealth. In the case where the investor faces borrowing constraints, capital gains may provide him with the funds needed to invest. Alternatively, high-wealth investors, who tend to invest most of their wealth in real estate, use the capital gains to increase the preferred investment in real estate. As further evidence of this, we find that, if we break the sample down on the basis of the liquidity of the investor's overall portfolio (i.e., the percentage of overall wealth invested in financial assets),[20] capital gains increase stock market participation for investors with liquid assets and reduce it for investors with illiquid assets.

The results on the debt ratios are also interesting. Higher debt-to-total income ratio increases stock market participation. This holds for both classes of investors. The variable that proxies for debt-to-wealth ratio of the investor, however, is negative and significant only for the low-wealth investors. These results can be rationalized if we assume that debt-to-total income proxies for the ability to access credit of the investors - i.e., their creditworthiness. Higher creditworthiness means easier access to funds to be invested in the stock market. The fact that this ratio is significant and positive for both classes of investors would support this interpretation. In contrast, the debt-to-wealth ratio seems to proxy for borrowing constraints. As such, they limit market participation of the low-wealth investors only, while they do not affect the behavior of the high-wealth ones.

The demographic variables are consistent with the results of previous studies (Heaton and Lucas, 2000, Vissing-Jørgensen, 2002a) who found that the level of education increases market participation. This holds for both secondary education and higher education for all the investors, regardless of their level of wealth. Analogous are the results in terms of the professional ability of the investors. The more skilled they are, the more they tend to participate.

[19] The only exception is the lack of significance of labor income in the case of low-wealth investors. This may be explained by borrowing constraints. An increase in income for borrow-constrained investors may induce them to consume more as opposed to investing in the stock market.

[20] These results are available upon request.

Market participation is also directly related to age and the immigration status. Age reduces market participation regardless of the level of wealth of the investors. In other words, investors tend to participate less in the stock market as they get older. Immigration status directly affects market participation. In general, participation is highest for native Swedish people and decreases for immigrants. However, there is heterogeneity across investors. While immigration status matters for low-wealth investors, it does not affect market participation for the high-wealth ones. Indeed, high-wealth investors may overcome problems caused by the lack of knowledge about the new country by hiring expert local advice.[21]

The main conclusion we can draw is that these results, in line with the findings of Davis and Willen (2000a, and 2000b), indicate that heterogeneity plays a major role in defining investors' attitude toward the stock market.

7.2 H2: Portfolio choice: the risk profile of the financial portfolio

Test of Hypothesis H.2.A: The tilt in the risk profile. The test of hypothesis H.2.A. can be seen as a preliminary evidence of investor behavior. It focuses on either the correlation (covariance) between the portfolio of the investor and his non-financial income or the index of hedging.

We start by studying the correlation (covariance) between the portfolio of the investor and his non-financial income. Figures 1 and 2 display the different correlations between investors' real estate, financial portfolio and non-financial income (i.e., labor and entrepreneurial income). They are constructed in the following way. First, we calculate for each investor the correlation of the measure of income as defined in the Section 5.1 with real estate and the returns of the stocks held in the portfolios. Then, we average these correlations across investors. In a similar fashion, we also construct a measure of correlation between investors' non-financial income and the value-weighted Swedish stock market index (SIX Index). There are some interesting points worth noting.

The first thing to note is that there is a high fraction of investors who display a negative correlation between financial and non-financial income. This holds both in the case where the correlation is between non-financial income and the market as well as in the case where the correlation is between non-financial income and investor's portfolio. This also holds for both entrepreneurial income and labor income.

Moreover, the graphs show that the distribution based on the correlation between non-financial and financial income is more skewed to the right. That is, investor portfolios are more positively related to investor income than the market portfolio is. This may be due either to hedging behavior or to spurious correlation.[22] To deal with this issue, we compare

[21] Market participation is also a positive function of the business cycle, as it increases with the degree of consumers' confidence. This always holds, regardless of the wealth and the illiquidity of the investor.

[22] For instance, Sweden underwent a massive restructuring in the public sector in the '90s, at the very time

two correlations: the correlation with the market and the one with the financial portfolios of the investors. A difference between the two correlations may be attributed to a deliberate strategy of the investor.

The second point is a strong bimodal shape of the relationship between non-financial income and portfolio return. This suggests strong heterogeneity across investors in their reaction to fluctuations in entrepreneurial income, possibly due to wealth effects. We will investigate this later on.

The third point is the low average correlation between real estate and non-financial income. The wide dispersion of behavior suggests that some investors hedge their non-financial income with real estate, while others react to an increase in real estate wealth by raising their investment in risky financial assets. The latter effect is consistent with analogous results in the US (Case, Quigley and Shiller, 2001). Finally, it is worth noting that entrepreneurial income seems to be negatively related to real estate. Evidence on the correlation between real estate returns and entrepreneurial income has not yet been properly documented in the literature before.

In Table 3, we report descriptive statistics on the average value of the correlations between non-financial income and either investor's portfolios or aggregate stock market and tests of the difference between them. We also report our indexes of hedging (i.e., Γ and Δ). These figures allow us to quantify our earlier claims.

The comparison of the correlation with the portfolio and the correlation with the market shows that investors deliberately move away from hedging. Indeed, while the correlation of labor income with the market is negative (-0.007 for the low-wealth investors and -0.036 for the high-wealth investors), the correlation of the labor income of the investor with his portfolio is positive (0.025 for the low-wealth investors and 0.053 for the high-wealth investors). In other words, investors construct their portfolios so as to actually turn their natural negative correlation with the market into a positive one. These differences are statistically significant and hold across different specifications (i.e., for both Γ and Δ).

The behavior is analogous for the case of entrepreneurial risk. Investors reduce the negative correlation that would otherwise exist between their non-financial income and the market. That is, the correlation of entrepreneurial income with the investor's portfolio is less negative than the one with the market. In particular, it drops from -0.073 to -0.007 for the low-wealth investors and from -0.074 to -0.071 for the high-wealth investors. These results point in the direction of a familiarity effect.[23] Again, these differences are statistically significant and

the stock market was booming. A public employee affected by such a restructuring would display a negative correlation induced by exogenous reasons.

[23] Alternatively, this may be evidence of a wealth effect attributable to the stock market (Poterba, 2000). Indeed, investors may deliberately increase their share of risky assets at the times the market is booming and reduce it when the market drops. In the next sections, we will be able to distinguish between the two possibilities.

hold across specifications (i.e., for both Γ and Δ).

Test of Hypothesis H.2.B: Determinants of the tilt in the risk profile. We now focus on restriction H.2.B., estimated conditional on market participation. We recall that the equation that models the decision to invest in risky financial assets is 18, that is:

$$\Delta^*_{z,t} = \alpha_2 + \beta_2 Y_{z,t} Var_{Y_z,t} + \gamma_2 Y_{x,t} Cov_{Y_z,Y_x,t} + \zeta_2 \Theta_{z,t} + \boldsymbol{\delta}_2 \mathbf{F}_{2,t} + \theta_2 \lambda_t + \varepsilon_{2,t}, \qquad (21)$$

for restriction 4. Hedging requires that $\beta_2 > 0$, $\gamma_2 > 0$ and $\zeta_2 > 0$. We consider both the cases of hedging of labor income and entrepreneurial income. All the specifications are estimated including the six sets of control variables: measures of income and wealth, borrowing constraints, demographic variables, professional ability and risk, momentum/stock performance variables and regional and macroeconomic variables.

The results are displayed in Table 4, Panel A for the case of labor income risk and Panel B for the case of entrepreneurial income. The results reject the hypothesis of hedging. For the overall sample, all the three coefficients β_2, γ_2 and ζ_2 are almost always negative. If we consider the two classes of investors, we see that β_2 is always negative, for both labor and entrepreneurial income, for high- and low-wealth investors. This is a particular strong rejection of hedging, as β_2 represents the very coefficient that captures the direct impact of the riskiness of the *zth* source of income on the portfolio tilt to hedge it. Moreover, also the coefficients γ_2 and ζ_2 do not support the hypothesis of hedging. In particular, the coefficient ζ_2, is always negative for both types of non-financial income and across different specifications, while γ_2 is always negative except that for low-wealth investors in the case of entrepreneurial income.

We can therefore reject the hypothesis of hedging in general and across investors for both labor and entrepreneurial income. The rejection points in the direction of familiarity. In particular, in the case of low-wealth investors, it seems that they systematically act in a fashion opposite to the one required by hedging. This is more consistent with the alternative hypothesis of familiarity.

To further consider the role played by familiarity, we re-estimate specification 21 including our indexes of familiarity. The results (reported in Table 4 as Specification II), show that familiarity affects investors' decision to hedge labor income as well as entrepreneurial income. In particular, there is a strong negative correlation between active hedging and two measures of familiarity: geographical proximity and the holding period. This holds regardless of the level of wealth of the investors[24] and across specifications. These findings confirm the intuition that investors deliberately behave in a way opposite of that required by hedging because they want to invest in stocks with which they are familiar. That is they tilt their financial

[24] The only exception is the case of high-wealth investors who are not affected by geographical proximity in the case of entrepreneurial income.

portfolio towards a more positive correlation with their non-financial income in order to invest in familiar stocks.

Professional proximity is not related to hedging labor income risk. This finding is important as it suggests that the type of familiarity that affects investors and induces them to deviate from hedging is not the one related to the company/sector they work for. In other words, the decision not to hedge is a deliberate one, *not due to employment constraints such as belonging to a stock plan* that invests in the company's stocks.

However, professional proximity affects the low-wealth investors inducing them to concentrate in assets positively correlated with it. This may be due to the existence of borrowing constraints and limited capital that induce the low-wealth investors to focus on their main business: i.e., entrepreneurial activity.[25] This is consistent with the previous results.

Let us now consider some of the other variables. For the case of the low-wealth investors, the decision to hedge is a function of the funds available. More funds available seem to increase hedging labor income for the low-wealth investors. In particular, an increase in wealth (both financial and real estate wealth) and capital gains induce the low-wealth investors to hedge more labor income, while an increase of both the debt-to-total income ratio and the debt-to-wealth ratio negatively reduce hedging labor income.

The high-wealth investors' instead, do not seem to be affected by the level of financial wealth or capital gains, while they reduce their hedging of both labor income as their real-estate wealth increases. Higher debt-to wealth ratio induces them to reduce risk by increasing hedging.

In the case of entrepreneurial income, the level of both financial and real estate wealth, as well as capital gains, seem to discourage hedging. This holds for both classes if investors. Moreover, it is interesting to note the strong negative correlation between hedging entrepreneurial income and the debt-to-total income ratio. This also holds across investors and specifications and suggests that investors use their lines of credit to increase the investment in their own business. These results suggests that hedging labor income is very different from hedging entrepreneurial income and that investors tend to concentrate their resources in entrepreneurial activity.

Age reduces both hedging labor income and hedging entrepreneurial income. This holds for both classes of investors and in the different specifications. The intuition is that investors, as they grow older, are less afraid of labor income shocks, as they approach a period of fixed income payment. Education does not seem to affect the decision to hedge labor income risk for either class of investors, while it negatively affects the decision to hedge entrepreneurial income for the low-wealth investors.

[25] Also, investing in stocks of companies in the same area of activity may actually help to forge business alliances and deals that reduce the *business* (entrepreneurial) risk.

7.3 H3: Portfolio choice: investment in risky assets

We now proceed to test the relationship between hedging and portfolio composition, and focus on restriction H3, estimated conditional on market participation.[26] We start by considering a specification where the measure of hedging is provided by the correlation between investor's financial and non-financial portfolio, that is:

$$h_t = \alpha_3 + \boldsymbol{\beta}_3 \mathbf{Var_{Y,t}} + \boldsymbol{\gamma}_3 \mathbf{Corr_{Y,p,t}} + \boldsymbol{\delta}_3 \mathbf{F}_{3,t} + \theta_3 \lambda_t + \mu_3 h_{t-1} + \varepsilon_{3,t}. \tag{22}$$

As in the case of stock market participation, in order to relate our results to the existing literature (Heaton and Lucas, 2000b and Vissing-Jørgensen, 2002a), we consider two specifications: in the first $\mathbf{Var_{Y,t}}$ is the variance of the sources of non-financial income. If the investors buy to hedge, we expect that $\boldsymbol{\beta}_3 > \mathbf{0}$ if $\mathbf{Corr_{Y,p,t}} < \mathbf{0}$ and $\boldsymbol{\beta}_3 < \mathbf{0}$ otherwise. In the second specification, $\mathbf{Var_{Y,t}}$ is the "adjusted variance". That is, a variable constructed as the product between the variance of non-financial income and a dummy that takes the value 1 if the $\mathbf{Corr_{Y,p,t}} < \mathbf{0}$ and -1 otherwise. In this case, if investors buy to hedge we expect that $\boldsymbol{\beta}_3 > \mathbf{0}$, regardless of the sign of the $\mathbf{Corr_{Y,p,t}}$.

Regarding the correlation effect, in order to investigate the possibility of asymmetric effects, we separately consider the positive and negative correlations between financial and non-financial income (i.e., $\mathbf{Corr^{+}_{Y,p,t}}$ and $\mathbf{Corr^{-}_{Y,p,t}}$). We recall that if investors buy to hedge, we expect that $\boldsymbol{\gamma}_3 < \mathbf{0}$, in both cases. That is, investors should reduce their loadings on stocks that are correlated with their non-financial income. We consider a specification based on the percentage value of the investment in risky assets (stocks and mutual funds) over overall wealth (Risky Share) and a specification based on the dollar value of the investment (Risky Value).

The results are reported in Table 5, Panel A, for the general case (unadjusted variance) and Panel B, for the case of adjusted variance. Let us start by considering the first specification (Panel A). The results do not support the hypothesis that investors buy to hedge. Indeed, $\boldsymbol{\gamma}_3$ is always positive. This holds for both labor income and entrepreneurial income and also for both the specification based on the percentage investment and the one based on the dollar value of the holdings. Moreover, the results are robust across investors, regardless of their wealth level. Another way of reading these results is that the investors who invest more in risky assets are those who have chosen a portfolio composition more positively related to their non-financial income.

The only noticeable difference is the fact that the relationship between the correlation of non-financial income and financial income and investing in risky assets is stronger for low-wealth investors. This may suggest that low-wealth investors are more affected by familiarity

[26] We also replicated the specification contained in Table IX of Heaton and Lucas (2000b), with a similar set of variables. If we do not control for the endogenous market participation, our results are analogous to those of Heaton and Lucas. Endogenous participation makes the difference.

than the high-wealth investors are. We will see that this is indeed the case in the following section. These results are different from the findings of Heaton and Lucas (2000b) and Vissing-Jørgensen (2002a) who find no evidence of a correlation effect.

It is also worth noting that there is an overall negative correlation between the variance of non-financial income and the investment in risky assets. This holds for both labor and entrepreneurial income and is robust across specifications (i.e., both in the case of absolute holdings and in the case of share in the portfolio). However, if we split the sample according to the level of wealth, there is strong heterogeneity. Indeed, the variance of non-financial income increases risk-taking for the high-wealth investors and decreases it for the low-wealth ones. This may suggest that investing in risky assets is perceived as a risky strategy for low-wealth investors. This is consistent with the previous results on stock market participation. Low-wealth investors perceive that investment in the stock market increases their overall risk and, therefore, the higher their non-financial risk is, the less they participate and invest. In contrast, the high-wealth investors, with access to professional advice, better information and lower sensitivity to risk,[27] may be induced to select higher payoff/higher risk strategies. The results based on the adjusted variance (Panel B) do not differ significantly from the ones based on unadjusted variance.

We now employ our measure of hedging $\mathbf{\Gamma}_t$. As we saw in Table 3, on average, investors do not hedge, that is the $\mathbf{\Gamma}_t s$ are negative.[28] Moreover, Figures 1 and 2 suggest that investors actively reallocate their portfolios toward stocks that are correlated with their non-financial income. We can explicitly test this assumption by using equation 19, that is:

$$h_t = \alpha_3 + \boldsymbol{\beta}_3 \mathbf{Var}_{\mathbf{Y,t}} + \boldsymbol{\gamma}_3 \mathbf{\Gamma}_t + \boldsymbol{\delta}_3 \mathbf{F}_{3,t} + \theta_3 \lambda_t + \mu_3 h_{t-1} + \varepsilon_{3,t}. \tag{23}$$

According to equation 6, we expect $\boldsymbol{\gamma}_3 > \mathbf{0}$ in the case investors buy to hedge. As in the previous test of equation 18, we consider a specification based on the percentage investment (Risky Share) and a specification based on the dollar value of the investment (Risky Value).

The results, reported in Table 5, Panel C, show clearly that investors do not invest in risky assets in order to hedge either labor income or entrepreneurial income. Indeed, $\boldsymbol{\gamma}_3$ is negative for both the dollar value of the investment and the percentage investment. This points in the direction of familiarity.

If we split the sample according to the wealth level of the investors, we find a strong heterogeneity. If we consider the specification based on the percentage investment, $\boldsymbol{\gamma}_3$ is strongly negative for the low-wealth investors, while it is very small and less significant for the high-wealth investors. In the case of labor income, the value of $\boldsymbol{\gamma}_3$ drops from -1.016 for the low-wealth investors to -0.002 for the high-wealth investors. If we consider the specification

[27] In the case of risk aversion decreasing with the level of wealth.

[28] With the partial exception of Γ_{2t} for the high-wealth investors.

based on the dollar value of the investment, instead, the value of γ_3 becomes positive and significant for the high-wealth investors. That is, for the high-wealth investors there seems to be some partial evidence of hedging.

To further investigate this issue, we test specification 23 by directly including among the explanatory variables our indexes of familiarity. If investment in risky assets is mainly familiarity-driven, we expect γ_3 not to be significant or negative and the indexes of familiarity to be positively related to h_t.

The results, reported in Table 5, Panel D, support our hypothesis. The investment in financial assets is affected by familiarity. This holds, regardless of the level of wealth. However, the impact is stronger for low-wealth investors, while it is weaker and disappears for the high-wealth investors. This is the case for both professional and geographical proximity. The coefficients of our indexes of familiarity decrease with the level of wealth (from 0.064 to 0.040 for geographical proximity in the case of the dollar value of the investment) and even become negative altogether for the high-wealth investors (-0.001 and -0.001 for, respectively, geographical and professional proximity[29] in the case of percentage investment and -0.543 for professional proximity in the case of the dollar value of the investment).

The impact of the holding period, on the other hand, grows with the level of wealth (from 0.011 to 0.015 in the case of the percentage investment and from 0.072 to 0.731 in the case of the dollar value of the investment). This is consistent with the fact that the holding period may proxy for the private information that the household has purchased.

Overall, the results from the tests of restrictions H1-H3 provide evidence that investors in general do not hedge. Investors, characterized by a negative correlation between their labor income and the market, tend to increase their loadings on risky assets that are more closely correlated to their income than the market as a whole. That is, they tend to go for assets with which they are more familiar.

8 Cost of hedging/familiarity

The construction of $\mathbf{\Gamma}$ also allows us to estimate the cost of hedging/familiarity. Indeed, both strategies may entail a cost in terms of lower performance and reduced profits that is a function of the enacting of the degree of deviation from the market portfolio, for hedging- or familiarity-induced motives. We consider two measures of "profits": the financial gains/losses in the year standardized by the value of the risky assets at the beginning of the year and the change in wealth standardized by the value of wealth at the beginning of the year. Financial gains/losses include the realized capital gains/losses and the dividends.

[29] For the case of high-wealth investors, professional proximity is not even significant.

Both measures may be subject to criticism and must be taken with a pinch of salt. Financial gains/losses represent an imprecise measure if investors do not turn over their positions regularly. A change in wealth does not account properly for the saving decisions of the investors. Given that both biases may be related to the income of the investor, we include both the level and the variance of investors' income and wealth among the control variables.

The fact that gains and losses are directly reported by the financial intermediary through which the transaction is executed reduces the potential bias due to the underreporting of capital gains for tax purposes. Other biases may be due to the "lock-in effect" that generates different incentives to sell the stocks for investors with different marginal tax rates, and to clientele effects. However, for all these biases (underreporting, lockin and clientele) Yitzhaki (1987) shows that "the likely effects of these biases is to cause an underestimate of the observed differences in rates of return among income classes." Therefore, the bias acts *against* the possibility of actually finding a statistically significant difference between classes.

Descriptive statistics of the profits and their differences between groups of investors are reported in Table 6, Panels A and B. We consider both profits based on the changes of wealth (Π_w) and profits based on financial gains/losses (Π_F). As expected, high-wealth investors make more profits than low-wealth ones. This holds for the statistics based on the mean as well as those based on the median. In Table 6, Panel C, we compare the profits of the investors who hedge (i.e., $\mathbf{\Gamma} > \mathbf{0}$) and those who do not hedge (i.e., $\mathbf{\Gamma} < \mathbf{0}$). Hedgers, in general, earn lower profits than the non-hedgers. This suggests that hedging is indeed expensive, as we would expect it to be in equilibrium.

Notice that this comparison is separately done for both high-wealth and low-wealth investors and therefore it is not inconsistent with the fact that high-wealth investors make more profits than do the low-wealth ones. It is also interesting to note that the cost of hedging (i.e., the difference in profits between the hedgers and the non-hedgers) is higher for the low-wealth investors than for the high-wealth ones. This fits with the intuition that high-wealth investors have access to better financial services and advice.

In order to assess the relationship between profits and hedging/familiarity motives, we estimate:

$$\Pi_t = \alpha_4 + \beta_4 \mathbf{Var}_{Y,t} + \boldsymbol{\gamma}_4 \mathbf{\Gamma}_t + \boldsymbol{\delta}_4 \mathbf{F}_t + \theta_4 \lambda_t + \varepsilon_{4,t}, \tag{24}$$

where Π_t are the profits realized at t by the investor. The results are reported in Table 7, Panel A, for the case of profits based on changes of wealth (Π_w) and Panel B, for the case of profits based on financial gains/losses (Π_F).

We will focus on labor income. The results show a strong positive correlation between profits and geographical proximity and holding period. This holds regardless of the level of wealth of the investors. Professional proximity, however, only affects the profits of the

low-wealth investors.

Moreover, there is a difference in the impact for high-wealth and low-wealth investors. Holding period - a proxy for expensive private information - mostly affects the high-wealth investors, while geographical and professional familiarity - a proxy for cheap information - mostly affect the low-wealth investors. The intuition is that if familiarity proxies for information, low-wealth investors mostly use cheap information (i.e., geographical and professional proximity), while high-wealth investors mostly use private information (holding period). In both cases, this information increases profits, as it helps investors to make profitable investments and reduces investors' incentive to enact (expensive) hedging.

9 Conclusions

We studied the question of whether investors use their investment in financial assets to hedge their non-financial income. We used a new approach based on the inspection of the relationship between investors' non-financial income and financial income and constructed measures of "hedging".

We provided evidence that investors do not engage in hedging, but seem to deliberately tilt their portfolio toward stocks that are most closely related to them. We rationalized this in terms of "familiarity" and we provided evidence of it. We showed a high degree of heterogeneity across investors and we identified differences in terms of wealth and liquidity of their overall portfolio. We used a unique and new dataset where all the sources of income as well as the asset holdings, are broken down at the investor level.

These results provide a challenge to standard portfolio theory and shed new insights on investors' behavior. As future research it would be interesting to study the determinants of familiarity and to assess whether familiarity is just a mere behavioral heuristics or the outcome of a rational behavior justifiable, for example, in terms of limited information.

The two explanations have very different implications: behavioral biases are related to human characteristics and are equally likely to be present in different countries and across markets. Informational constraints and market frictions are, instead, more likely to be affected by institutional as well as endowment differences. If familiarity is information-based, we may expect it to lose importance as the degree of sophistication of the investors or their relative wealth increase. Therefore, processes such as globalization and financial integration, by increasing information, should reduce the impact of familiarity on investors' choices and therefore on asset prices.

10 Appendix

In this Appendix we develop the testable restrictions on the tilt in the portfolio. We rely on the standard literature on portfolio choice with multiple assets and, in particular, Tepla (2001). Let's consider an economy with n risky securities denoted by S and a riskless asset B. The riskless asset earns and instantaneous interest rate $r > 0$, while the risky securities follow a geometric Brownian motion, such that:

$$dB = rBdt \tag{25}$$

$$\mathbf{dS} = \mathbf{I}_s\boldsymbol{\mu}dt + \mathbf{I}_s\boldsymbol{\Sigma}\mathbf{dw}, \tag{26}$$

where, $\mathbf{w}$ is a n-dimensional standard Brownian motion, $\mathbf{I}_s$ is an n-dimensional diagonal matrix with the risky securities prices as entries, $\boldsymbol{\mu}$ is a n-dimensional vector of mean returns and $\boldsymbol{\Sigma}$ is the matrix of diffusion coefficients. We assume $\boldsymbol{\Sigma}$ to be diagonal, that is markets are complete and each asset loads only on a specific source of uncertainty. The investor has other non-financial sources of income ($\mathbf{Y}$):

$$\mathbf{dY} = \mathbf{I}_y\mathbf{a}dt + \mathbf{I}_y\mathbf{s}\mathbf{dw}, \tag{27}$$

where $\mathbf{I}_y$ is an n-dimensional diagonal matrix with value of the income source as entries, $\mathbf{a}$ is a n-dimensional drift vector and $\mathbf{s}$ is the matrix of diffusion coefficients. We assume that to rule out arbitrage opportunities, $(\mathbf{a} - r) = \mathbf{s}\boldsymbol{\Sigma}'(\boldsymbol{\Sigma}\boldsymbol{\Sigma}')^{-1}(\boldsymbol{\mu} - r)$. The representative investor maximizes utility of terminal wealth $(W(T))$,[30] where the wealth follows:

$$dW = [\boldsymbol{\theta}'(\boldsymbol{\mu} - r) + Wr]dt + \boldsymbol{\theta}\boldsymbol{\Sigma}\mathbf{dw} \tag{28}$$

The representative investor is endowed with a HARA utility function

$$U = \frac{1-\gamma}{\gamma}(\frac{y}{1-\gamma})^{\gamma} \tag{29}$$

of terminal $y = W + \mathbf{Y}'\mathbf{e}$, where $\mathbf{e}$ is a vector of ones. Let us define $cov_{\mathbf{Y},p}$ the covariance between the return on the financial portfolio of the investor and the rate of change of his non-financial income and $cov_{\mathbf{Y},m}$ the covariance between the return on the market portfolio and the rate of change of the investor's non-financial income. The measure of deviation from the market is:

$$\Delta = cov_{\mathbf{Y},m} - cov_{\mathbf{Y},p}. \tag{30}$$

[30] We can alternatively consider the case of the labor income flow. In this case, the investor does not maximize the utility of terminal wealth, but $MaxE[\int_0^T U(C(s))ds]$,s.t.$E[\int_0^T \xi_s C(s)ds] \leq$

$\xi_0 W_0 + E[\int_0^T \xi_s Y(s)ds]$, where ξ_s is the state price density. The result is analogous to the one we report in equation 32, but with labor income defined from time t to T. That is, the residual working life of the invetsor. $\boldsymbol{\theta}'_p = \frac{1}{W}\boldsymbol{\Sigma}^{-2}\left\{\frac{W+\mathbf{Y}(\mathbf{T}-\mathbf{t})'\mathbf{e}}{1-\gamma}(\boldsymbol{\mu} - r) \ - \boldsymbol{\Sigma}\mathbf{s}\mathbf{Y}(\mathbf{T}-\mathbf{t})\right\}$. This is effectively what we construct when we use the Carrol and Samwick and Vissing-Jorgenson methodology to define permanent income.

The covariances between the non-financial risk and, respectively, the market portfolio and the investor's actual portfolio are:

$$cov_{\mathbf{Y},m} = \boldsymbol{\theta}_m \boldsymbol{\Sigma} \mathbf{s}' \text{ and } cov_{\mathbf{Y},p} = \boldsymbol{\theta}_p \boldsymbol{\Sigma} \mathbf{s}', \tag{31}$$

where $\boldsymbol{\theta}'_m$ and $\boldsymbol{\theta}'_p$ are, respectively, the vectors of the proportion of wealth invested in risky assets for the market portfolio in the absence of non-financial risk and for the investor's portfolio in the presence of non-financial risk. They are:

$$\boldsymbol{\theta}'_p = \frac{1}{W}\boldsymbol{\Sigma}^{-2}\left\{\frac{W + \mathbf{Y}'\mathbf{e}}{1-\gamma}(\boldsymbol{\mu} - r) - \boldsymbol{\Sigma}\mathbf{s}\mathbf{Y}\right\} \text{ and } \boldsymbol{\theta}'_m = \frac{1}{W}\boldsymbol{\Sigma}^{-2}\left\{\frac{W}{1-\gamma}(\boldsymbol{\mu} - r)\right\} \tag{32}$$

Therefore, equation 30 can be rewritten as:

$$\boldsymbol{\Delta} * W = \mathbf{Y}'\left[\mathbf{s}\mathbf{s}' - \mathbf{e}\frac{(\boldsymbol{\mu} - r)'}{(1-\gamma)}\boldsymbol{\Sigma}^{-2}\boldsymbol{\Sigma}\mathbf{s}'\right]. \tag{33}$$

Let' us assume that are two non-financial sources of income: x and z. The deviation from the market to hedge income y is:

$$\Delta_z * W = Y_z Var_{Y_z} + Y_x Cov_{Y_z,Y_x} - (Y_z + Y_x)\sum_{j=1}^{n} \Omega_{S_j} * Cov_{S_j,Y_z}, \tag{34}$$

where $\Omega_{S_j} = \frac{(\boldsymbol{\mu}_{s_j} - r)'}{(1-\gamma)\boldsymbol{\sigma}^2_{s_j}}$ and μ_{s_j} and $\sigma^2_{s_j}$ are, respectively, the mean and the variance of the jth risky asset.

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Table 1: Descriptive Statistics of the sample

This table contains the descriptive statistics of the sample. Panel A reports the general demographic characteristics (number of households for each year, members in household, adults in the household, age of the oldest member of the household, percentage of the sample with secondary and higher education). Panel B reports the age and gender distribution of the sample. We report Mean, Median, Standard Deviation, Inter-Quartile Range (IQR) and Maximum value. They have been calculated over the whole sample (i.e., across-investors and time). Panel C reports the percentage of the households paying wealth tax, having labor income, having entrepreneurial income and having real estate wealth. The column "Representation in the sample" reports the fraction of households in the sample who pay wealth tax, earn labor or entrepreneurial income or hold real estate wealth. The other columns report statistics (Mean, Median, Standard Deviation, IQR, Maximum) of, respectively, the value of wealth, labor and entrepreneurial income (gross yearly income) and real estate. All monetary values are in Swedish Krones.

Panel A: General demographic characteristics

Variable	*Mean*	*Median*	*Std.Dev.*	*IQR*	*Maximum*
Number of households	292,901	291,913	647	686	293,320
# of members in household	2.67	2.00	1.51	3.00	16.00
# of adults in household	1.77	2.00	0.69	1.00	9.00
Age of oldest household member	49.28	47	17	24	107
% with secondary education	43.5%	43.5%	0.6%	0.5%	44.3%
% with higher education	31.4%	31.2%	1.4%	1.4%	33.7%

Panel B: Age and gender distribution of the sample

Age	*Males*	*Females*	*Age of oldest household member*
0-19	18.2%	17.2%	0.5%
20-29	4.8%	4.9%	10.7%
30-39	7.1%	8.2%	21.7%
40-49	7.4%	7.4%	23.6%
50-59	5.9%	5.3%	17.9%
60+	6.6%	7.2%	25.8%
Total	49.9%	50.2%	100%

Panel C: Wealth and income characteristics of households

Variable	Representation in the sample	Mean	Median	Std.Dev.	I. Q. R.	Maximum
Wealth-tax Payers	7.9%	359,592	102,700	2,648,521	353,400	1,023,147,857
Labor Income Earners	100.0%	321,489	287,722	237,526	276,190	43,445,271
Entrepreneurial Income Earners	9.8%	88,114	43,268	172,565	111,726	7,320,000
Real Estate Holders	54.6%	449,400	387,000	348,736	340,000	78,140,000

Table 2: Stock market participation
(Tests of restriction H1)

We report estimates of the probit model for stock market participation. We consider the overall sample, the sample of the low-wealth households and the sample of the high-wealth households. The level and variance of labor and entrepreneurial income, as well as their correlation with real estate and the market, are constructed using the methodology of Carrol and Samwick (1997) and Vissing-Jorgensen (2001). *RetMarket* is the return on the market measured by SIX Trust index in the previous 24 months. *Financial Wealth* is the market value of securities and bank deposits, *Real Estate* is the tax-based value of real estate holdings adjusted for the difference between tax base and market price (the adjustment coefficient, provided by Statistics Sweden, is different for each year and region). *Capital Gains/Losses* are the realized capital gains/losses. *Capital Gains/Losses* have been standardized by dividing them by their standard deviation. *Debt/Wealth Ratio* proxies for the leverage of the household, whereas *Debt/Total income Ratio* proxies for the interest payment coverage. All financial variables, except *Capital Gains/Losses*, have been transformed into logarithms. *Secondary Education* and *Higher Education* are dummies that take value 1 if the highest level of education in the household is, respectively, secondary education and University or higher education and 0 otherwise. *Ability* proxies for the individual abilities of the members of the household. *Size of Household* is the number of members belonging of the family. *Age* and *Age2* are, respectively, the age and square of the age of the oldest member of household. *Immigrant Status* is a dummy that takes value 1 if at least one household member immigrated to Sweden and zero otherwise. *Stockholm Dummy* is a dummy that takes value 1 if the household lives in Stockholm and zero otherwise. *Consumer Confidence* represents the year-by-year change in consumer confidence index (provided by Statistics Sweden). *Unemployment risk* is the one year-ahead forecast of a linear probability model where the unemployment status (i.e., 1 if unemployed and zero otherwise) is regressed on demographical variables, measures of income and wealth and regional, geographical and professional dummies. A set of eleven industry dummies and eight regional dummies are also used as controls. Their coefficient dummies are not reported. We report the pseudo-R^2, the log-likelihood and the number of observations used. The number of observations refers to the extended sample (PARTICIPAT=0) and to the sample restricted to the households who participate in the stock market (PARTICIPAT=1). We consider two specifications. In the first specification ("Unadjusted Variance") we consider the value of the variance of labor and entrepreneurial income. In the second specification ("Adjusted Variance"), we consider a measure of "adjusted variance", where the variance of labor (entrepreneurial) income has been multiplied by a dummy that takes the value 1 if the correlation between labor (entrepreneurial) income and the market is <0 and -1 otherwise.

	All households				***Low-wealth households***				***High-wealth households***			
	Unadjusted Variance		*Adjusted Variance*		*Unadjusted Variance*		*Adjusted Variance*		*Unadjusted Variance*		*Adjusted Variance*	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Labor Income (Variance)	-0.022	(-12.53)	-0.002	(-1.63)	-0.028	(-14.40)	0.001	(0.39)	-0.032	(-5.74)	-0.021	(-4.16)
Entrepr. Income (Variance)	-0.010	(-1.76)	-0.011	(-1.79)	-0.005	(-5.70)	-0.005	(-5.63)	-0.001	(-0.67)	-0.008	(-1.28)
Corr(Labor Inc., Market)	-0.015	(-3.82)	-0.026	(-6.33)	-0.007	(-1.72)	-0.014	(-3.27)	-0.028	(-2.21)	-0.060	(-4.57)
Corr(Entr.Inc., Market)	0.016	(1.11)	0.014	(1.53)	0.006	(0.96)	-0.003	(-0.59)	-0.014	(-1.13)	-0.012	(-1.03)
Control Variables												
Intercept	-4.373	(-254.39)	-4.404	(-262.93)	-4.086	(-224.21)	-4.124	(-232.65)	-1.612	(-20.91)	-1.694	(-22.54)
Labor Income (Level)	0.069	(20.84)	0.065	(21.09)	0.046	(1.26)	0.045	(1.35)	0.066	(7.19)	0.068	(8.04)
Entrepr. Income (Level)	0.088	(25.96)	0.087	(27.21)	0.060	(16.41)	0.059	(17.05)	0.097	(9.61)	0.093	(9.60)
Corr(Labor Inc., Real Estate)	-0.049	(-16.49)	-0.049	(-16.86)	-0.024	(-7.38)	-0.023	(-7.32)	-0.039	(-4.17)	-0.036	(-3.95)
Corr(Entr.Inc., Real Estate)	0.024	(4.96)	0.024	(5.05)	0.012	(2.10)	0.011	(1.96)	0.024	(1.95)	0.021	(1.88)
RetMarket	1.831	(163.19)	1.922	(175.80)	1.853	(150.73)	1.940	(162.01)	1.590	(49.82)	1.687	(54.04)
log(Financial Wealth)	0.210	(268.16)	0.211	(271.66)	0.186	(228.29)	0.187	(231.36)	0.048	(12.05)	0.049	(12.30)
log(Real Estate Wealth)	0.036	(80.59)	0.036	(81.85)	0.026	(53.80)	0.026	(54.88)	0.007	(4.24)	0.006	(4.09)
Capital Gains/Losses	0.380	(117.86)	0.356	(78.53)	0.525	(134.22)	0.523	(132.90)	0.000	(-0.63)	-0.637	(-1.29)
Debt/Total Income Ratio	0.000	(-0.56)	-0.003	(-0.04)	0.423	(4.61)	0.319	(4.51)	0.170	(2.82)	0.152	(3.29)
Debt/Wealth Ratio	-43.164	(-3.01)	-41.098	(-3.05)	-34.428	(-3.01)	-27.572	(-3.09)	-9.213	(-0.72)	-8.269	(-0.70)
Secondary Education	0.274	(59.01)	0.270	(59.40)	0.235	(45.86)	0.232	(46.31)	0.216	(17.61)	0.224	(18.56)
Higher Education	0.498	(102.30)	0.495	(104.44)	0.431	(79.97)	0.429	(81.81)	0.427	(33.60)	0.436	(35.11)
Ability	0.133	(33.05)	0.138	(36.55)	0.115	(26.34)	0.118	(28.72)	0.071	(6.47)	0.090	(8.65)
Size of Household	-0.006	(-2.48)	-0.007	(-2.78)	-0.035	(-11.95)	-0.033	(-12.07)	-0.018	(-2.76)	-0.018	(-2.79)
Immigration Status	-0.121	(-27.19)	-0.124	(-28.47)	-0.121	(-25.48)	-0.128	(-27.39)	-0.024	(-1.73)	-0.027	(-1.95)
Age	0.039	(64.89)	0.039	(66.31)	0.035	(54.34)	0.035	(55.54)	0.020	(8.45)	0.021	(8.85)
Age2	-0.027	(-48.75)	-0.027	(-50.02)	-0.027	(-45.55)	-0.027	(-46.61)	-0.017	(-8.63)	-0.017	(-8.90)
Unemployment Risk	-0.841	(-37.98)	-0.886	(-41.55)	-0.726	(-30.53)	-0.755	(-33.04)	-0.534	(-7.52)	-0.629	(-9.11)
Consumer Confidence	0.020	(220.07)	0.020	(232.61)	0.019	(195.70)	0.020	(207.08)	0.018	(72.40)	0.018	(76.30)
Pseudo R2	0.37		0.37		0.33		0.33		0.20		0.20	
LogLikelihood	-559,580		-575,955		-459,184		-472,233		-80,949		-77,944	
Number of observations:												
PARTICIPAT=1	249,857				178,286				71,571			
PARTICIPAT=0	1,507,549				1,455,618				51,931			

Table 3: Correlation and indexes of hedging
(Tests of restriction H2.A)

This table reports some statistics of the correlations of non-financial income (i.e., labor income and entrepreneurial income) with financial returns (i.e., portfolio returns and overall stock market returns) and real estate return. The non-financial income components are estimated by using the Carrol and Samwick (1997) and Vissing-Jorgensen (2002) methodology reported in the text. We report the descriptive statistics separately for high-wealth and low-wealth households as well as our indexes of active hedging (i.e., Γ_1 and Γ_2, where Γ_1 = Corr(Labor Inc., Market) -Corr(Labor Inc., Portfolio) and Γ_2 = Corr(Ent. Inc., Market) -Corr(Ent. Inc., Portfolio)). We report the the results of the *t-tests* for each group (where we test for mean = 0 hypothesis) as well as the difference between high- and low-wealth households. The values of Δ_1 and Δ_2 are multiplied by 10,000.

	Low Wealth					*High Wealth*					*T-test of the difference*	
Variable	*Mean*	*Median*	*Std.Dev.*	*I. Q. R.*	*T-test Mean=0*	*Mean*	*Median*	*Std.Dev.*	*I. Q. R.*	*T-test Mean=0*	*T-Stat*	*p-value*
Corr(Labor Inc., Market)	-0.007	0.000	0.311	0.414	-4.86	-0.036	-0.048	0.306	0.405	-16.51	10.82	<0.0001
Corr(Labor Inc., Portfolio)	0.025	0.085	0.785	1.770	2.57	0.053	0.100	0.676	1.100	7.44	-2.32	0.020
Corr(Labor. Inc., Real Estate)	-0.063	-0.086	0.467	0.759	-27.81	-0.131	-0.190	0.460	0.738	-39.51	16.71	<0.0001
Corr(Entrepr. Inc., Market)	-0.073	-0.142	0.607	0.900	-11.01	-0.074	-0.143	0.589	0.900	-9.14	0.09	0.926
Corr(Entrepr. Inc., Portfolio)	-0.007	0.000	0.835	1.880	-0.29	-0.071	-0.142	0.768	1.600	-3.99	2.10	0.036
Corr(Entrepr. Inc., Real Estate)	-0.176	-0.321	0.637	0.979	-25.24	-0.181	-0.210	0.615	0.857	-21.33	0.40	0.686
Γ_1	-0.030	-0.033	0.820	1.343	-2.31	-0.081	-0.109	0.710	1.069	-10.42	3.36	0.001
Γ_2	-0.012	-0.000	0.956	1.322	-0.34	0.004	0.00	0.8734	1.133	0.20	-0.39	0.694
Δ_1	0.55	-4.96	385.38	182.74	0.16	-13.57	-18.66	283.93	175.07	-3.27	2.62	0.009
Δ_2	92.31	11.16	1537.35	1005.78	2.55	80.14	-12.63	1341.99	875.45	1.96	0.22	0.826

Table 4: Determinants of the tilt in the risk profile. (Tests of restriction H2.B)

This table reports estimates of the determinants of D_1 (Panel A) and D_2 (Panel B) where Δ_1 = Cov(Labor Inc., Market) - Cov(Labor Inc., Portfolio) and Δ_2 = Cov(Entrepreneurial Income, Market) - Cov(Entrepreneurial Income, Portfolio). Θ_L is $-(Y_L+Y_L)\Sigma_j SR_j*Cov(Ret_j, Y_L)$. It is defined in the text (Appendix), while $Cov(Y_E, Y_L)$ is the correlations between labor and entrepreneurial income. Familiarity variables are *Professional Proximity*, *Geographical Proximity* and *Holding Period.* They are constructed as follows. For each stock in the portfolio we identify three measures of familiarity and then we aggregate them for each investor on the basis of his portfolio composition (i.e., using as weights the value of the portfolio holding). The first measure is *Professional Proximity*. It is a dummy taking the value 1 if the investor's profession is in the same area of activity as the company whose stock is under consideration, and zero otherwise. We use the one-digit SNI92 codes (similar to SIC codes) to identify the areas of activities. For example, in the case of an investor working in the mining sector holding a stock of a mining company, the dummy would be equal to 1. The second measure is *Geographical Proximity*, that is the proximity between the residence of the investor and the place where the company is located. In particular, we use the logarithm of the inverse of the distance between the ZIP code of the investor and the ZIP code of the closest branch/subsidiary of the company whose stock we consider. The greater the value of the variable, the closer the investor is to the stock. Finally, we construct a variable that proxies for *Holding Period*, based on the time a stock entered the investor's portfolio. Each index of familiarity is constructed weighting the measures for each investor on the basis of his portfolio composition.

We consider six types of control variables: *measures of income and wealth, borrowing constraints, demographic variables, professional ability and risk, momentum/stock performance variables and regional and macroeconomic variables.* The *measures of income and wealth* contain the vector of the wealth of the ith investor at time t, broken down into its individual components (i.e., financial, real estate and other), as well as measures of income (i.e., labor and entrepreneurial) and overall (i.e., financial and non-financial) capital gains and losses of the ith investor at t. We also include the correlation between non-financial income (both labor income and entrepreneurial income) and real estate. We consider two types of *borrowing constraints*. The first one is the ratio of investor debt to total income, and the second is the ratio of investor debt to total wealth. Both of them are constructed at the investor level at time t. The *demographic variables* include: the profession of the investor, his level of education, broken down into high-school and university level, the age of the oldest member of the family of the investor and its value squared. We also construct variables to account for the professional ability and risk of the investor. The first variable is based on the difference between his income and the average income of his profession. The second variable is the one-year-ahead forecast of a linear probability model where the unemployment status (i.e., 1 if unemployed and zero otherwise) is regressed on demographic variables, measures of income and wealth and regional, geographical and professional dummies. The *momentum/stock performance variables* are the return and volatility on the market portfolio in the previous twelve months, as well as the returns and volatility on the investor's portfolio in the same period. The *regional and macroeconomic variables* include an Index of Consumer Confidence and a set of dummies that account for the regional location of the investor as well as the industry in which he works. We consider 8 geographical areas and 10 industries. We also include a Stockholm dummy and a dummy that controls for the immigration status. The Stockholm dummy takes the value of 1 if the investor lives in the capital and 0 otherwise. The immigration status is a dummy that takes the value 0 if all the members of the household are native Swedes, and 1 if at least one member of household immigrated.

Panel A: Determinants of D_1 *(Hedging labor income risk)*

	All households				*Low-wealth households*				*High-wealth households*			
	I		II		I		II		I		II	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
$Y_L Var(Y_L)$	-0.26	(-18.04)	-0.25	(-17.94)	-0.34	(-24.95)	-0.33	(-23.35)	-9.88	(-51.85)	-10.12	(-53.87)
$Y_E Cov(Y_E, Y_L)$	-1.48	(-50.81)	-1.38	(-40.08)	-1.56	(-65.50)	-1.40	(-43.27)	-4.83	(-38.57)	-3.83	(-30.32)
Θ_L	-0.84	(-50.48)	-0.76	(-35.75)	-0.92	(-66.24)	-0.80	(-38.70)	-0.85	(-45.95)	-0.86	(-45.97)
Geographical proximity			-1.96	(-51.04)			-2.48	(-50.63)			-1.68	(-24.07)
Professional proximity			-0.61	(-0.89)			-1.09	(-1.13)			0.25	(0.23)
Holding Period			-6.36	(-13.54)			-7.58	(-15.63)			-4.43	(-34.71)
Control Variables												
Intercept	-32.66	(-11.80)	-44.70	(-16.09)	-49.58	(-15.58)	-72.58	(-21.88)	-27.97	(-6.99)	-18.04	(-4.47)
Corr(Labor Inc., Real Estate)	2.73	(23.06)	2.56	(21.59)	3.05	(24.13)	2.97	(22.54)	3.62	(13.70)	2.87	(10.77)
Corr(Entr. Inc., Real Estate)	-0.07	(-0.36)	-0.13	(-0.72)	0.04	(0.19)	-0.02	(-0.08)	-1.28	(-3.90)	-1.22	(-3.68)
Market Volatility	0.61	(11.38)	1.74	(31.60)	0.41	(6.81)	4.01	(21.66)	-0.17	(-1.64)	-0.14	(-1.31)
RetMarket	10.06	(9.07)	20.24	(18.04)	16.77	(12.35)	32.37	(22.68)	6.09	(2.82)	7.93	(3.62)
RetPortfolio	0.21	(23.54)	0.19	(21.56)	0.15	(13.39)	0.17	(16.79)	0.00	(-0.80)	0.00	(-0.80)
log(Financial Wealth)	1.25	(10.56)	1.50	(12.64)	1.79	(14.27)	1.94	(14.80)	0.48	(3.26)	0.25	(1.70)
log(Real Estate Wealth)	0.13	(4.84)	0.19	(6.97)	0.18	(6.79)	0.24	(8.49)	-0.32	(-6.75)	-0.34	(-7.12)
Capital Gains/Losses	0.46	(9.61)	0.44	(9.08)	0.65	(11.51)	0.62	(10.47)	0.11	(1.18)	0.08	(0.82)
Debt/Total Income Ratio	0.01	(-0.83)	0.01	(-0.86)	0.01	(-1.69)	0.01	(-1.68)	0.01	(1.25)	0.01	(1.20)
Debt/Wealth Ratio	-0.51	(-0.73)	-1.32	(-1.89)	-0.49	(-2.77)	-1.43	(-2.13)	0.44	(37.28)	0.35	(29.34)
Secondary Education	-1.11	(-4.89)	-0.88	(-3.89)	-1.09	(-4.27)	-0.72	(-2.70)	0.08	(0.17)	-0.24	(-0.53)
Higher Education	-0.68	(-2.18)	-0.43	(-1.36)	-0.32	(-0.94)	-0.02	(-0.05)	0.63	(1.04)	0.22	(0.36)
Ability	-0.54	(-3.46)	-0.05	(-0.34)	-0.55	(-3.17)	0.01	(0.00)	-0.49	(-1.65)	0.00	(-0.01)
Size of Household	0.93	(18.83)	0.95	(19.32)	0.95	(18.06)	1.09	(20.01)	-0.05	(-0.40)	-0.02	(-0.14)
Immigration Status	-1.13	(-6.13)	-1.51	(-8.14)	-1.77	(-8.56)	-2.30	(-10.67)	1.89	(4.90)	2.18	(5.59)
Age	0.73	(23.20)	0.71	(22.71)	0.91	(26.41)	0.81	(22.60)	0.65	(8.75)	0.55	(7.35)
Age2	-0.74	(-27.72)	-0.72	(-26.75)	-0.95	(-30.61)	-0.85	(-26.22)	-0.55	(-8.93)	-0.50	(-8.00)
Unemployment Risk	-8.13	(-9.82)	-13.65	(-16.45)	-9.15	(-10.19)	-16.10	(-17.22)	5.53	(3.01)	-0.14	(-0.08)
Consumer Confidence	0.12	(10.82)	0.06	(5.70)	0.17	(12.89)	0.03	(2.28)	0.08	(3.52)	0.09	(4.16)
Stockholm Dummy	-0.30	(-2.16)	0.03	(0.23)	-0.55	(-3.50)	-0.50	(-3.04)	-0.24	(-0.90)	0.42	(1.52)
Lambda	6.19	(9.45)	7.323	(11.12)	10.07	(13.00)	10.938	(13.51)	5.28	(2.84)	4.32	(2.30)
Adj R2	0.020		0.020		0.023		0.023		0.024		0.024	

Panel B: Determinants of D_2 *(Hedging entrepreneurial income risk)*

	All households				*Low-wealth households*				*High-wealth households*			
	I		II		I		II		I		II	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
$Y_L Var(Y_L)$	-0.43	(-34.15)	-0.43	(-34.36)	-0.06	(-4.22)	-0.05	(-2.91)	1.09	(24.81)	0.73	(20.41)
$Y_E Cov(Y_E, Y_L)$	-0.49	(-3.82)	-0.48	(-3.73)	-0.19	(-1.43)	-0.15	(-0.99)	-11.17	(-10.96)	-7.15	(-8.63)
Θ_E	-0.34	(-50.58)	-0.34	(-50.58)	-0.12	(-15.78)	-0.11	(-13.33)	-0.59	(-21.80)	-0.62	(-28.16)
Geographical proximity			-2.90	(-38.73)			-1.45	(-13.16)			-5.38	(-38.36)
Professional proximity			-2.43	(-1.80)			-5.09	(-2.35)			0.22	(0.10)
Holding Period			-4.89	(-40.83)			-8.09	(-49.88)			-22.27	(-36.76)
Control Variables												
Intercept	37.29	(7.04)	91.24	(17.06)	-21.27	(-3.23)	-43.13	(-5.95)	-255.51	(-25.52)	43.10	(5.31)
Corr(Labor Inc., Real Estate)	-0.21	(-0.92)	-0.03	(-0.11)	-0.15	(-0.56)	-0.29	(-0.99)	-2.10	(-3.18)	-2.27	(-4.23)
Corr(Entr. Inc., Real Estate)	-2.06	(-6.00)	-2.09	(-6.02)	-1.63	(-3.67)	-1.66	(-3.40)	-2.82	(-3.42)	-3.08	(-4.62)
Market Volatility	3.80	(36.62)	13.35	(24.23)	7.53	(58.09)	12.52	(45.04)	-2.21	(-15.33)	-0.86	(-3.91)
RetMarket	18.44	(8.70)	37.51	(17.38)	8.51	(3.03)	28.78	(9.20)	47.25	(8.75)	27.66	(6.28)
RetPortfolio	0.00	(-0.14)	0.00	(-2.70)	0.02	(5.53)	-0.05	(-13.91)	0.00	(-1.00)	0.00	(-0.79)
log(Financial Wealth)	-0.99	(-4.40)	-0.88	(-3.87)	-0.96	(-3.70)	-0.76	(-2.67)	-1.35	(-3.65)	-0.23	(-0.78)
log(Real Estate Wealth)	-0.35	(-6.67)	-0.35	(-6.66)	-0.13	(-2.28)	-0.07	(-1.07)	-0.66	(-5.51)	-0.34	(-3.46)
Capital Gains/Losses	0.26	(2.82)	0.25	(2.75)	0.04	(0.38)	0.00	(-0.04)	0.55	(2.38)	0.66	(3.54)
Debt/Total Income Ratio	-0.30	(-163.83)	-0.21	(-117.68)	-0.43	(-216.99)	-0.55	(-252.55)	-0.49	(-66.37)	-0.23	(-38.24)
Debt/Wealth Ratio	3.28	(2.44)	2.65	(1.95)	2.92	(2.12)	2.07	(1.36)	-0.06	(-2.08)	-0.12	(-4.84)
Secondary Education	-4.80	(-11.03)	-4.56	(-10.38)	-3.29	(-6.20)	-2.97	(-5.07)	-8.06	(-7.22)	-1.01	(-1.12)
Higher Education	-4.87	(-8.18)	-4.65	(-7.73)	-2.67	(-3.75)	-2.52	(-3.21)	-9.29	(-6.12)	0.44	(0.36)
Ability	-3.22	(-10.84)	-3.51	(-11.69)	-3.22	(-8.79)	-3.11	(-7.70)	-0.02	(-0.03)	-0.40	(-0.66)
Size of Household	-0.74	(-7.85)	-1.07	(-11.17)	-0.33	(-2.98)	-0.24	(-2.00)	0.44	(1.44)	-0.62	(-1.52)
Immigration Status	0.21	(0.58)	0.31	(0.87)	0.54	(1.24)	-0.42	(-0.88)	-1.19	(-1.23)	0.21	(0.27)
Age	0.53	(8.86)	0.62	(10.14)	-0.30	(-4.23)	-0.34	(-4.29)	1.69	(9.05)	-0.34	(-2.23)
Age2	-0.59	(-11.48)	-0.63	(-12.09)	-0.21	(-3.16)	-0.26	(-3.58)	-1.74	(-11.30)	-0.10	(-3.82)
Unemployment Risk	27.52	(17.40)	32.61	(20.42)	18.45	(9.90)	11.49	(5.59)	-9.50	(-2.07)	3.71	(0.99)
Consumer Confidence	0.09	(4.10)	0.50	(23.53)	-0.36	(-13.19)	-0.51	(-16.68)	2.13	(38.72)	0.36	(8.05)
Stockholm Dummy	0.29	(1.07)	0.87	(3.15)	0.40	(1.19)	-0.15	(-0.42)	2.67	(3.94)	2.50	(4.49)
Lambda	-6.61	(-5.29)	-6.000	(-4.74)	-6.36	(-3.99)	-4.66	(-2.64)	-17.13	(-3.70)	11.74	(3.12)
Adj R2	0.012		0.013		0.019		0.019		0.023		0.024	

Table 5: Portfolio choice: investment in risky assets (Test of restriction H3).

We report the estimates of the determinants of the investment in risky financial assets. The dependent variable is either the percentage value of the investment in risky assets over overall wealth (Risky Share) or the dollar value of the investment (Risky Value). The variables are defined as in Table2. In Panels A and B, the main explanatory variable is represented by the correlations between financial and non-financial income. Positive and negative correlations ("+" and "-") are separately considered. In Panel A, we consider the Unadjusted measure of Variance, while in Panel B, we consider the Adjusted measure of Variance. The Unadjusted Variance is the value of the variance of labor and entrepreneurial income. The Adjusted Variance is the variance of labor (entrepreneurial) income, multiplied by a dummy that takes the value 1 if the correlation between labor (entrepreneurial) income and the investor's portfolio is <0 and -1 otherwise. In Panels C and D, the main explanatory variables are the measures of hedging. They are Γ_1 and Γ_2, where Γ_1 = Corr(Labor Inc., Market) - Corr(Labor Inc., Portfolio) and Γ_2 = Corr(Entrepreneurial Income, Market) - Corr(Entrepreneurial Income, Portfolio). In Panel D, we also include our indexes of familiarity. They are *Professional Proximity, Geographical Proximity* and *Holding Period.* The indexes are constructed as follows. For each stock in the portfolio we identify three measures of familiarity and then we aggregate them for each investor on the basis of his portfolio composition (i.e., using as weights the value of the portfolio holding). The first measure is *Professional Proximity.* It is a dummy taking the value 1 if the investor's profession is in the same area of activity as the company whose stock is under consideration, and zero otherwise. We use the one-digit SNI92 codes (similar to SIC codes) to identify the areas of activities. For example, in the case of an investor working in the mining sector holding a stock of a mining company, the dummy would be equal to 1. The second measure is *Geographical Proximity*, that is the proximity between the residence of the investor and the place where the company is located. In particular, we use the logarithm of the inverse of the distance between the ZIP code of the investor and the ZIP code of the closest branch/subsidiary of the company whose stock we consider. The greater the value of the variable, the closer the investor is to the stock. Finally, we construct a variable that proxies for *Holding Period*, based on the time a stock entered the investor's portfolio. Each index of familiarity is constructed weighting the measures for each investor on the basis of his portfolio composition. *RetPortfolio* is the return of the investors' portfolio in the previous 12 months, while *Market Volatility* is the volatility in the analogous period. We consider two specifications. We report the results of the first specification in Panel A and the results of the second specification in Panel B. *Debt/Wealth Ratio* is divided by 10,000. Estimates are performed using 2SLS. *Debt/Wealth Ratio* is divided by 10,000. The *t-statistics* are reported in parentheses.

Panel A: Correlations and Unadjusted Variance

	All households				***Low-wealth households***				***High-wealth households***			
	Risky Share		*Risky Value*		*Risky Share*		*Risky Value*		*Risky Share*		*Risky Value*	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Labor Income (Variance)	-0.025	(-20.97)	-0.233	(-27.59)	-0.023	(-16.32)	-0.181	(-28.78)	0.001	(1.10)	0.243	(25.24)
Entrepr. Income (Variance)	-0.015	(-33.63)	-0.140	(-42.44)	-0.020	(-35.42)	-0.097	(-37.96)	0.003	(12.79)	0.247	(83.76)
Corr(Labor Inc., Portfolio) +	0.766	(239.49)	4.368	(185.67)	0.719	(163.33)	3.134	(156.82)	0.015	(8.99)	0.681	(33.69)
Corr(Labor Inc., Portfolio) -	0.149	(44.30)	1.442	(58.26)	0.535	(117.34)	1.111	(53.70)	0.021	(12.39)	0.047	(1.59)
Corr(Entr. Inc., Portfolio) +	1.893	(287.51)	17.745	(369.76)	2.387	(240.90)	14.397	(321.86)	0.230	(85.57)	1.505	(41.51)
Corr(Entr. Inc., Portfolio) -	0.231	(37.54)	2.765	(61.57)	0.111	(11.69)	2.034	(47.45)	0.031	(10.55)	0.037	(1.12)
Control Variables												
Intercept	-0.319	(-6.14)	-1.368	(-3.66)	-0.018	(-0.29)	2.433	(8.86)	0.218	(10.83)	3.660	(14.63)
Labor Income (Level)	-0.112	(-56.00)	-1.005	(-69.83)	-0.098	(-41.11)	-0.911	(-84.72)	-0.006	(-4.89)	0.126	(8.78)
Entrepr. Income (Level)	0.107	(48.15)	0.850	(53.91)	0.132	(49.89)	0.591	(51.01)	-0.004	(-3.24)	0.078	(4.99)
Corr(Labor Inc., Real Estate)	0.060	(32.10)	-0.527	(-39.08)	0.015	(6.93)	-0.236	(-24.08)	-0.007	(-5.84)	0.165	(11.27)
Corr(Entr. Inc., Real Estate)	0.357	(128.56)	2.861	(142.93)	0.346	(97.07)	1.503	(94.08)	0.071	(49.74)	2.953	(166.32)
Market Volatility	20.273	(24.98)	138.309	(23.34)	11.166	(10.77)	55.835	(11.92)	2.245	(4.90)	-66.158	(-11.57)
RetMarket	0.300	(15.54)	2.400	(17.25)	0.140	(5.64)	0.928	(8.33)	-0.067	(-6.47)	-0.896	(-6.89)
RetPortfolio	-0.002	(-150.38)	-0.012	(-129.21)	0.004	(162.97)	0.000	(-2.22)	0.001	(125.32)	0.001	(19.17)
log(Financial Wealth)	-0.021	(-9.74)	0.190	(12.40)	-0.031	(-13.39)	0.094	(8.90)	-0.008	(-12.88)	0.015	(1.92)
log(Real Estate Wealth)	-0.043	(-94.08)	0.017	(5.26)	-0.052	(-109.39)	0.005	(2.18)	-0.005	(-23.89)	-0.014	(-5.49)
Capital Gains/Losses	0.003	(3.55)	0.017	(3.14)	0.003	(2.81)	0.014	(3.49)	-0.001	(-2.02)	0.003	(0.59)
Debt/Total Income Ratio	-0.066	(-0.48)	-0.877	(-0.86)	-0.062	(-0.40)	-0.706	(-1.00)	-0.073	(-0.57)	0.407	(0.26)
Debt/Wealth Ratio	-0.001	(-0.95)	-0.017	(-2.29)	-0.001	(-0.59)	-0.011	(-2.31)	-0.452	(-8.98)	-6.440	(-10.32)
Secondary Education	0.021	(3.97)	0.069	(1.79)	0.004	(0.72)	-0.103	(-3.72)	-0.017	(-5.89)	-0.059	(-1.65)
Higher Education	0.031	(8.15)	0.219	(7.97)	0.006	(1.24)	-0.021	(-1.02)	-0.014	(-6.70)	0.071	(2.78)
Ability	0.059	(21.50)	0.582	(29.33)	0.033	(9.98)	0.295	(19.63)	-0.004	(-3.09)	0.225	(12.98)
Size of Household	-0.006	(-8.28)	0.034	(6.14)	-0.009	(-10.21)	0.022	(5.38)	-0.003	(-6.12)	0.081	(12.36)
Immigration Status	0.011	(3.81)	0.148	(7.01)	-0.002	(-0.62)	0.183	(11.45)	0.000	(0.14)	0.036	(1.75)
Age	0.005	(8.39)	0.033	(8.47)	0.004	(6.55)	0.008	(2.92)	-0.001	(-4.50)	0.030	(7.17)
Age2	-0.004	(-7.91)	-0.021	(-6.49)	-0.003	(-5.49)	-0.006	(-2.20)	0.001	(3.94)	-0.019	(-5.54)
Unemployment Risk	-0.400	(-24.84)	-5.198	(-44.96)	-0.157	(-8.27)	-3.193	(-37.59)	0.018	(2.07)	-1.442	(-13.16)
Consumer Confidence	0.002	(11.44)	0.015	(10.64)	0.002	(7.42)	0.005	(4.24)	-0.001	(-9.85)	-0.007	(-5.14)
Stockholm Dummy	-0.025	(-11.47)	-0.303	(-19.17)	-0.014	(-5.01)	-0.154	(-12.66)	-0.001	(-0.46)	-0.091	(-6.20)
Lagged Dependent Variable	0.122	(51.36)	-0.023	(-14.61)	0.121	(46.49)	0.007	(5.80)	0.881	(232.47)	0.288	(169.09)
Lambda	0.185	(15.29)	1.038	(11.90)	0.121	(8.23)	0.356	(5.40)	-0.019	(-2.04)	0.333	(2.80)
Adj R2	0.54		0.22		0.61		0.10		0.50		0.18	

Panel B: Correlations and Adjusted Variance

	All households				***Low-wealth households***				***High-wealth households***			
	Risky Share		*Risky Value*		*Risky Share*		*Risky Value*		*Risky Share*		*Risky Value*	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Labor Income (Adj. Variance)	-0.036	(-33.87)	-0.328	(-43.62)	-0.028	(-22.98)	-0.225	(-41.05)	0.002	(2.28)	0.499	(51.27)
Entrepr. Income (Adj. Variance)	-0.020	(-45.06)	-0.182	(-59.54)	-0.025	(-45.98)	-0.120	(-50.83)	0.001	(3.46)	0.128	(39.42)
Corr(Labor Inc., Portfolio) +	0.688	(217.86)	3.484	(153.74)	0.593	(140.88)	2.297	(122.17)	0.028	(16.71)	1.715	(74.53)
Corr(Labor Inc., Portfolio) -	0.121	(37.12)	1.409	(60.16)	0.466	(108.64)	0.755	(39.39)	0.009	(4.96)	-0.055	(-1.67)
Corr(Entr. Inc., Portfolio) +	1.669	(255.99)	15.985	(345.36)	2.129	(225.59)	12.891	(307.77)	0.243	(90.05)	5.083	(122.71)
Corr(Entr. Inc., Portfolio) -	0.088	(14.79)	1.382	(32.55)	0.317	(35.44)	0.617	(15.55)	0.011	(3.67)	0.370	(9.94)
Control Variables												
Intercept	-0.266	(-5.34)	-0.746	(-2.13)	0.041	(0.70)	2.812	(11.12)	0.201	(10.31)	2.979	(10.90)
Labor Income (Level)	-0.129	(-66.93)	-1.021	(-75.37)	-0.111	(-49.17)	-0.908	(-91.23)	-0.006	(-5.01)	0.079	(4.88)
Entrepr. Income (Level)	0.107	(49.94)	0.847	(57.00)	0.131	(52.94)	0.587	(54.91)	-0.003	(-2.69)	0.145	(8.33)
Corr(Labor Inc., Real Estate)	-0.076	(-42.09)	-0.574	(-45.28)	-0.033	(-15.95)	-0.322	(-35.66)	-0.008	(-7.13)	-0.068	(-4.13)
Corr(Entr. Inc., Real Estate)	0.343	(127.75)	2.810	(148.75)	0.336	(100.33)	1.489	(100.77)	0.078	(54.67)	2.927	(146.30)
Market Volatility	20.313	(25.82)	131.588	(23.47)	11.265	(11.54)	55.866	(12.88)	2.764	(6.03)	-45.790	(-7.22)
RetMarket	0.293	(15.82)	2.216	(17.01)	0.130	(5.61)	0.833	(8.14)	-0.058	(-5.77)	-0.384	(-2.73)
RetPortfolio	-0.002	(-171.81)	-0.011	(-127.74)	0.004	(160.28)	-0.002	(-17.07)	0.001	(124.83)	0.005	(67.37)
log(Financial Wealth)	-0.022	(-10.90)	0.171	(11.96)	-0.034	(-15.30)	0.078	(8.09)	-0.008	(-12.71)	0.030	(3.40)
log(Real Estate Wealth)	-0.043	(-97.61)	0.015	(5.05)	-0.052	(-116.38)	0.004	(1.83)	-0.005	(-24.72)	-0.015	(-5.06)
Capital Gains/Losses	0.003	(3.64)	0.016	(3.19)	0.003	(2.89)	0.014	(3.60)	-0.001	(-1.80)	0.010	(1.85)
Debt/Total Income Ratio	-0.062	(-0.46)	-0.716	(-0.74)	-0.065	(-0.44)	-0.651	(-0.99)	-0.079	(-0.62)	-1.306	(-0.75)
Debt/Wealth Ratio	-8.992	(-0.88)	-0.017	(-2.28)	-5.542	(-0.54)	-109.381	(-2.40)	-0.047	(-9.35)	-0.659	(-9.49)
Secondary Education	0.028	(7.65)	0.038	(1.06)	0.000	(-0.01)	-0.127	(-4.99)	-0.016	(-5.79)	-0.031	(-0.79)
Higher Education	0.017	(3.21)	0.198	(7.66)	0.003	(0.70)	-0.027	(-1.42)	-0.013	(-6.52)	0.116	(4.06)
Ability	0.060	(22.60)	0.591	(31.65)	0.032	(10.04)	0.305	(22.01)	-0.004	(-3.11)	0.215	(10.98)
Size of Household	-0.007	(-9.98)	0.029	(5.52)	-0.011	(-12.16)	0.019	(4.85)	-0.003	(-6.39)	0.076	(10.44)
Immigration Status	0.013	(4.50)	0.156	(7.77)	0.000	(0.06)	0.191	(12.84)	0.000	(0.05)	0.070	(3.01)
Age	0.004	(7.85)	0.030	(8.15)	0.004	(6.45)	0.008	(2.96)	-0.001	(-4.34)	0.028	(6.14)
Age2	-0.003	(-7.63)	-0.019	(-6.21)	-0.003	(-5.49)	-0.006	(-2.38)	0.001	(3.80)	-0.020	(-5.21)
Unemployment Risk	-0.424	(-27.43)	-5.273	(-48.72)	-0.184	(-10.40)	-3.451	(-44.34)	0.017	(1.90)	-2.219	(-18.06)
Consumer Confidence	0.002	(11.18)	0.013	(9.87)	0.002	(7.09)	0.003	(2.87)	-0.001	(-9.45)	-0.003	(-2.27)
Stockholm Dummy	-0.027	(-12.61)	-0.304	(-20.37)	-0.015	(-5.83)	-0.168	(-14.95)	-0.001	(-0.94)	0.058	(3.51)
Lagged Dependent Variable	0.121	(52.20)	-0.020	(-13.59)	0.119	(48.36)	0.008	(7.14)	0.866	(228.32)	0.265	(139.93)
Lambda	0.176	(15.24)	0.915	(11.27)	0.109	(7.95)	0.266	(4.41)	-0.014	(-1.53)	0.646	(5.08)
Adj R2	0.54		0.22		0.61		0.10		0.50		0.18	

Panel C: Indexes of Hedging.

	All households				***Low-wealth households***				***High-wealth households***			
	Risky Share		*Risky Value*		*Risky Share*		*Risky Value*		*Risky Share*		*Risky Value*	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Γ_1	-1.105	(-368.79)	-3.578	(-210.57)	-1.016	(-272.26)	-3.251	(-186.29)	-0.002	(-2.77)	0.028	(3.14)
Γ_2	-1.676	(-295.55)	-12.798	(-398.13)	-2.070	(-264.78)	-13.591	(-371.64)	-0.091	(-63.03)	-0.356	(-23.86)
Control Variables												
Intercept	0.054	(0.70)	5.021	(11.48)	0.270	(3.25)	4.836	(12.50)	0.209	(11.53)	3.950	(21.04)
Labor Income (Variance)	0.016	(9.13)	0.077	(7.77)	-0.002	(-1.22)	-0.078	(-8.79)	0.001	(1.53)	0.000	(0.00)
Entrepr. Income (Variance)	0.012	(18.85)	0.088	(23.57)	0.008	(10.69)	0.054	(15.33)	0.015	(75.42)	0.119	(56.45)
Labor Income (Level)	0.064	(21.57)	0.393	(23.22)	-0.017	(-5.18)	-0.451	(-29.67)	-0.011	(-10.07)	-0.023	(-2.12)
Entrepr. Income (Level)	0.067	(20.02)	0.345	(18.62)	0.092	(25.51)	0.412	(25.22)	-0.003	(-2.69)	-0.019	(-1.62)
Corr(Labor Inc., Real Estate)	0.115	(41.22)	0.492	(31.07)	0.044	(15.00)	-0.021	(-1.53)	-0.016	(-15.22)	0.026	(2.39)
Corr(Entr. Inc., Real Estate)	0.137	(33.28)	1.017	(43.68)	0.089	(18.57)	0.574	(25.59)	0.097	(76.61)	0.371	(28.09)
Market Volatility	3.368	(2.72)	-30.424	(-4.34)	-3.053	(-2.17)	-35.808	(-5.44)	1.777	(4.30)	-96.681	(-22.63)
RetMarket	0.002	(0.08)	-0.834	(-5.13)	-0.050	(-1.51)	-0.416	(-2.66)	-0.065	(-6.94)	-1.048	(-10.70)
RetPortfolio	0.002	(99.42)	0.022	(197.92)	0.005	(144.38)	0.005	(34.37)	0.000	(-22.54)	0.000	(0.67)
log(Financial Wealth)	-0.033	(-10.40)	0.015	(0.86)	-0.036	(-11.38)	0.050	(3.38)	-0.008	(-14.30)	0.279	(45.97)
log(Real Estate Wealth)	-0.044	(-64.93)	-0.010	(-2.72)	-0.052	(-80.33)	0.003	(0.91)	-0.005	(-27.01)	-0.007	(-3.65)
Capital Gains/Losses	0.005	(4.85)	0.028	(4.59)	0.005	(3.78)	0.021	(3.66)	-0.001	(-2.38)	0.018	(4.74)
Debt/Total Income Ratio	0.041	(0.19)	0.207	(0.17)	-0.012	(-0.06)	-0.448	(-0.45)	-0.097	(-0.85)	2.347	(1.98)
Debt/Wealth Ratio	0.000	(-0.14)	-0.010	(-1.06)	0.000	(-0.08)	-0.009	(-1.35)	-0.501	(-11.02)	-0.225	(-0.48)
Secondary Education	0.024	(3.01)	-0.058	(-1.28)	0.006	(0.73)	-0.119	(-3.04)	-0.014	(-5.26)	-0.066	(-2.45)
Higher Education	0.003	(0.51)	-0.057	(-1.76)	-0.010	(-1.62)	-0.111	(-3.86)	-0.009	(-4.61)	-0.036	(-1.85)
Ability	-0.008	(-1.94)	0.090	(3.85)	0.002	(0.38)	0.181	(8.51)	-0.002	(-1.95)	0.004	(0.30)
Size of Household	0.003	(2.48)	0.057	(8.56)	-0.007	(-5.63)	0.022	(3.72)	-0.003	(-5.44)	-0.025	(-5.02)
Immigration Status	-0.013	(-2.90)	0.079	(3.20)	-0.009	(-1.76)	0.190	(8.45)	0.003	(1.77)	0.031	(2.00)
Age	0.007	(8.10)	0.010	(2.07)	0.004	(4.74)	0.001	(0.25)	-0.001	(-4.38)	-0.003	(-1.08)
Age2	-0.005	(-7.97)	-0.004	(-1.08)	-0.003	(-4.42)	-0.002	(-0.48)	0.001	(3.57)	0.001	(0.25)
Unemployment Risk	0.351	(14.58)	-0.237	(-1.74)	0.200	(7.73)	-1.889	(-15.74)	-0.001	(-0.16)	-0.103	(-1.25)
Consumer Confidence	0.001	(4.09)	-0.005	(-3.25)	0.001	(3.06)	-0.004	(-2.32)	-0.001	(-10.90)	-0.005	(-5.00)
Stockholm Dummy	0.015	(4.59)	0.029	(1.54)	0.007	(1.85)	-0.036	(-2.08)	-0.002	(-2.28)	0.001	(0.06)
Lagged Dependent Variable	0.165	(44.99)	0.043	(23.51)	0.135	(37.89)	0.032	(18.85)	0.884	(258.78	0.336	(266.77
Lambda	0.065	(3.62)	-0.347	(-3.40)	0.067	(3.37)	-0.033	(-10.35)	-0.01247	(-2.28)	0.318	(3.55)
Adj R2	0.54		0.19		0.61		0.09		0.50		0.17	

Panel D: Indexes of Hedging and Indexes of Familiarity

	All households				*Low-wealth households*				*High-wealth households*			
	Risky Share		*Risky Value*		*Risky Share*		*Risky Value*		*Risky Share*		*Risky Value*	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Γ_1	-0.783	(-288.87)	-1.583	(-102.61)	-0.821	(-243.16)	-2.328	(-147.57)	-0.002	(-2.86)	0.009	(0.98)
Γ_2	-1.590	(-349.65)	-12.566	(-431.03)	-1.985	(-280.77)	-12.718	(-384.90)	-0.090	(-62.30)	-0.391	(-25.17)
Geographical proximity	0.000	(0.34)	0.075	(16.12)	0.006	(6.27)	0.064	(13.70)	-0.001	(-3.06)	0.040	(12.14)
Professional proximity	0.082	(5.74)	0.352	(4.30)	0.046	(2.37)	0.089	(1.98)	-0.001	(-0.17)	-0.543	(-12.12)
Holding Period	0.008	(6.42)	0.065	(8.82)	0.011	(7.66)	0.072	(10.61)	0.015	(5.30)	0.731	(101.36
Control Variables												
Intercept	0.077	(1.10)	5.233	(13.16)	0.300	(3.99)	4.998	(14.29)	0.196	(10.72)	2.922	(14.99)
Labor Income (Variance)	0.017	(10.51)	0.066	(7.33)	-0.002	(-1.43)	-0.077	(-9.64)	0.001	(1.67)	0.006	(0.80)
Entrepr. Income (Variance)	0.013	(21.67)	0.084	(24.84)	0.008	(11.07)	0.050	(15.52)	0.015	(75.20)	0.135	(62.21)
Labor Income (Level)	0.089	(33.03)	0.445	(29.00)	-0.012	(-3.97)	-0.423	(-30.76)	-0.010	(-9.98)	-0.032	(-2.85)
Entrepr. Income (Level)	0.076	(25.38)	0.383	(22.73)	0.094	(28.79)	0.411	(27.81)	-0.003	(-2.74)	-0.012	(-0.97)
Corr(Labor Inc., Real Estate)	0.120	(47.61)	0.452	(31.48)	0.040	(15.06)	-0.033	(-2.61)	-0.016	(-15.01)	0.037	(3.23)
Corr(Entr. Inc., Real Estate)	0.173	(46.54)	1.137	(53.83)	0.088	(20.18)	0.544	(26.84)	0.096	(76.08)	0.383	(28.04)
Market Volatility	1.635	(1.43)	-17.145	(-2.63)	-2.628	(-2.01)	-25.141	(-4.11)	1.572	(3.75)	-134.889	(-29.72)
RetMarket	-0.025	(-0.97)	-0.737	(-4.95)	-0.056	(-1.85)	-0.348	(-2.44)	-0.069	(-7.34)	-1.492	(-14.69)
RetPortfolio	0.002	(136.76)	0.020	(195.34)	0.004	(149.71)	0.004	(25.25)	0.000	(-14.24)	0.000	(0.46)
log(Financial Wealth)	-0.035	(-12.07)	0.015	(0.94)	-0.038	(-13.04)	0.046	(3.40)	-0.009	(-14.60)	0.265	(42.03)
log(Real Estate Wealth)	-0.044	(-71.91)	-0.009	(-2.62)	-0.052	(-89.10)	0.002	(0.78)	-0.005	(-27.00)	-0.004	(-2.12)
Capital Gains/Losses	0.005	(4.70)	0.024	(4.24)	0.004	(3.68)	0.018	(3.51)	-0.001	(-2.38)	0.019	(5.03)
Debt/Total Income Ratio	0.059	(0.30)	0.260	(0.23)	-0.011	(-0.06)	-0.428	(-0.47)	-0.098	(-0.85)	1.974	(1.59)
Debt/Wealth Ratio	-1.340	(-0.09)	-87.120	(-1.06)	0.611	(0.05)	-82.355	(-1.30)	-0.492	(-10.86)	1.346	(2.75)
Secondary Education	0.026	(3.57)	-0.050	(-1.23)	0.005	(0.66)	-0.121	(-3.44)	-0.014	(-5.41)	-0.101	(-3.60)
Higher Education	0.006	(1.08)	-0.035	(-1.20)	-0.010	(-1.78)	-0.107	(-4.10)	-0.009	(-4.75)	-0.055	(-2.74)
Ability	0.001	(0.17)	0.143	(6.72)	0.004	(0.94)	0.185	(9.63)	-0.003	(-2.09)	-0.029	(-2.17)
Size of Household	0.001	(0.58)	0.040	(6.66)	-0.008	(-7.49)	0.016	(3.03)	-0.003	(-5.28)	-0.019	(-3.74)
Immigration Status	-0.015	(-3.68)	0.060	(2.64)	-0.008	(-1.88)	0.180	(8.82)	0.003	(1.84)	0.031	(1.92)
Age	0.006	(8.72)	0.010	(2.41)	0.004	(5.19)	0.002	(0.47)	-0.001	(-4.56)	-0.004	(-1.36)
Age2	-0.005	(-8.00)	-0.003	(-0.89)	-0.003	(-4.74)	-0.002	(-0.59)	0.001	(3.76)	0.001	(0.54)
Unemployment Risk	0.304	(13.96)	-0.608	(-4.91)	0.183	(7.82)	-1.891	(-17.41)	-0.001	(-0.15)	0.216	(2.53)
Consumer Confidence	0.001	(3.80)	-0.006	(-4.25)	0.001	(2.89)	-0.004	(-2.85)	-0.001	(-11.06)	-0.006	(-5.57)
Stockholm Dummy	0.015	(5.19)	-0.008	(-0.47)	0.006	(1.72)	-0.051	(-3.26)	-0.002	(-1.79)	-0.272	(-10.22)
Lagged Dependent Variable	0.165	(49.78)	0.040	(23.52)	0.133	(41.20)	0.028	(18.03)	0.884	(256.72)	0.295	(214.90
Lambda	0.053	(3.28)	-0.340	(-3.66)	0.060	(3.32)	-0.052	(-3.62)	-0.015	(-2.78)	0.114	(2.23)
Adj R2	0.54		0.23		0.61		0.12		0.50		0.20	

Table 6: Profits of high-wealth and low-wealth households

We report tests of the difference of two measures of profits for high-wealth and low-wealth households. The measures are $P_{Wt}=(Wealth_t/Wealth_{t-1}-1)$ and $P_{Rt}=((Capital\ Gains/Losses_t+Dividends_t)/RISKY\_ASSETS_{t-1})$, where capital gains and losses are the reported realized gains/losses of the household in risky assets at year *t*. Panel A reports *t-tests*, *Wilcoxon* and *Kolmogorov-Smirnov tests* of the equality of profits between high-wealth vs. low-wealth households. For the *t-tests* we used *Satterwhaite* version of the *t-tests* that assumes inequality of variances in two sub-samples. In all cases equality of variances was rejected at the 1% level. In Panels B and C, households are separated into 2 groups: the "hedgers" (defined as the households with positive Γ_1) and non-hedgers (households with negative Γ_1). Panel B reports the tests of difference of profits between high- and low-wealth households after they have been separated into hedgers and non-hedgers. Panel C reports the tests of difference of profits between hedgers and non-hedgers performed separately for high-wealth and low-wealth households.

Panel A: Profit measures

	Mean		Median		T-Test		Wilcoxon Test		Kolmogorov-Smirnov Test	
Variable	*Low-wealth*	*High-wealth*	*Low-wealth*	*High-wealth*	*t value*	*p-value*	*Z*	*p-value*	*Ksa*	*p-value*
Π_R	0.130	0.221	0.000	0.056	41.94	<.0001	120.39	<.0001	62.83	<.0001
Π_{Wt}	0.048	0.097	0.064	0.077	23.43	<.0001	11.34	<.0001	16.89	<.0001

Panel B: Profit measures (low- vs. high- wealth households)

		Mean		Median		T-Test		Wilcoxon Test		Kolmogorov-Smirnov Test	
Variable	*Hedging*	*Low-wealth*	*High-wealth*	*Low-wealth*	*High-wealth*	*t value*	*p-value*	*Z*	*p-value*	*Ksa*	*p-value*
Π_R	yes	0.123	0.217	0.000	0.046	36.91	<.0001	96.40	<.0001	48.63	<.0001
Π_R	no	0.194	0.230	0.045	0.074	7.44	<.0001	31.92	<.0001	18.66	<.0001
Π_{Wt}	yes	0.043	0.083	0.061	0.069	17.72	<.0001	3.56	0.0002	14.76	<.0001
Π_{Wt}	no	0.091	0.131	0.093	0.100	6.11	<.0001	2.55	0.0054	9.01	<.0001

Panel C: Profit measures (hedgers- vs. non-hedgers)

		Mean		Median		T-Test		Wilcoxon Test		Kolmogorov-Smirnov Test	
Variable	*Wealthy*	*Hedgers*	*Non-Hedgers*	*Hedgers*	*Non-Hedgers*	*t value*	*p-value*	*Z*	*p-value*	*Ksa*	*p-value*
Π_R	yes	0.217	0.230	0.046	0.074	3.15	0.0020	34.40	<.0001	22.44	<.0001
Π_R	no	0.123	0.194	0.000	0.045	19.99	<.0001	60.75	<.0001	32.96	<.0001
Π_{Wt}	yes	0.083	0.091	0.069	0.100	19.48	<.0001	24.09	<.0001	13.62	<.0001
Π_{Wt}	no	0.043	0.131	0.061	0.093	7.62	<.0001	17.47	<.0001	12.78	<.0001

Table 7: Determinants of Profits

This table reports estimates for the two measures of profits defined in Table 8. Methodology and variables are identical those described in Tables 5 and 6. We report the results for estimates based on Heckman correction and 2SLS. The *t-statistics* are reported in parentheses.

Panel A: Determinants of Π_{Ft}

	All households				***Low-wealth households***				***High-wealth households***			
	I		**II**		**I**		**II**		**I**		**II**	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Γ_1	0.005	(2.10)	0.010	(4.51)	0.122	(44.53)	0.155	(54.55)	0.000	(0.06)	0.000	(-0.11)
Γ_2	0.000	(-0.07)	0.002	(0.49)	0.013	(2.34)	0.013	(2.11)	0.000	(0.01)	-0.002	(-0.30)
Geographical proximity			0.035	(54.21)			0.058	(69.98)			0.017	(13.97)
Professional proximity			-0.022	(-1.93)			0.045	(2.77)			-0.018	(-0.97)
Holding Period			0.018	(17.26)			0.120	(99.07)			0.054	(24.14)
Control Variables												
Intercept	0.291	(5.12)	0.252	(4.45)	0.217	(3.54)	0.162	(2.56)	-0.042	(-0.52)	-0.080	(-0.97)
Labor Income (Variance)	0.028	(22.05)	0.024	(18.73)	0.031	(22.03)	0.036	(24.49)	0.020	(6.37)	0.024	(7.51)
Entrepr. Income (Variance)	0.000	(-0.79)	-0.001	(-1.64)	0.001	(1.53)	0.002	(3.16)	-0.002	(-2.14)	-0.002	(-1.94)
Labor Income (Level)	0.187	(85.38)	0.169	(77.49)	0.225	(93.62)	0.260	(104.40)	0.135	(28.76)	0.157	(33.18)
Entrepr. Income (Level)	-0.051	(-21.43)	-0.052	(-21.76)	-0.029	(-11.23)	-0.029	(-10.95)	-0.047	(-9.27)	-0.054	(-10.58)
Corr(Labor Inc., Real Estate)	0.053	(25.86)	0.045	(21.83)	0.089	(40.77)	0.100	(44.24)	0.030	(6.42)	0.038	(7.95)
Corr(Entr. Inc., Real Estate)	0.010	(3.17)	0.014	(4.75)	0.071	(20.05)	0.091	(24.64)	-0.030	(-5.20)	-0.085	(-14.84)
Market Volatility	-7.434	(-8.22)	2.120	(2.28)	-3.985	(-3.86)	-5.564	(-5.05)	-5.071	(-2.73)	-6.695	(-3.50)
RetMarket	-0.187	(-8.87)	-0.073	(-3.45)	-0.134	(-5.42)	-0.129	(-5.00)	-0.096	(-2.26)	-0.143	(-3.35)
log(Financial Wealth)	-0.014	(-5.91)	-0.008	(-3.52)	-0.014	(-6.16)	-0.013	(-5.28)	-0.020	(-7.71)	-0.020	(-7.61)
log(Real Estate Wealth)	0.000	(-0.45)	0.000	(0.80)	-0.001	(-1.21)	-0.001	(-1.45)	-0.001	(-1.03)	-0.001	(-0.65)
Capital Gains/Losses	0.000	(0.37)	0.000	(0.08)	-0.001	(-0.86)	-0.001	(-0.58)	0.003	(2.07)	0.004	(2.33)
Debt/Total Income Ratio	0.157	(0.99)	0.146	(0.93)	0.152	(0.96)	0.174	(1.06)	0.022	(0.04)	0.082	(0.16)
Debt/Wealth Ratio	2.659	(0.23)	3.646	(0.31)	-0.533	(-0.05)	0.001	(1.11)	1.297	(6.35)	1.474	(7.13)
Secondary Education	0.052	(8.83)	0.056	(9.56)	0.057	(9.17)	0.064	(9.97)	0.062	(5.35)	0.060	(5.11)
Higher Education	0.022	(5.30)	0.029	(6.94)	0.026	(5.73)	0.034	(7.17)	0.049	(5.83)	0.047	(5.61)
Ability	-0.026	(-8.63)	-0.016	(-5.28)	0.000	(-0.11)	0.009	(2.68)	-0.013	(-2.38)	-0.021	(-3.70)
Size of Household	0.015	(17.13)	0.017	(19.97)	0.012	(13.26)	0.016	(16.84)	0.033	(15.29)	0.033	(15.45)
Immigration Status	-0.048	(-14.77)	-0.051	(-15.97)	-0.053	(-15.03)	-0.055	(-14.95)	-0.038	(-5.70)	-0.042	(-6.15)
Age	0.003	(4.65)	0.004	(7.10)	0.003	(4.84)	0.004	(5.66)	0.010	(7.25)	0.010	(7.43)
Age2	-0.001	(-2.09)	-0.002	(-4.94)	-0.001	(-1.92)	-0.002	(-3.07)	-0.007	(-6.27)	-0.007	(-6.50)
Unemployment Risk	0.382	(21.66)	0.287	(16.31)	0.358	(18.89)	0.329	(16.78)	0.076	(2.14)	0.117	(3.23)
Consumer Confidence	0.000	(-2.04)	0.000	(-1.70)	0.000	(-0.14)	0.000	(0.08)	0.000	(-0.71)	-0.001	(-1.70)
Stockholm Dummy	0.001	(0.29)	-0.019	(-7.88)	-0.002	(-0.90)	-0.014	(-5.09)	-0.016	(-3.27)	-0.022	(-4.42)
Lambda	-0.103	(-7.80)	-0.059	(-4.48)	-0.104	(-7.09)	-0.090	(-5.89)	0.030	(1.78)	0.015	(0.37)
Adj R2	0.01		0.01		0.01		0.01		0.01		0.01	

Panel B: Determinants of Π_{Wt}

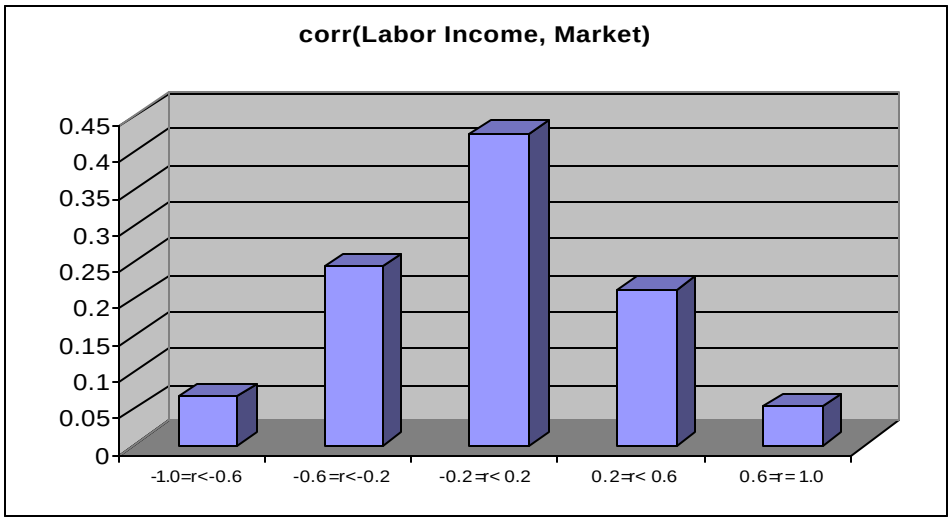
	All households				*Low-wealth households*				*High-wealth households*			
	I		II		I		II		I		II	
Variable	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
Γ_1	-0.019	(-5.84)	-0.011	(-3.49)	-0.090	(-18.29)	-0.061	(-12.11)	-0.007	(-3.36)	0.003	(1.56)
Γ_2	0.000	(0.07)	0.001	(0.12)	-0.016	(-1.49)	-0.019	(-1.77)	0.002	(0.71)	0.001	(0.15)
Geographical proximity			0.031	(32.75)			0.059	(40.43)			0.061	(92.24)
Professional proximity			0.041	(2.37)			0.090	(3.14)			-0.014	(-1.40)
Holding Period			0.073	(48.07)			0.143	(67.07)			0.037	(31.02)
Control Variables												
Intercept	-0.318	(-3.85)	-0.385	(-4.64)	-0.668	(-6.09)	-0.771	(-6.95)	0.506	(11.57)	0.517	(11.57)
Labor Income (Variance)	-0.011	(-5.68)	-0.008	(-4.34)	-0.008	(-3.00)	0.000	(-0.02)	-0.005	(-2.83)	-0.006	(-3.27)
Entrepr. Income (Variance)	-0.002	(-3.18)	-0.002	(-2.63)	-0.003	(-2.66)	-0.001	(-1.29)	-0.001	(-2.64)	-0.002	(-4.02)
Labor Income (Level)	-0.012	(-3.77)	0.007	(2.09)	0.015	(3.45)	0.068	(15.70)	-0.008	(-3.06)	0.001	(0.58)
Entrepr. Income (Level)	0.026	(7.39)	0.027	(7.66)	0.044	(9.53)	0.049	(10.39)	0.009	(3.43)	0.008	(2.85)
Corr(Labor Inc., Real Estate)	0.019	(6.38)	0.028	(9.32)	0.072	(18.34)	0.096	(24.15)	0.005	(1.80)	0.002	(0.61)
Corr(Entr. Inc., Real Estate)	-0.011	(-2.40)	-0.016	(-3.57)	-0.021	(-3.36)	-0.005	(-0.82)	-0.034	(-11.09)	-0.117	(-37.38)
Market Volatility	-10.635	(-8.04)	-12.053	(-8.85)	3.942	(2.12)	-1.531	(-0.79)	-43.484	(-44.59)	-29.612	(-28.59)
RetMarket	0.084	(2.72)	0.073	(2.37)	0.108	(2.43)	0.080	(1.76)	0.078	(3.42)	0.172	(7.36)
log(Financial Wealth)	0.027	(8.04)	0.029	(8.38)	0.038	(9.05)	0.040	(9.27)	0.001	(0.75)	0.007	(4.60)
log(Real Estate Wealth)	0.020	(28.16)	0.020	(28.04)	0.025	(29.51)	0.025	(28.91)	0.007	(14.43)	0.007	(14.20)
Capital Gains/Losses	-0.011	(-9.37)	-0.011	(-9.14)	-0.011	(-6.56)	-0.010	(-6.25)	-0.011	(-12.27)	-0.011	(-12.84)
Debt/Total Income Ratio	0.156	(0.67)	0.164	(0.71)	0.187	(0.66)	0.216	(0.75)	0.061	(0.23)	0.158	(0.56)
Debt/Wealth Ratio	-0.005	(-2.73)	-0.004	(-2.25)	-0.004	(-2.24)	-0.003	(-1.43)	-4.730	(-44.03)	-4.926	(-43.98)
Secondary Education	0.005	(0.64)	0.010	(1.22)	0.025	(2.24)	0.036	(3.18)	-0.001	(-0.12)	-0.003	(-0.39)
Higher Education	-0.003	(-0.53)	0.002	(0.33)	0.010	(1.17)	0.020	(2.43)	-0.008	(-1.84)	-0.003	(-0.55)
Ability	-0.001	(-0.25)	0.005	(1.12)	0.011	(2.87)	0.026	(4.27)	0.000	(-0.01)	0.009	(3.01)
Size of Household	-0.004	(-2.90)	-0.001	(-0.69)	0.003	(1.63)	0.008	(4.59)	-0.004	(-3.46)	-0.002	(-1.98)
Immigration Status	-0.025	(-5.32)	-0.025	(-5.36)	-0.047	(-7.33)	-0.048	(-7.37)	0.013	(3.51)	0.009	(2.44)
Age	0.004	(4.74)	0.005	(5.41)	0.005	(4.69)	0.006	(5.39)	-0.004	(-5.40)	-0.001	(-0.77)
Age2	-0.002	(-3.04)	-0.003	(-3.94)	-0.002	(-2.39)	-0.003	(-3.21)	0.003	(4.68)	0.000	(-0.53)
Unemployment Risk	0.069	(2.71)	0.040	(1.55)	0.081	(2.37)	0.043	(1.25)	0.055	(2.85)	-0.044	(-2.21)
Consumer Confidence	0.001	(2.81)	0.001	(2.51)	0.001	(3.09)	0.001	(3.24)	0.000	(1.83)	0.000	(-1.17)
Stockholm Dummy	0.019	(5.55)	0.010	(2.74)	0.012	(2.40)	0.001	(0.29)	0.041	(15.83)	-0.001	(-0.50)
Lambda	0.022	(2.16)	0.036	(2.83)	0.080	(3.03)	0.092	(3.45)	-0.116	(-5.59)	-0.056	(-2.62)
Adj R2	0.02		0.02		0.02		0.02		0.10		0.10	

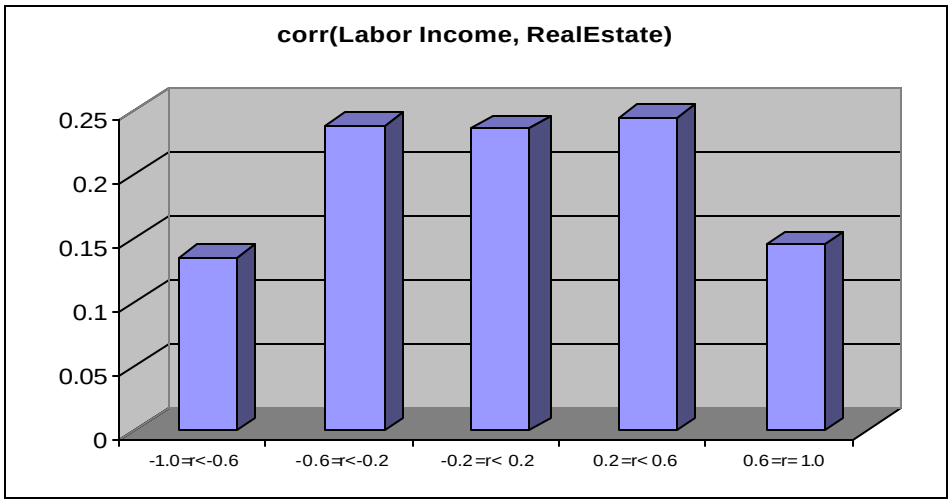
Fig.1: Frequency plots for the correlation between conditional rate of growth of labor income and overall stock market Index (SIX Index), regional real estate indices (Englund *et. al.*, 1998) and return on household portfolio of risky assets (RET_PORT). Percentage of the total sample is along the Y-axis, range of values of the correlation cœfficients are along the X-axis. We use five ranges for correlations: from -1 to –0.6, from -0.6 to -0.2, from –0.2 to 0.2, from 0.2 to 0.6 and from 0.6 to 1.

Fig.2: Frequency plots for correlation between conditional rate of growth of entrepreneurial income and overall stock market Index (SIX Index), regional real estate indices (Englund *et. al.*, 1998) and return on household portfolio of risky assets (RET_PORT). Percentage of the total sample is along the Y-axis, range of values of the correlation coefficients are along the X-axis. We use five ranges for correlations: from -1 to –0.6, from -0.6 to -0.2, from –0.2 to 0.2, from 0.2 to 0.6 and from 0.6 to 1.

Fig.3: We report stock market participation rate (Fig. 3A), average share of risky asset in overall portfolio (Fig. 3B) and average share of risky assets conditional on stock market participation (Fig. 3C) for overall population, non-wealthy and wealthy investors in different age groups.

Figure 1


corr(Labor Income, Market)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1.0=r<-0.6
-0.6=r<-0.2
-0.2=r< 0.2
0.2=r< 0.6
0.6=r=1.0


corr(Labor Income, RealEstate)
0.25
0.2
0.15
0.1
0.05
0
-1.0=r<-0.6
-0.6=r<-0.2
-0.2=r< 0.2
0.2=r< 0.6
0.6=r=1.0

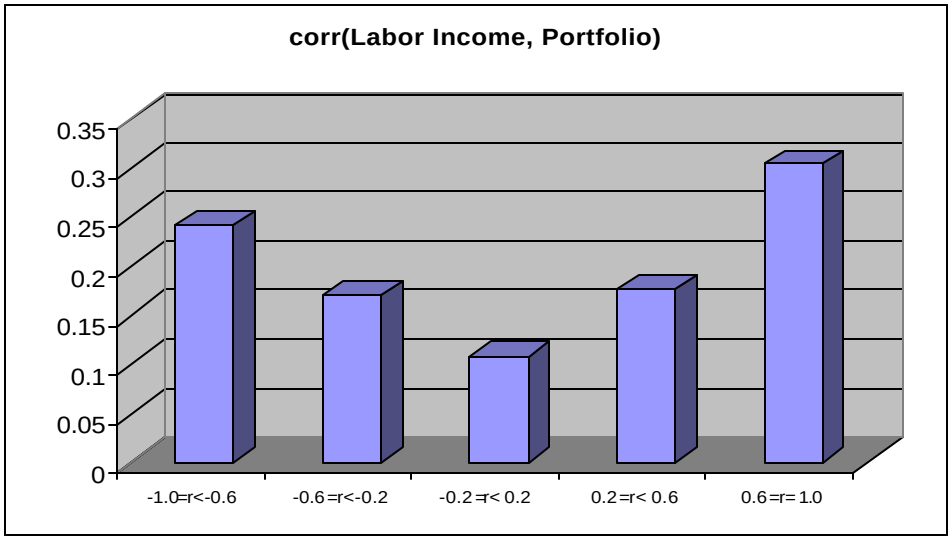
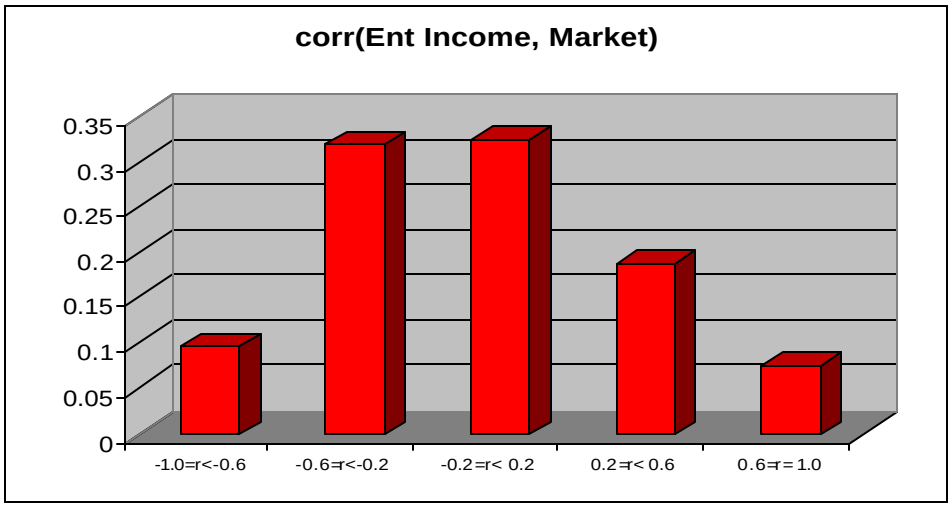
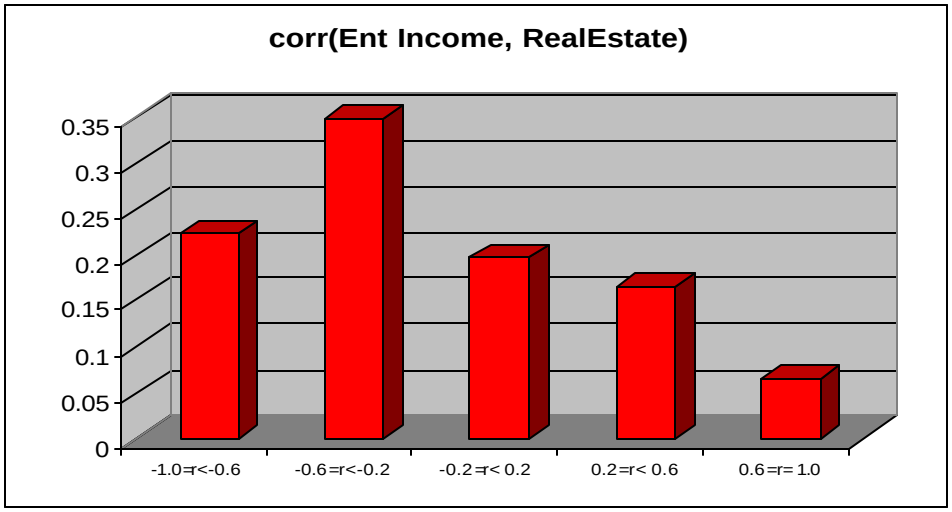

corr(Labor Income, Portfolio)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1.0=r<-0.6
-0.6=r<-0.2
-0.2=r< 0.2
0.2=r< 0.6
0.6=r=1.0

Figure 2


corr(Ent Income, Market)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1.0≤r<-0.6
-0.6≤r<-0.2
-0.2≤r< 0.2
0.2≤r< 0.6
0.6≤r≤1.0


corr(Ent Income, RealEstate)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1.0≤r<-0.6
-0.6≤r<-0.2
-0.2≤r< 0.2
0.2≤r< 0.6
0.6≤r≤1.0

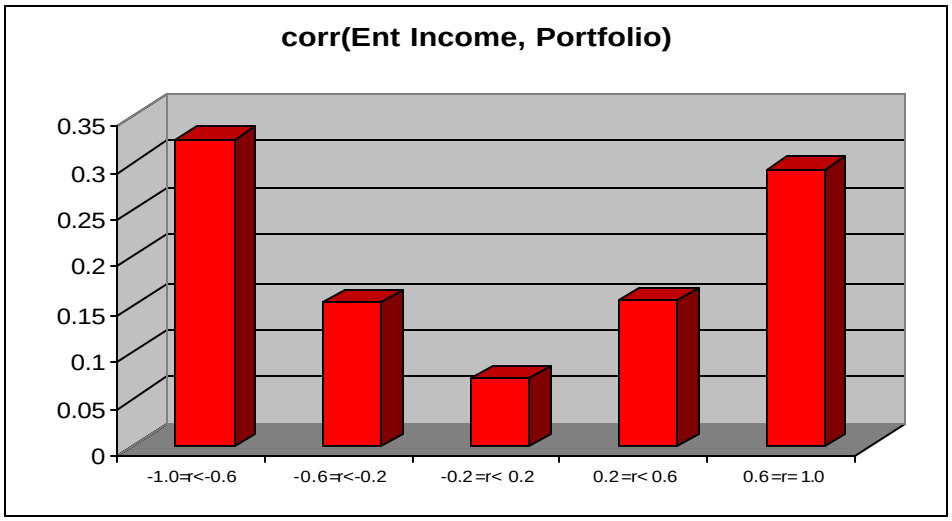
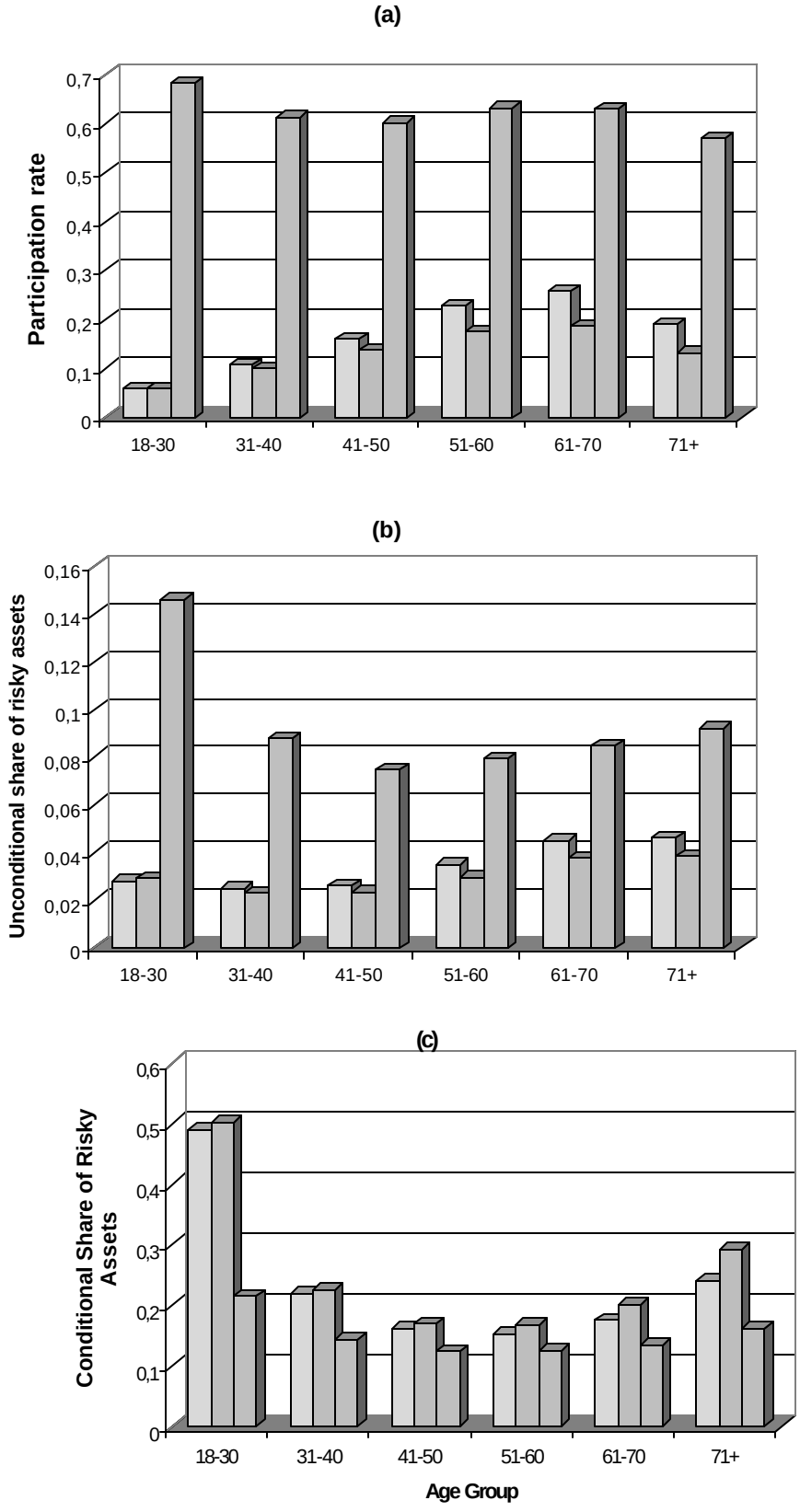

corr(Ent Income, Portfolio)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1.0≤r<-0.6
-0.6≤r<-0.2
-0.2≤r< 0.2
0.2≤r< 0.6
0.6≤r≤1.0

Figure 3


(a)
Participation rate
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
18-30
31-40
41-50
51-60
61-70
71+
(b)
Unconditional share of risky assets
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
18-30
31-40
41-50
51-60
61-70
71+
(c)
Conditional Share of Risky Assets
0,6
0,5
0,4
0,3
0,2
0,1
0
18-30
31-40
41-50
51-60
61-70
71+
Age Group