Rich Pickings? Risk, Return, and Skill in the Portfolios of the Wealthy

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ABSTRACT

This paper empirically investigates the portfolios of wealthy households and their implications for the dynamics of inequality. Using an administrative panel of all Swedish residents, we document that returns on financial wealth are on average 4% higher per year for households in the top 1% compared to the median household. These high average returns are primarily compensations for high levels of systematic risk. Abnormal risk-adjusted returns, linked for instance to informational advantages or exceptional investment skill, contribute only marginally to the high returns of the wealthy. Implications for inequality dynamics and public policy are discussed.

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Economic theory suggests that capital income should hold a fundamental role in the level and dynamics of wealth inequality. Returns on household savings accumulate multiplicatively over time and therefore have the potential to generate levels of wealth concentration that far exceed the concentration of income, especially at the top (Benhabib Bisin and Zhu 2011, Cagetti and de Nardi 2008). The impact of compounding on the wealth distribution might be considerably magnified if the wealthy select portfolios with high average returns, as Piketty (2014) suggests. Furthermore, capital income has the potential to reduce mobility across wealth groups: high average returns on investments might allow dynasties to perpetuate without having to rely on low consumption or costly-to-generate labor income (Piketty 2011).

Despite the theoretical importance of capital income, the empirical evidence is scant due to the limited information available on the richest households. In order to analyze empirically the investments of the wealthy, one needs to use a data set that meets several key requirements. Households at the very top of the wealth distribution should be sampled extensively and given strong incentives to truthfully report their holdings. The financial holdings of households should also be measured accurately and exhaustively. Traditional data sets do not meet these conditions. For instance, the U.S. Survey of Consumer Finances (SCF) contains only about 700 households in the top 1% of the wealth distribution and the response rate in this percentile is only 12% (Kennickell 2009), so the U.S. SCF does not provide an accurate description of investment strategies at the top. The few existing studies on differences in rates of return across the wealth distribution are restricted to U.S. foundations and university endowments, for which data on asset holdings and capital income flows are available only for broad asset classes (Piketty 2014, Saez and Zucman 2015). Because traditional data sets preclude the measurement of systematic risk and the estimation of expected returns, earlier studies only estimate differences in realized returns across wealth groups. The problem is that sample means of realized returns are highly noisy, which makes it difficult to assess the statistical significance of differences in returns.

The Swedish Income and Wealth Registry, which is based on the wealth tax records of the entire Swedish population between 1999 and 2007, satisfies the aforementioned key requirements for the analysis of the richest households. The registry has a response rate close to 100% and contains each year about 40,000 households from the top 1% of the wealth distribution.[1] The Swedish Income and Wealth Registry is also one of the most detailed and comprehensive sources for the analysis of household investment decisions, which has been used in earlier work (Betermier Calvet and Sodini 2015, Calvet Campbell and Sodini 2007, 2009a, 2009b, Calvet and Sodini 2014). The data include individual holdings of every

[1] For these reasons, the Swedish Income and Wealth Registry is recognized as the most accurate source for the measurement of top wealth holdings in Sweden (Roine and Waldenström 2009).

asset on December 31st of each year, which we match with the corresponding price data. We can therefore use standard asset pricing methods to evaluate portfolio performance, expected returns, and exposure to systematic and idiosyncratic risk at the level of each household.

Our paper makes several contributions to the literature. First, we show that wealthier households earn higher average returns than the median household by investing aggressively in risky assets bearing substantial systematic risk. Households in the top 10% of the wealth distribution select financial portfolios that earn on average 2.5% more per year than the median household. Furthermore, the top 1% of households earn 4.7% more per year and the top 0.1% earn 5.3% more per year than the median household. The higher returns of the wealthy stem from higher exposure to financial risk. We show that (i) richer households allocate a much larger share of their financial portfolios to risky assets, and (ii) within the risky portfolio, richer households load more aggressively on several risk factors, such as the market, size, and value factors. The allocation toward risky assets explains about 75% of the difference in expected returns between wealth groups, while the risk loadings of risky assets explains the remaining 25%.

Second, the strategies chosen by the wealthy involve a large increase in the volatility of portfolio returns. The standard deviation of the financial portfolio held by the top 1% households is about 24% per year, as compared to 12% for the median household. Despite these large differences in total risk-taking, there is no strong relationship between wealth and the level of diversification of the risky portfolio. Richer households tend to move away from funds and directly hold stocks, either in order to save on fund fees or because this allows them to follow investment styles not offered by mutual funds. When moving to direct stock ownership, rich households do not fully reach the level of diversification reached by the mutual funds available on the market.

Third, we find some support for the hypothesis that the richest households have exceptional investment skill within some asset classes. Our tests for the ability of rich individuals to pick stocks have weak power given the variability of returns and, while we do not find any stock alpha among the rich, we cannot rule out either significant effects of wealth. When we focus instead on mutual funds, we obtain more precise results and establish that the top 1% households select fund portfolios with significantly positive alphas. However, this fund-picking ability contributes very little to the returns of the rich compared to the effect of systematic risk.

Fourth, we investigate the implications of our findings for the dynamics of wealth inequality. Using a variance decomposition proposed in Campbell (2015), we find that the heterogeneity in investment returns makes a dominant contribution to the evolution of inequality in financial wealth. We also show that the impact of returns on inequality is primarily driven by differences in systematic risk exposure between rich and poor, while luck in realized returns is only second order.

The paper complements the empirical household finance literature relating wealth to investment risk and return. Richer individuals are known to be more risk-tolerant and therefore more willing to take on additional risk.[2] Until now, however, the literature has focused on the average investor. The contribution of the present paper is to analyze fine-grained differences in investment decisions at the top. This focus is motivated by recent evidence that in the United States, more than 90% of equity wealth is held by the top decile of the wealth distribution, 70% by the top percentile, and 45% by the top permille (Saez and Zucman 2015). The present paper zeroes in on the small group of investors that have a major impact on the aggregate demand for risky assets. Our work also contributes to the growing literature investigating how households select the risky assets and systematic risk exposures of their portfolios (e.g., Betermier Calvet and Sodini 2015, Calvet and Sodini 2014). We document that the wealthiest households are also able to reach higher-risk adjusted returns in their fund investments.

The findings of the paper deliver important insights for the current debate on wealth inequality and the policies undertaken to reduce it. We show that, for the most part, the higher returns earned by the wealthy are compensations for risk exposures that poorer households, for good or bad reasons, are unwilling to take. Thus, the higher returns earned by rich households do not seem to be driven primarily by exceptional investment skill or privileged access to private information. Our results suggest instead that the wealthy or their advisers understand the long-term benefits of exposing their investments to systematic risk and the various strategies that can achieve their desired risk exposures.

Our results suggest that the results of equilibrium models (Benhabib Bisin and Zhu 2011) can be strengthened by incorporating the empirical facts uncovered in this paper. The homogeneity of return variance assumed in theoretical work does not hold in the data, as idiosyncratic variance takes a bigger importance as households grow wealthier. Our analysis suggests that portfolio heterogeneity is empirically important and can help theorists explain higher levels of wealth inequality, especially at the top.

The rest of the paper is organized as follows. Section I describes the data and the

[2]See for instance Betermier, Calvet, and Sodini (2015), Calvet, Campbell, and Sodini (2007), Calvet and Sodini (2014), Guiso, Jappelli, and Terlizzese (1996), and King and Leape (1998). The link between financial wealth and risk-taking is consistent with utility functions with decreasing relative risk aversion, as in models of subsistence consumption (Carroll 2000, Wachter and Yogo 2010), habit formation (Campbell and Cochrane 1999), committed expenditures (Chetty and Szeidl 2007), or a “capitalist” taste for wealth (Bakshi and Chen 1996, Carroll 2002).

main variables. Section II reports the cross-sectional distribution of household wealth and income. Section III investigates the asset allocation of high-net-worth households. Section IV considers the risk and return of the financial portfolios held by the richest households. Section V examines the connection between financial portfolios and wealth inequality. Section VI concludes.

I. Data and Definition of Variables

A. ***Household Panel Data***

Disaggregated information of Swedish residents is available from the Swedish Income and Wealth Registry, which is compiled by Statistics Sweden from wealth tax returns. The data include the worldwide assets owned by each resident at year-end from 1999 to 2007. Bank account balances, debt, real estate holdings and stock and mutual fund investments are observed at the level of each account, property, or security. Most wealth items are reported at market value by third parties, which ensures an almost perfect response rate. Since Statistics Sweden assigns a household identification number to each resident, we can aggregate wealth at the household level and include income and demographic variables from other administrative sources.

B. ***Definition of Main Variables***

B.1. **Wealth Variables**

We use the following definitions throughout the paper. *Real estate wealth* consists of primary and secondary residences, rental, industrial, and agricultural property. We measure the household's *financial wealth* at date t as the total value of bank account balances, mutual funds, stocks, bonds, and other investment vehicles (bonds, derivatives, and capital insurance), excluding from consideration illiquid assets such as real estate or consumer durables, and defined contribution retirement accounts. Also, our measure of financial wealth is gross financial wealth and does not subtract mortgage or other household debt.

We define *gross wealth* as the sum of real estate and financial wealth. *Net wealth* is equal to gross wealth minus household debt. The *leverage ratio* is defined as total debt divided by gross wealth.

In our baseline results, households are ranked by net wealth, consistent with the empirical literature on wealth concentration.[3] One limitation of the Swedish Income and Wealth Registry is that it does not report unlisted business equity held by households, which represents a significant component of wealth at the top of the distribution (Wolff 2014).[4] Because our main explanatory variable is relative wealth rather than absolute wealth, the limitations of the Swedish data would matter if a household's rank in the distribution of net real estate and financial wealth (excluding business equity) had little correlation with its rank in the distribution of total net wealth. The U.S. Survey of Consumer Finances, which provide an exhaustive measurement of all wealth components, reveals that there is in fact a very high correlation between household rankings obtained with either measure, so that this limitation of the data is not a major of source of concern.[5]

B.2. **Real Estate Portfolio**

Residential real estate consists of properties that serve the purpose of housing consumption (main residence and holiday homes), while *commercial real estate* corresponds to properties that are primarily investment vehicles (rental, agricultural, and industrial properties). Residential properties provide a hedge against variation in the cost of housing and in this sense reduce household risk exposure;[6] furthermore, due to indivisibilities and moving costs, their contribution to wealth creation is likely to be small because housing dividends have to be consumed and capital gains are not realized unless the owner moves to a less valuable type of housing (Buiter 2010; Flavin and Yamashita 2002). By contrast, commercial real estate does not have a hedging value and is not subject to the housing constraints of their owners; therefore, it unambiguously increases the risk of household portfolios. For these reasons, we will classify commercial properties as risky investments (along with the risky securities we discuss in the next Section), while residential real estate will be treated as a separate category.

[3] See Roine and Waldenström (2009) for Sweden.

[4] We are also unable to measure pension wealth in the data, except for capital insurance accounts, and consumer durables. This does not pose a big problem given that this type of wealth is negligible at the top of the wealth distribution.

[5] The correlation in the logarithms of the net wealth rank is 0.94 in the entire population and 0.75 among households in the top 10% of the distribution of total net wealth (including consumer durables, pensions and business equity) on average between 1998 and 2007.

[6] Ownership of one's home obviously increases risk if the household borrows substantial amounts in order to buy the home. However, in the higher ranges of net wealth we consider in this paper, leverage is fairly low and does not vary with net wealth.

B.3. **Financial Portfolios**

The components of financial wealth are defined as follows. Cash consists of bank account balances and Swedish money market funds.[7] Risky mutual funds refer to all funds other than Swedish money market funds. The *risky portfolio* contains risky financial assets, that is directly held stocks and bonds, risky mutual funds, derivatives, capital insurance accounts, and other financial investment vehicles. We exclude assets with less than 3 months of return data from the quantitative analysis of portfolios.[8]

For every household h, the *complete portfolio* consists of the risky portfolio and cash. The *stock portfolio* contains directly held stocks, while the *fund portfolio* contains mutual funds. The *risky share* is the weight of the risky portfolio in the complete portfolio. A market participant has a strictly positive risky share.

B.4. **Pricing Factors**

Data on Nordic stocks and mutual funds for the 1991 to 2007 period are available from FINBAS, a financial database maintained by the Swedish House of Finance. The data include the monthly returns, market capitalizations, and book values of publicly traded companies. For securities not covered by FINBAS, we use price data from Datastream and Morningstar. We focus on stocks and funds with at least two years of available data. We exclude stocks worth less than 1 krona, which filters out very small firms. For comparison, the Swedish krona traded at 0.1371 U.S. dollar on 30 December 2003. We end up with a universe of approximately 1,000 stocks, out of which 743 are listed on one of the four major Nordic exchanges in 2003.[9] The data allow us to measure each security's exposure to systematic and idiosyncratic risk, as we now explain.

Local CAPM. The return on the market portfolio is proxied by the SIX return index (SIXRX), which tracks the value of all the shares listed on the Stockholm Stock Exchange. The risk-free rate is proxied by the monthly average yield on the one-month Swedish Treasury bill. The market factor MKT_t is the market return minus the risk-free rate in

[7]Financial institutions are required to report the bank account balance at year-end if the account yields more than 100 Swedish kronor during the year (1999 to 2005 period), or if the year-end bank account balance exceeds 10,000 Swedish kronor (2006 and 2007). We impute unreported cash balances by following the method used in Calvet, Campbell, and Sodini (2007, 2009a, 2009b) and Calvet and Sodini (2014), as is explained in the Internet Appendix.

[8]These assets typically represent about 10% of total financial wealth and this proportion varies very little across wealth groups, except at the very bottom of the distribution of wealth. We therefore expect little bias from this sampling decision.

[9]The major Nordic exchanges are the Stockholm Stock Exchange, the Copenhagen Stock Exchange, the Helsinki Stock Exchange, and the Oslo Stock Exchange.

month t. We index stocks and funds by $i \in \{1, \ldots, I\}$. For each asset i, we estimate the local CAPM:

$$r^e_{i,t} = a_i + b_i MKT_t + u_{i,t}, \tag{1}$$

where $r^e_{i,t}$ denotes the excess return of asset i in month t and $u_{i,t}$ is a residual uncorrelated to the market factor. Excess returns on individual assets are winsorized at the 1% before each of the estimations.

International CAPM. Since Sweden is a small and open economy, we consider an International CAPM that controls for both domestic and international risks (Solnik 1974). For each asset, we estimate the two-factor model:

$$r^e_{i,t} = a_i + b^L_i MKT_t + b^G_i G\_MKT_t + e_{i,t}, \tag{2}$$

where G_MKT_t denotes a global risk factor and $e_{i,t}$ is a residual uncorrelated to the factors. The global factor is obtained from Ken French's website.

International Fama and French Model. In our implementation of the Fama and French model, we include both global and local versions of the value and size factors (Hou Karolyi and Kho 2011).[10] Local value and size factors are constructed as in Fama and French (1993). That is, we sort the stocks traded on the Stockholm Stock Exchange by book-to-market value and market size, and then use these bins to compute the value factor, HML_t, and the size factor, SMB_t. The value premium is substantial in Sweden: HML_t averages to about 10% per year over the 1991 to 2007 period, which is consistent with the Sweden estimate in Fama and French (1998). The global value factor, G_HML_t, and the global size factor, G_SMB_t, are obtained from Ken French's website.

For every asset i, we estimate the six-factor model:

$$\begin{aligned} r^e_{i,t} \quad = \quad & a_i + b^L_i MKT_t + b^G_i G\_MKT_t + v^L_i HML_t + \\ & v^G_i G\_HML_t + s^L_i SMB_t + s^G_i G\_SMB_t + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

where $\varepsilon_{i,t}$ is a residual uncorrelated to the factors.

The market beta and size of stocks are readily available to investors. The value loading of a stock is tightly related to characteristics that can be easily observed by investors, such as the price-to-earnings (P/E) ratio or the dividend yield, as Betermier, Calvet, and Sodini (2015) show. These facts give credence to the view that sophisticated retail investors can distinguish between high beta and low beta stocks, between value and growth stocks, or

[10] We do not consider the momentum factor because earlier work shows that it is not to be priced in Sweden (Betermier Calvet and Sodini 2015; Rouwenhorst 1998).

between small and large stocks, and may therefore have a sense of the risk and return trade-offs involved with their equity investments.

B.5. Risk and Return Characteristics of Household Portfolios

The *market beta of a household portfolio* at time t is the weighted average of individual asset betas:

$$b_{h,t} = \sum_{i=1}^{I} w_{h,i,t} b_i,$$

where $w_{h,i,t}$ denotes the weight of asset i in household h's portfolio at time t. This definition applies to all the portfolios used in the paper, including the complete, risky, stock, and fund portfolios. The estimation methodology takes advantage of (i) the detailed yearly data available for household portfolios, which permit the calculation of $w_{h,i,t}$, and (ii) the long monthly series available for individual assets, which permit the precise estimation of b_i. The historic alpha of a portfolio, $a_{h,t}$, and its exposures to other risk factors are similarly defined.

II. The Cross-Section of Wealth and Income

A. ***Cross-Section of Household Wealth***

We now investigate the level of wealth inequality in Sweden and assess how representative Sweden is of other developed economies. Cross-country data (Roine and Waldenström 2014) indicate that Sweden has a relatively low level of wealth inequality. In Figure 1, we sort households by net wealth and report the shares of gross wealth, net wealth, and financial wealth held by each group. The top 1% hold on average 20.6% of total wealth in Sweden between 1999 and 2007 (Figure 1), as compared to 32.6% in the United States.[11] To put these estimates into perspective, the top 1% of households sorted by income receive 9.0% of national income in Sweden and 20.2% in the United States over the same period.[12] In both countries, wealth is therefore much more concentrated than income.[13] Furthermore, our measures of wealth inequality in Sweden are likely to be

[11]The U.S. estimate is based on the 1998, 2001, 2004 and 2007 surveys of the SCF, and excludes private business equity and retirement accounts from the definition of wealth.

[12]These estimates are obtained from the World Top Incomes database and include realized capital gains in the definiton of income.

[13]The bigger gap in income distributions is likely caused by the surge in wage inequality in the last few decades in the U.S., which did not happen at the same rhythm in Sweden (Roine and Waldenström 2014).

underestimates because the richest Swedish residents hold substantial foreign assets that are undeclared to tax authorities (Roine and Waldenström 2009).[14]

Figure 2 illustrates the allocation of gross wealth to real estate and financial wealth. The top 1% of Swedish households invest about 56.7% of their wealth in commercial and residential property. By contrast, the top 1% of U.S. households invest only 43.3% of gross wealth in real estate according to the SCF between 1998 and 2007. This cross-country difference has two likely causes. First, wealth concentration is higher in the U.S., so it takes a higher amount of wealth to make it into the top 1% and one is more likely to reach that group if one owns relatively more financial assets.[15] Second, national accounts reveal that over the sample period, real estate represents, respectively, 60.6% of aggregate private wealth in Sweden and 47.3% in the United States.[16] The greater importance of real estate in Sweden reflects a wealth structure that is common in continental Europe: the real estate share of private wealth is equal to 57.6% in Germany and 57.1% in France over the same period (Piketty and Zucman 2014).

It is important to keep track of personal debt since, for a given amount of net wealth, a higher leverage ratio (i.e., debt over gross assets) amplifies the riskiness of household wealth. As Figure 2 shows, leverage decreases with net wealth. However, most of the difference takes place between households below and above the median of the distribution of net wealth. Within the top decile of the distribution of net wealth, where a majority of Swedish wealth is held, there is no clear relationship between wealth and leverage.

Overall, wealth inequality in Sweden, while less pronounced than in the United States, is sufficiently sizable to allow for variation in investment styles and returns across wealth quantiles, as we show in the next sections. We also conjecture that investment differences across wealth quantiles, which we document on Swedish data, should be even sharper in more unequal countries like the United States.

B. ***Transitional Dynamics***

Wealth may affect investments through attitudes toward risk, economies of scale in money management, or skill. If many households reach high wealth levels due to some temporarily lucky holdings, we might fail to identify strong relationships between wealth an investment

[14]We discuss in the last section of this paper the implications of possibly large tax evasion for the interpretation of our findings.

[15]The Swedish data confirms this stylized fact: the average share of real estate in gross wealth is only 48.4% in the top 0.1% of the distribution of net wealth, as opposed to 56.7% in the top 1% and 65.1% in the top 10%.

[16]Sources: Waldenström (2015) for Sweden and Piketty and Zucman (2014) for the United States.

strategies. This is one reason why we focus on wealth ranks rather than levels.

Table I provides the transition probabilities between the household's rank in the wealth distribution in 1999 and its rank in 2007, conditional on the survival of the household. As is already well known in the literature on inequality, the distribution of wealth is very sticky, especially at the top. Despite very significant movements in asset prices between 1999 and 2007, nearly two-thirds of households in the top 1% of the distribution at the beginning of our sample period are still in that wealth bracket 8 years later. Out of the remaining third, more than three quarters are still in the top 5% by the end of the sample period.

Persistence is also strong at the very top of the wealth distribution. For instance when we consider the group of households in the top 0.1% in 1999, we obtain that 58% of them remain in the top 0.1% and 92% of them are in the top 1% eight years later. Such high persistence suggests that the current wealth rank of a household may be tied to structural differences in investment style, as we investigate in later sections.

C. ***Cross-Section of Household Income***

In Figure 3, we illustrate the median and the mean of labor income across wealth groups. The results shed light on the nature (rentier vs. self-made) of household wealth because, to some extent, labor income proxies for the amount of human capital held by the household. Up to the 99th percentile of wealth, belonging to higher rank in the distribution of wealth corresponds to a significantly higher level of labor income as well. Thus, until one reaches the very top of the wealth distribution, being wealthy is associated with earning substantial labor income and household wealth is primarily self-made.

Within the top 1%, the *median* labor income is a flat function of net wealth, which suggests that a large part of this wealth bracket consists of rentiers. Meanwhile, the *mean* of labor income keeps on increasing steeply with net wealth. While most of the very wealthy households are rentiers, a few of them are also among the very top labor income earners in Sweden and as such can be considered as self-made fortunes. The heterogeneity of households in the top 1% suggests that wealth may impact their portfolio asset allocations through multiple channels.

III. Asset Allocation

In this Section, we document how the asset allocation of household portfolios varies empirically across quantiles of the net wealth distribution, including the very top.

A. ***Gross Wealth***

Figure 4 illustrates how households in different net wealth bracket allocate gross wealth to cash, risky financial assets, and residential and commercial real estate. We define the *total risky share* as the weight of risky financial assets and commercial real estate in household gross wealth. As Figure 4 shows, the total risky share is only about 14% of the total but then gradually increases to 33% for households in the top 10%-5%, 56% for households in the top 1%-0.5%, and 78% for households in the top 0.1%. The total risky share therefore quickly increases with financial wealth, especially within the top decile.

The top 1% of Swedish households hold 10% of gross wealth in cash, 28.5% in residential real estate, 33.5% in risky financial wealth, and 28% in commercial real estate. By comparison, the top 1% of U.S. households hold 8% in cash, 30.5% in residential estate, 48.5% in risky financial wealth and 12.5% in investment real estate.[17] The shares of cash and residential real estate are therefore comparable in both countries, and consequently the total risky share is also about the same for the top 1% Swedish households (61.5%) and the top 1% U.S. households (61%). One interesting difference between Sweden and the U.S. is that wealthy Swedish households invest proportionally more in investment real estate and less in financial assets than their U.S. counterparts. We now investigate possible explanations for this difference.

B. ***Real Estate Portfolio***

Figure 5 illustrates the composition of the real estate portfolio across net wealth brackets. The share of residential real estate decreases monotonically with the level of net wealth. In the first three quartiles of the distribution of net wealth, real estate households owners allocate more than 90% to their own residences. In the top decile, 78% of the real estate assets are still occupied by their owner. The proportion of residential housing then drops sharply to 62% for households in the top 1% and less than half for the top 0.1%. Rich Swedes own significantly more commercial real estate than rich U.S. households. Commer-

[17] Source: U.S. Survey of Consumer Finances (1998-2007).

cial real estate represents 19.5% of the real estate portfolio for the top 1% in the U.S.,[18] compared to 38% for the top 1% in Sweden. This difference largely stems from the weight of agricultural property in Sweden: 41% of the top 1% own some agricultural property, most often in the form of forestry.[19] Owning a forestry allows wealthy Swedes to earn a risky yield by harvesting trees through specialized companies. From a portfolio perspective, the contribution of real estate to total portfolio risk is therefore a steeply increasing function of net wealth.

C. ***Financial Portfolio***

Figure 6 illustrates how the asset allocation of the complete financial portfolio varies with the net wealth rank. As has been shown in previous literature, the risky share increases rapidly as one climbs the wealth ladder. Households in the bottom half of the distribution invest 18% of their financial wealth in risky assets. The risky share reaches 55% for the top 10%-5%, 66% for the top 1%-0.5%, and 71.5% for the top 0.1%

While quickly declining with wealth, the share of cash remains substantial among the wealthiest. For instance, the richest 1% U.S households hold about 22% of their complete financial portfolios in cash.[20]At the same time, rich Swedish households own a more substantial portion of their wealth in real estate than U.S. households and real estate holdings of the rich Swedes are in a short majority residential holdings. From these facts, one may draw the conclusion that the rich in Sweden are particularly cautious in their investments. The findings of Section III.A, which cover risky investments across all wealth components, show that this is not the case. Fortunes primarily based on real estate investments tend to hold safe financial portfolios, while fortunes based on financial assets hold real estate portfolios containing mostly residential properties. In Sweden, wealth based on real estate is simply more prevalent than in the U.S., which drives down the risky share of financial portfolios. Unfortunately, due to the lack of detail on the characteristics of each real estate property, we are not able to further quantify the contribution of real estate holdings to portfolio risk and returns. Later results on the impact of net wealth on financial risk and return will therefore likely be an underestimate of the effect of wealth on total risk and

[18]Source: U.S Survey of Consumer Finances (1998-2007).

[19]According to Swedish national accounts, timber tracts represented 53% of the value of all agricultural properties between 1999 and 2007 (Waldenström, 2015).

[20]This estimate is an 1998-2007 average from the U.S. Survey of Consumer Finances. In order to be consistent with Swedish data, we exclude private business equity and retirement accounts from the definition of net wealth, we count as risky financial assets all directly-held stocks and bonds, mutual funds (excluding money-market funds), other managed accounts and cash-value life insurances, and we count as riskless financial assets all checking accounts, money-market funds, certificates of deposits and savings bonds.

return.

To what extent does the positive relationship between the financial risky share and wealth come from higher stock market participation? Figure 7 shows that stock market participation becomes less sensitive to wealth as one climbs to the top ranks. The participation rate is 90% on average in the top decile of net wealth and reaches 97% in the top percentile. There is no significant difference in participation within the top percentile. Participation in risky asset markets distinguishes the bottom half of the population from its top half, but it really is the intensity of risk-taking conditional on participation that distinguishes the wealthiest from the rest of the population.

D. ***Risky Portfolio***

We now consider the allocation of risky financial wealth to directly held stocks and mutual funds. Figure 6 shows that the mutual fund share of the risky portfolio is a steeply declining function of wealth. Below the 90th percentile of the wealth distribution, about three-quarters of risky financial wealth is held through funds. In the top 0.1%, the picture is completely reversed as 75% of the risky portfolio is directly invested in stocks.

Figure 7 illustrates that like the middle class, high-net-worth households hold mutual funds. Only 16% of households in the top 0.1% do not participate at all in these investment vehicles. These residual fund investments do not however serve the same purpose as for the rest of the population. The wealthy can hold better diversified portfolios of Swedish stocks than the median household. For instance in the top 1%, the vast majority of direct stock market participants hold at least 5 different stocks. Rather than investing in funds holding the Swedish stock market, very wealthy households seem to instead invest in funds with the purpose of diversifying their portfolio across asset classes and geographical regions. We verify that the share of mutual funds based outside Sweden is 15% on average across all wealth segments and reaches 30% for households in the top 0.1%. Relatedly, the share of hedge funds is very close to 0% outside the top 1% of households but reaches 5.6% among the top 0.1%.[21]

Overall, while most of the population, including within the top decile of the wealth

[21] While this means that most individuals owning hedge funds are very wealthy, this never corresponds to more than 1% of a household's financial savings, even for the wealthiest households. This is not surprising: the vast majority of investors in hedge funds are institutional even in the U.S. (Stulz 2007). At the same time, investor demand for hedge funds has grown since 1999 so they may take a slightly higher weight in individual portfolios nowadays: the top 0.1% had only 1.3% of their fund holdings allocated to hedge funds in 1999, but this type of investment had already reached a 10% share of fund holdings of the top 0.1% by 2007.

distribution, relies on index-like mutual funds to obtain a diversified return on their risky portfolio, households at the very top of the wealth distribution use far more detailed investment products, as they directly own many individual stocks and invest in complex funds when they choose to delegate money management to an intermediary. We now examine whether this translates into a higher level of diversification, more compensated risk, or better risk-adjusted performance.

IV. Returns and Risk Loadings

High net worth households select a basket of investment products that is very distinct from the middle class. This Section investigates how these choices impact portfolio risk and return.

A. ***Exposure to the Domestic Stock Market***

How do expected returns correlate with wealth? A simple approach to this question would consist of taking the average of the annual return earned by each group. The problem is that the time series of stock returns has a very large standard deviation and, as a result, average stock returns take a long time to converge toward their expected level. Given that we only have nine years of holdings data, the average return approach is *de facto* unfeasible and we need to rely instead on an asset pricing model, as in Calvet, Campbell, and Sodini (2007).

We use as a starting point the simplest existing model, the CAPM, which gives a good sense of our approach and its benefits. In Table II, we regress the market beta of a household's financial portfolio on a set of indicator variables for the household's rank in the distribution of net wealth. The analysis is conducted for (1) the risky portfolio, (2) the stock portfolio, and (3) the fund portfolio. The estimation is based on stock and fund participants in the 40th percentile of the distribution of net wealth.[22]

The market beta of the risky portfolio substantially increases as households climb the net wealth ladder. While the median household has a market beta close to 0.74, it reaches 0.82 for the top 10%, 0.88 for the top 1%, and 0.91 for the top 0.1%. This means that the amount of compensated risk-taking by richer households is substantially underestimated if one only looks at the share of risky assets in the complete portfolio. Consider for example

[22]We choose to exclude poorer households because their stock market participation rate is small (below 50%) and the risky share of their portfolio negligible (less than 15%), so there is a large selection bias involved in estimations conditional on participation.

the case in which all households invest their risky portfolio in the Swedish market portfolio. The pattern of risky shares with respect to wealth that we observe in the data then involves that households in the top 1% earn a risk premium that is about 2.5 times larger than for the median household. If instead we take into account the fact that household exposures to market risk increase with wealth, the market risk premium is instead 3.2 times larger for the top 1% compared to the median.

The market beta of the stock portfolio mildly *declines* with wealth, while the market beta of the fund portfolio remains almost constant. However, fund portfolios are on average much less exposed to market risk than stock portfolios. It is therefore by moving their portfolio away from funds toward directly-held stocks that rich household achieve high loadings on market risk.

B. ***Exposure to Global Stock Markets***

Investment products offered to Swedish investors allow them to expose their portfolio to global risk factors (Calvet Campbell and Sodini 2007). At the same time, even in the 21st century, capital markets are not fully integrated and it has been shown that both global and local market factors remain priced separately (Hou Karolyi and Kho 2011). In order to investigate whether households try to benefit from each of these premia, we estimate the International CAPM outlined in Section I. A high loading on the local factor relative to the global factor reflects a mix of investor home bias and portfolio exposure to currency risk.

In Table III, columns 1 and 2, we show how the household wealth rank affects the exposure of their risky portfolio to each of these two factors. The first striking fact is that Swedish households retain a strong exposure to local equity and currency risks: the median household's risky portfolio loads three times as much on the Swedish market as on the global market factor. The loadings on the Swedish market factor are only mildly reduced by the inclusion of a global factor (from 0.74 to 0.66 for the median household); this means that Swedish households earn substantially higher expected returns than what a purely national asset pricing model would predict. Perhaps more surprisingly, the richest households load more heavily on the local factor: households in the top 1% load more than four times as much on the local factor.

Columns 3 to 6 shed some light on this apparent puzzle by distinguishing the stock and the fund portfolios. For the median household, stocks and funds are equally biased toward the Swedish factor, so there is no impact on the geographic tilt of going away from funds toward stocks. On the fund side, this is likely due to the fact that Swedish mutual funds provide exposure to foreign equity risk but they are denominated in Swedish kronor so they do not provide a hedge against local currency risk (Calvet Campbell and Sodini 2007). On the stock side, since the stock portfolios of Swedes contain overwhelmingly Swedish companies, the significant stock loading on the global factor suggests that many Swedish companies are effectively global companies. In their fund holdings, richer households do not have a significantly different geographic mix. This means that rich Swedes' greater localism comes from the way they invest in stocks: what we see is that top 1% households invest in Swedish stocks that load about six times more on the local factor than on the global, as opposed to only three times more for the median household. The likely reason is that poorer households tend to focus on popular stocks, which correspond to the most global companies in the Stockholm Stock Exchange, while richer households are willing to invest in other Swedish companies (Betermier Calvet and Sodini 2015).

C. ***Value Investing***

High net worth households load heavily on high-market-beta assets to earn a risk premium. Yet, one of the main results in asset pricing in the last two decades is that investors may earn predictable premia by correlating their portfolio with a broad set of factors beyond the market risk. This set of additional expected premia sought by investors allows to classify household strategies according to distinct "styles": value is the most salient of these factors for stocks, but this is by no means an exhaustive list for that asset class, and other risky asset classes favored by households, such as bonds, may load on other factors. Various explanations, risk-based or behavioral, have been given for why these investing styles lead to predictable premia. Either way, richer households are likely to engage more in these investment strategies because they are less risk-averse, they stand to gain more from investing rationally and they can more easily delegate the management of their portfolio to skilled intermediaries in order to identify these high-return factors and load their risky portfolio onto them. We test the validity of this claim and estimate household exposures to the local and global market, value, and size factors.

We present the results in Table IV, columns 1 to 6. Neither the median nor the richest households have significant exposure to local value and size factors. However, this does not mean that style does not matter: the median household is loading negatively on the global small stocks while the richest households are loading positively on global value stocks. When the global and local style exposures are combined together a similar picture emerges: the top 1% of households have a combined value loading equal to +0.08 and a combined size loading equal to -0.07, as compared to -0.04 and -0.12 for the median household. This means the differential in expected premia between rich and poor households is amplified by style investing.

What seems puzzling is that the relationship between wealth and the value loading is not fully monotonic, as households in the top 0.1% have a significantly lower value loading than the top 1%-0.1%. The non-monotonic behavior originates from increased exposure to Swedish growth stocks in the top of the wealth distribution. One likely explanation is the tech bubble, which was in Sweden a phenomenon as large as in the U.S. and made a significant number of households very rich because they included top executives of tech companies remunerated via stocks of their own company as well as founders of these companies. Not surprisingly, these tech stocks are generally classified as local growth stocks in our sample. Yet, these executives and entrepreneurs were likely not able to rebalance their portfolio toward value stocks because of selling restrictions or because they wanted to retain control over their company. In order to test this hypothesis, we re-estimate the style loadings when we exclude from the data these individual asset holdings that represent more than 0.5% of the total market capitalization.[23] The magnitudes of our estimates are virtually unchanged except for the fact that the value tilt becomes again monotonically increasing even at the very top of the wealth distribution.[24]

It is important to investigate how rich households manage to tilt their portfolios toward small and value stocks. In Tables V and VI, we regress the Fama-French loadings of the stock and fund portfolios on wealth ranks. Over the period 1999-2007, none of the mutual funds offered in Sweden were advertising themselves as "value" oriented, yet some of them depicted themselves as small-cap funds. We should therefore expect that richer households could not expose themselves via mutual funds to the value risk but only to the small-cap risk. This is precisely what we observe in Table VI: for funds held by the top 1% households, the combined value loading is equal to -0.07 and the combined size loading is equal to -0.09, compared to -0.06 and -0.14 for the median household. Rich households literally do not differ in terms of their fund loadings on value, while they exhibit a small but non-trivial small-cap tilt in their choice of funds. Together with our findings on the entire risky portfolio, this must mean that rich households use their direct stock holdings to expose themselves to value factors. This is confirmed in the data (columns 3 to 6): for stocks held by the top 1% households, the combined value loading is equal to +0.18 and the combined size loading is equal to -0.08, as opposed to -0.07 and -0.06 for the median household. Incidentally, this result also partly explains why richer households move away from funds into direct stock ownership. As households get richer, they are more willing

[23]While this appears to be a fairly small threshold for control from a U.S. perspective, data on the control structure of Swedish companies (collected by Sundin and Sundqvist 1986) suggests that many corporate insiders retain such small capital stakes and yet derive significant control from these, typically thanks to dual-class shares and pyramidal ownership.

[24]Results available upon request.

to expose themselves to additional classes of compensated equity risks but, since many of these exposures are not offered by existing mutual funds, those households need to manage stocks by themselves in order to reach their desired investment style.

D. *Expected Returns*

How does this active search for premia among the wealthiest households translate into excess returns? This is a question to which answers are more imprecise because equity premia are notoriously hard to pin down with certainty, but this is also essential because we want to turn household differences in investment strategies into differences that effectively matter for the dynamics of inequality, i.e. returns. In Table VII, based on the estimated betas discussed above, we report estimates of the additional expected return implied by the compensated factors sought by richer households. The first set of three columns apply (1) the CAPM, (2) the International CAPM, and (3) the Fama and French model to the complete portfolio, while the second set of columns applies these asset-pricing models to the risky portfolio.

In column 1, we take the Swedish market index as a benchmark and compute the equity premium using its arithmetic average return between 1991 and 2007.[25] Our estimates imply large differences in returns across wealth brackets: the top 1% households earn an additional 415 basis points per year over the median household in expectation. In column 2, we estimate the impact of wealth on expected returns taking into account both the local and the global historical equity premia. Because both local and global factors are priced, the expected returns are higher in absolute terms, but poorer households benefit the most because they load relatively more on the global factor. As a result, the differential in expected returns between rich and poor remains virtually unchanged (427 points per year). Finally, in column 3 we show how expected premia vary with wealth once we include the effects of value and size investing. Because richer households load more on each of these style factors, we find a significantly higher return differential between rich and poor: the top 1% households earn an additional 468 basis points per year with respect to the median household.

These large differences are primarily driven by the increase in the risky share as households get richer. However, columns 4, 5 and 6 in Table VII show that differences in expected returns on the risky portfolio are also substantial. In the most conservative scenario, which is the international CAPM model, the top 1% earn a 128-basis-point higher equity premium with respect to the median household, while our highest estimate, which

[25]The historical equity premia we use in this sub-section are all available in the appendix.

uses an international Fama-French model, involves a 230-basis-point annual difference in equity returns between the top 1% and the median. This means that due to differences in equity returns depending on wealth, the difference in returns on financial assets between rich and poor households is higher by as much as 33% with respect to what would be implied by the observed differences in risky shares and homogeneous risky portfolios.

E. ***Portfolio Diversification***

Wealthy households earn higher expected returns by selecting portfolios that load on compensated factors. Does this come at the expense of higher portfolio risk? Not necessarily, since richer households may at the same time be better able to reduce their exposure to idiosyncratic risk. This is why it is crucial to determine how wealth affects the variance of household returns.

E.1. **Total Risk vs. Idiosyncratic Risk**

We follow the methodology used in Calvet, Campbell, and Sodini (2007) to compute each household's portfolio expected variance and its decomposition into systematic and idiosyncratic risk. For every pair of assets i and j, we estimate the covariance of their returns, $\sigma_{i,j}$, using the entire monthly data available for the two assets between 1992 and 2007; for every asset i, we also compute the variance of its return, σ_i^2, using all the monthly data in the same period. The total variance of the risky portfolio held by household h is then defined as:

$$\sigma_h^2 = \sum_i w_{i,h}^2 \sigma_i^2 + 2\sum_{i,j} w_{i,h} w_{j,h} \sigma_{i,j},$$

where $w_{i,h}$ is the share of asset i in household h's portfolio.

We can further decompose the total variance of household portfolios into systematic and idiosyncratic risk. This requires an asset pricing model, so as to understand to which extent household portfolios load onto systematic risk. We choose to treat as systematic risks all exposures to local and global Fama-French factors. Results are available in Table VIII. They show a substantial increase in total risk borne by households as their wealth increases (column 1). This is not the result of just an increasing systematic risk, as idiosyncratic risk also increases to a large extent with wealth (column 2). As a result, the share of idiosyncratic risk in total risk (column 3) varies much less with wealth than total risk itself: it only mildly decreases as one goes from the median household (28.4%) to the 90th percentile of net wealth (25.9%) and it increases again with wealth between the 90th percentile and the very top end of the distribution (33.8% for the top 0.1%).

E.2. Return Loss from Underdiversification

Because the risky share of their portfolio is simultaneously increasing, the consequence is that wealthy households pay a much greater cost for this incomplete diversification. Calvet, Campbell, and Sodini (2007) have proposed a measure of this cost, the *return loss* from investing in an underdiversified pool of assets instead of into a perfectly diversified portfolio (henceforth, the benchmark portfolio) with a similar level of exposure to systematic risks. In mathematical terms, it writes as follows:

$$RL_h = \omega_h \, \sigma_h \, (S_B - S_h),$$

where ω_h is the risky share of household h's portfolio, S_B is the Sharpe ratio of the benchmark portfolio, and S_h is the Sharpe ratio of the risky portfolio held by household h. As a benchmark portfolio, we use the historical mean, standard deviation and covariances of the various compensated factors (up to six of them if one uses the international Fama-French model) to look for the combination of factor exposures that maximizes the Sharpe ratio.[26] We define the relative Sharpe ratio loss as:

$$RSRL_h = 1 - \frac{S_h}{S_B}.$$

We can rewrite the return loss as:

$$\log(RL_h) = \log(\mathbb{E}r_B^e) + \log(\omega_h) + \log(\beta_h) + \log\left(\frac{RSRL_h}{1 - RSRL_h}\right),$$

where $\mathbb{E}r_B^e$ is the expected excess return on the benchmark portfolio and β_h is the ratio of the expected excess return $\mathbb{E}r_h^e$ for household h's risky portfolio over the the expected excess return on the benchmark portfolio $\mathbb{E}r_B^e$.[27][28] The first term is common to all households, the next two track the aggressiveness of household portfolios while the last one captures underdiversification.

[26]Using the international Fama-French portfolio together with historical factor return data from 1991 to 2007, one finds that the Sharpe-ratio-maximizing portfolio has the following composition: 9.2% into the Swedish market portfolio, 3.8% into the Swedish SMB portfolio, 8.6% into the Swedish HML portfolio, 18.2% into the global market portfolio, 15.3% into the global SMB portfolio and 44.8% into the global HML portfolio. This is the benchmark portfolio we use in this subsection.

[27]We call this term β_h because when the market portfolio is chosen as the benchmark this effectively equates the market beta of household h's risky portfolio.

[28]In our regressions, in the few cases where these terms are negative, we take instead their absolute value as our outcome variable.

In Table IX, we show how the logarithm of the return loss and its three household-varying components differ across wealth groups, using an international Fama-French asset pricing model. The return loss from underdiversification is steeply and continuously increasing with wealth (column 1), which is a confirmation, in a univariate setting, of what is found in a multivariate setting by Calvet, Campbell, and Sodini (2007). A large underlying force is that, for any given level of underdiversification, richer people pay a lot more for it because they are taking much more systematic risk (columns 2 and 3). In the lower ends of the distribution, the marginal effect of wealth is to react to this greater exposure to systematic risk by reducing the level of underdiversification of the risky portfolio, but the counteracting effect is too mild to make a difference. Once one enters into the top 2.5%, more wealth actually increases underdiversification and this largely contributes to increasing the cost of partial diversification among the wealthiest.

E.3. **The Origins of Underdiversification Among the Wealthy**

It remains unclear why these households keep so much idiosyncratic risk: this may reveal either substantial stock-picking behavior, exposure to unknown systematic risk factors or a willingness to enjoy private benefits of concentrated ownership. We first test the latter hypothesis by looking at the behavior of the idiosyncratic share of risk once we remove direct stock holdings that likely provide significant control over the firm, i.e., those that represent more than 0.5% of the market capitalization of the company (column 6 in Table VIII). Not surprisingly, the idiosyncratic share is now lower, especially for the richest households, but not by much: among the top 0.1% households, the idiosyncratic share of the risky portfolio goes from 33.8% to 27.5% if one excludes controlling stakes. In addition, even when we exclude controlling stakes, the idiosyncratic share slowly goes down with wealth until the 95th percentile and then goes up again. This must mean that the tendency to seek control over firms is not the unique and probably not even the primary reason for the fact that rich households do not substantially increase the diversification of their portfolios.

To shed light onto other potential reasons for underdiversification among the rich, we investigate the impact of wealth on diversification within stock and fund holdings (columns 4 and 5 in Table VIII). Stock holdings are in general much less diversified than fund holdings: for the median household, the share of idiosyncratic variance is 51% for stocks and 20% for funds. Interestingly, the diversification of the stock portfolio steadily increases with wealth and the share of idiosyncratic variance goes down to 36% for the stock holdings of the top percentile. If at the very top of the distribution households became less diversified because of active stock-picking, we would have expected the opposite result and, at least at the very top of the distribution, diversification within stock holdings should have been decreasing with wealth.

Looking at diversification within fund holdings allows to obtain a more complete image of diversification by rich households. Mutual funds manage portfolios that are an order of magnitude bigger than the stock portfolio of any household, including among the very rich. As a result, they are hard to beat in terms of diversification: even for the median household, the share of idiosyncratic risk in the fund portfolio is 20.5%, a level which is far below the level of idiosyncratic risk that the richest households may obtain in their stock holdings. Therefore, by moving away from funds into stocks, richer households naturally expose themselves to more idiosyncratic risk. Surprisingly, fund holdings of the richest households, while more diversified than their stock holdings, are significantly less diversified than those of the rest of the population. This could mean that those funds that the wealthy retain are the ones that load on atypical yet compensated risk factors that we do not observe. It could also be that these funds are more active than usual. Either way, this suggests that funds held by the rich are strong performers, as we investigate in the next section.

F. ***Risk-Adjusted Performance***

Very wealthy investors earn greater expected returns through greater exposure to priced factors. This does not have to be the unique way in which richer households earn higher returns: besides having a greater portfolio beta, they may also earn a greater alpha, i.e. obtain higher returns even after greater exposure to risk factors is taken into account. This is what we test in this sub-section.

F.1. **Stock Portfolio**

To make sure we do not mistake alpha for risk-taking we use our most complete asset pricing model, the international Fama-French model, to account for risk exposures. As opposed to the previous parts of our analysis, we calculate and closely look at the monthly returns $R_{h,t}$ actually realized by each household. Since we observe holdings only on the 31st of December, we need to make the assumption that households choose a buy-and-hold strategy over the next 12 months. This may lead to underestimate portfolio performance since experts in stock-picking would certainly trade more than once a year. In order to understand the size of this bias, we will vary in our analysis the duration in which we observe monthly returns, from the first three months of the year to the entire 12 months.

Once we have computed household realized returns, we need to adjust for differences in exposure to systematic risks. With this aim in mind, we retrieve for each household and year the loadings on these compensated risks (the "betas") that we have analyzed at length in the previous sub-sections. Using the vector of estimated household-specific betas β_h together with the corresponding vector of factor returns R_t realized in the year after household holdings are observed, we construct an expected monthly return $R^*_{h,t} = \beta_h \cdot R_t$ for every household h. We obtain the household monthly alpha by simply subtracting the expected return from the realized return:

$$\alpha_{h,t} = R_{h,t} - R^*_{h,t} = R_{h,t} - \beta_h \cdot R_t.$$

Finally, we also report differences in performance once we weigh the alpha realized on the stock portfolio by the share of directly-held stocks in the risky portfolio or in the entire financial portfolio of the household. This is a source of statistical efficiency as this makes sure that households owning very few stocks do not have too much weight in the estimation (Seasholes and Zhu, 2010). This also leads to an interpretation of the results that is directly comparable to our results on expected returns discussed above.

We can then estimate the impact of the household's net wealth rank on December 31st on the alpha they realize in the subsequent period. It is important to mention how we account for the non-random structure of noise in household realized returns. These are subject to common macro shocks that may not be fully accounted for using adjustments for market risk; this justifies a clustering of standard errors along the time dimension (in our case, by calendar month). We display our estimates in Table X. Unsurprisingly, because they are derived from realized returns, household monthly alphas are very noisy. This is particularly true when we do not weigh household alphas on stocks by the share of stocks in the entire portfolio (columns 1 to 4). In this case, no wealth group earns an alpha that is significant from zero over any holding duration, but we are unable to rule out economically significant effects given the large standard errors. In columns 5 to 8, we look at alphas weighted by the share of stocks in the risky portfolio. As expected, alpha estimates are much more precise. At the same time, none of the wealth groups is making an alpha that significantly differs, economically or significantly from zero: with a holding duration of 12 months, households with median wealth earn an annual stock alpha equal to 35 basis points while the alpha earned by households in the top percentile is actually 12 basis points per year lower. The standard error on this last estimate is equal to 69 basis points, so we can rule out any first-order difference in risk-adjusted performance between these two groups. The top thousandth of the population makes an alpha that is bigger than that of the median household by 123 points but with an equally high standard error. This last result also entirely disappears if one looks to shorter holding durations, so it is clearly not robust. Overall, compared to the impact of risk premia earned by rich households, their stock-picking ability is at best a secondary factor in explaining high returns.

F.2. **Fund Portfolio**

While they do not appear to have stock-picking abilities that would contribute significantly to investment returns, richer households might still be better at selecting the best-performing mutual funds. One way to approach this would be to replicate the methodology we use for stocks, which is to measure risk-adjusted realized returns. Given the data at hand, this procedure yields very imprecise results, as we just saw for our analysis of stock holdings. In addition, stock-picking and fund-picking are fundamentally different activities: in the former case, stock markets are very efficient and making an alpha requires obtaining timely private information on companies; in the latter case, flows into mutual funds may not respond as quickly to information about fund quality, so that one can probably make substantial alpha by identifying the skill of fund managers. This means it is more efficient to take an indirect approach: following the methodology proposed by Fama and French (2010) to identify mutual funds' ability, we measure the skill (i.e. the alpha) of each mutual fund over the longest time series available, which is typically longer than the maximum of 9 years we can use for households; we then investigate whether rich households select funds with a higher alpha.

We measure historical fund alphas using an international 3-factor model. Since we measure fund fees, we can compute gross and net fund alphas. Just as for our measurement of stock alphas, we obtain the household's fund alpha by weighing the alpha of each fund with its share in the household's fund portfolio. We also report results when we weigh household fund alphas by the share of the fund portfolio in the risky and in the total financial portfolio of each household. We show the results from this approach in Table XI. In columns 1 and 2, we display estimates for the impact of wealth on the alpha on the fund portfolio of each household. As documented by Flam and Vestman (2014), Sweden-based mutual funds have done particularly well in the nineties so it is not surprising that gross alphas are between 1 and 2% a year across wealth groups. Naturally, once one considers net alphas, risk-adjusted performance is negative for all wealth groups but those in the top percentile of the population. The 1% earn an alpha higher than the median by 29 basis points per year, while the top 0.1% outperform the median by 69 basis points.

This higher performance by the richest households does not come from selecting funds with lower fees: the difference in alpha between the top 1% of the population and the rest is virtually unchanged when we consider either gross or net performance. This suggests either that richer households know how to recognize skilled funds or that they focus on funds loading on risk factors we do not capture very well (for example, fixed income funds or hedge funds). However, it should be kept in mind that the richest households only invest a small share of their financial portfolio in funds. As a result, the actual effect of their fund-picking ability on returns for the entire portfolio is second-order relative to the effect of higher risk premia: columns 3 to 6 display alphas weighted by the share of funds in the financial portfolio and one can see that the top 1% and the top 0.1% respectively get an additional 2 and 6 basis points a year on their total return from their ability to pick funds.

G. ***Possible Impact of Tax Evasion***

Sweden is a small open economy with substantial capital taxes in our period of study: capital income taxes at flat rates, a progressive inheritance tax until 2004 and a progressive wealth tax until 2007. While substantial evasion of financial wealth within Swedish territory is extremely unlikely given the existence of financial holding registries, it is possible that there is some transfer of financial wealth abroad by Swedish residents taking place for tax reasons. This foreign wealth most likely belongs to the richest parts of the population. Roine and Waldenström (2009) use imbalances in the Swedish balance of payments to determine the amount of Swedish wealth hidden abroad. They estimate that accounting for this foreign wealth, and assuming it all goes to the top 1%, leads to a top 1% wealth share as high as 27% on average for the period 1999-2006, which is substantially higher than the wealth share we measure in our data (e.g., 20.6% on average). For our purposes, the question this level of evasion poses is whether and how observing the entire wealth of Swedish residents would affect our main findings.

An obvious consequence is that absolute levels of wealth are underestimated, by a possibly significant amount at the top. However, we mostly focus here on the impact of household *rank* in the distribution of wealth. Therefore, our results remain unaffected as long as the amounts of wealth held abroad and the amounts kept locally have a substantial *rank* correlation, which is a reasonable assumption. If there is no such correlation, our estimates are then simply biased toward zero and less significant economically than in reality.

A more insidious impact of tax evasion is that we do not measure the entire basket of financial assets held by the richest households. These hidden assets may have substantially different risk and return characteristics relative to those we observe in the data. Zucman

(2013) provides aggregate data on the portfolio composition of tax haven accounts held by foreigners (regardless of their nationality). He estimates that cash represents a small share of these accounts (24%), mutual funds (including bond and equity funds) represent 37% of the total, while the remainder (39%) is comprised of directly-held stocks and bonds.[29] In our data, the top 1% hold 36% of their financial portfolios (excluding derivatives and capital insurance accounts) in cash, 22% in mutual funds and 42% in directly-held stocks and bonds. These portfolio compositions are broadly similar so it is unlikely that our results on portfolio risk and return among the wealthy Swedes are significantly affected by cross-border tax evasion.

V. Financial Portfolios and Wealth Inequality

We have documented in great detail the differences in portfolio risks and returns between rich and poor households. How can these structural differences account for the level and the evolution of wealth inequality? This is the question we ask in this section.

A. ***Heterogeneity in Returns and Inequality***

Intuitively, if richer households earn higher returns than the poor, the gap between rich and poor should widen. Going from this intuition to a quantified impact of portfolio strategies on wealth inequality requires the use of a model of wealth concentration. For this purpose, there is a large class of models available in the existing literature. Its main focus so far has been on the importance of household savings behavior in accounting for the steady-state level of wealth concentration. However, calibrations of these models typically fail to account for the large share of wealth held by the very top of the distribution. To realistically account for the share of wealth held at the top, attention was recently given to the heterogeneity in returns to capital. Benhabib, Bisin, and Zhu (2011) show that such heterogeneity is critical in explaining wealth concentration at the top of the distribution. Yet, from a household finance point of view, the model they use is very crude: the investment technology is similar for all households and yields the same expected return with the same amount of exposure to idiosyncratic risk; there is also no attention given to differences in exposure to

[29] Zucman (2013) distinguishes the proportions of directly-held stocks and bonds in his estimations, and finds a significantly higher proportion of bondholding in offshore accounts around the world than in Sweden-based holdings. One likely reason is that the risky bond market is much less developed in Sweden than in either the U.S. (where the corporate and mortgage-backed bond markets are deep) or emerging economies (where central government debt is a risky investment). This is why we choose to bundle together directly-held equities and bonds for this comparison exercise.

systematic risks.

In a recent paper, Campbell (2015) proposes a parsimonious model of the dynamics of wealth concentration that allows for significant diversity in investment strategies. He shows that on average over time and in the absence of savings, the evolution of the variance of wealth is governed by the following law of motion:

$$\begin{aligned}\mathbb{E}\left[Var^*(w_{h,t+1}) - Var^*(w_{h,t})\right] &= \mathbb{E}\left[Var^*(\mathbb{E}_t r_{h,t+1})\right] + \mathbb{E}\left[Var^*(\widetilde{r}_{h,t+1})\right] \\ &\quad +2\mathbb{E}\left[Cov^*(\mathbb{E}_t r_{h,t+1}; w_{h,t})\right],\end{aligned}$$

where $w_{h,t}$ is the logarithm of financial wealth held by household h at the beginning of year t, $\mathbb{E}_t r_{h,t+1}$is the annual log return expected by household h at the beginning of year t, and $\widetilde{r}_{h,t+1}$ is the difference between the annual log return realized by household h at the end of year t and the log return it expected at the beginning of the year.[30] Those are three parameters we can estimate in our data. Since we only measure returns earned on financial holdings, we restrict ourselves to the analysis of the dynamics of inequality in financial wealth, including riskless assets[31]. The sample comprises all Swedish households with positive financial wealth. We assume that the expected returns of household portfolios are entirely driven by exposures to priced factors and that all household portfolio alphas are equal to zero. Just as in our above analysis of the relationship between wealth rank and expected returns, we use various factor structures to assess the robustness of our results: local CAPM, international CAPM and international Fama-French 3-factor model. Premia are historical annual returns for each of these factors during the period 1991 to 2007. To compute realized returns, we assume that households choose their holdings on December 31st and remain passive over the next 12 months.

Results are available on Table XII. Between 1999 and 2007, the variance in the logarithm of financial wealth increased on average by 0.039 every year. The sum of the three return terms in the above equation equals about 0.06. This means that heterogeneity in returns is the essential driver of the reinforcement of inequality in financial wealth. In comparison, other potential reasons, such as heterogeneity in financial saving rates, are residual; in fact, over the period 1999-2007, rich households divested part of their financial wealth to invest in real estate, and this negative correlation of financial savings with wealth has partly counteracted the impact of returns on financial wealth concentration.

This large contribution of investment returns to inequality does not come from the diversity in investment strategies *per se* (the first term of the equation), which represents

[30] All moments in that equation should be interpreted as cross-sectional moments.

[31] Because we do not observe returns on directly-held bonds, derivatives and capital insurance accounts, we exclude these holdings in the computation of financial wealth.

only 1.5% of the overall effect of returns. However, as we have shown in the previous subsections, it turns out that those investment strategies that deliver the highest expected returns are systematically chosen by richer households, as suggested by Piketty (2014), and this (i.e., the third term of the equation) alone contributes to about three-fourths of the impact of return heterogeneity on inequality. The impact of randomness in returns, the second term of the equation, which has been emphasized by Benhabib, Bisin, and Zhu (2011), is another important contributor to inequality albeit an order of magnitude lower than the wealth-return gradient (about 22% of the total effect of returns on inequality).

Campbell (2015) estimates his own equation using Indian data and finds similar orders of magnitude for the impact of returns on inequality but with a much higher contribution of randomness in returns. One reason for this gap may be that Indian households have virtually no access to mutual funds, which makes it harder for them to diversify their portfolio and boosts the variance of unexpected returns across households. Another likely reason for the discrepancy is that Campbell (2015) only considers returns to stock wealth, so there is no role in his estimates for the impact of wealth on risk-taking, which is in Sweden the main mechanism through which wealthier households obtain higher returns. In the appendix, we show a variance decomposition that focuses exclusively on the risky portfolio; the results become then very similar to the Indian case.

B. *What Role for Higher-Order Moments of the Joint Distribution of Wealth and Returns?*

The variance decomposition suggested by Campbell (2015) is only a first theoretical step because his is a model of the dynamics of inequality rather than of its steady-state level. It also limits itself to understanding the variance of wealth, which means there is no long-term role for higher-order moments and co-moments of returns and wealth. This prevents the model from accounting for the fat tail on the right end of the wealth distribution and its evolution. The state-of-the-art model of wealth concentration by Benhabib, Bisin, and Zhu (2011) also assumes away the potential impact of higher-order moments since it assumes that the variance in idiosyncratic returns is unrelated to initial wealth. This has spurred a criticism of that model from Acemoglu and Johnson (2015); they argue that if richer people are better diversified then the contribution of random investment returns to wealth inequality at the top should be muted relative to the calibrations of Benhabib, Bisin, and Zhu (2011). Our own evidence shows that idiosyncratic volatility is indeed highly correlated with wealth, albeit not negatively, as predicted by Acemoglu and Johnson (2015), but positively. This suggests that a richer model linking portfolio strategies to inequality would lead to a fatter, not thinner, right-tail of the distribution than what Benhabib, Bisin, and Zhu (2011) and Campbell (2015) predict.

Conclusion

One of the aims of taxation is to correct disparities in living standards and, to the extent that wealth inequality contributes to welfare inequality, this motivates substantial taxes on capital. It is well known in taxation theory that such taxes may imply substantial distortions in household saving decisions.[32] Yet, it turns out that a large part of capital formation at the top of the distribution comes from differences in portfolio returns between rich and poor. This means the important parameter to pin down the welfare implications of capital taxation is whether this return differential reflects efforts made by rich households or not. Higher returns among richer households may indeed be a fair reward for a higher tolerance to risk or they may compensate the costly acquisition of private information. Alternatively, this premium may reward privileged access to information, the financial ability to invest in markets with substantial entry barriers or a greater awareness to the benefits of risky investments. In other words, richer households may earn high returns because they put up additional effort and, in doing so, contribute to the quality of capital markets; or they may just be the idle beneficiaries of inefficient capital markets. Capital taxation probably entails a higher efficiency cost in the former than in the latter case. It is therefore essential to take stock of the evidence at our disposal and assess which hypothesis for the wealth-return gradient we observe is the most plausible. Our results point to a large and robust role for the willingness of rich investors to take compensated risks while, comparatively, the differences in risk-adjusted portfolio performance are significant but small. This means that the stock-picking behavior of households (be it due to luck or effort) is likely a second-order driver of the wealth premium relative to the impact of differences in risk loadings. The important question then becomes whether this risk compensation is fair or not: do poor households load their portfolio on market risk as much as they should? is the equity premium really a fair remuneration of risk tolerance? These are old, but not settled yet, questions in asset pricing. We hope that by linking this literature to the economics of wealth inequality our work provides a new impetus to research on these questions.

[32] Under certain assumptions, these distortions may lead even an inequality-minded central planner to set tax rates on capital to zero.

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Table I
Mobility of Net Wealth from 1999 to 2007

This table reports the transition probabilities between a household's net wealth rank in 1999 and its net wealth rank in 2007, conditional on the household being observed in the tax data at both dates. One should read the table as follows: among households belonging to the top 0.1% of the distribution of net wealth in 1999 and still in existence in 2007, 2.1% will have fallen below the tenth decile of the distribution by 2007, 1.3% will be between the 90th and the 95th percentile, 4.4% between the 95th and the 99th percentile, 34% between the top 1% and the top 0.1% of the distribution and, finally, 58.2% will remain in the top 0.1% of the distribution.

		Wealth Rank in 2007				
		<P90	P90-P95	P95-P99	P99-P99.9	P100
Wealth Rank in 1999	<P90	95.1%	3.7%	1.1%	0.1%	0.0%
	P90-P95	38.0%	37.9%	23.0%	1.1%	0.0%
	P95-P99	12.9%	20.8%	56.8%	9.3%	0.2%
	P99-P99.9	4.3%	4.3%	30.8%	56.0%	4.6%
	P100	2.1%	1.3%	4.4%	34.0%	58.2%

Table II
Local CAPM Portfolio Loadings and Net Wealth

This table reports regressions of household portfolios' beta on the Swedish market factor on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. Standard errors are clustered at the household level. One should read the table as follows: the average household in the top 0.1% of the distribution of net wealth has a market beta equal to 0.912 (=0.748+0.164) on its risky portfolio, 1.012 (=1.061-0.049) on its stock portfolio and 0.643 (=0.655-0.012) on its fund portfolio.

	Dependent Variable: Market Beta					
	Risky Portfolio (1)		Stock Portfolio (2)		Fund Portfolio (3)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group						
P50-P55	0.000	-0.66	-0.013	-11.94	-0.003	-6.67
P55-P60	0.005	9.93	-0.019	-16.41	0.001	2.14
P60-P65	0.008	14.88	-0.027	-23.40	0.002	5.22
P65-P70	0.011	20.31	-0.033	-28.48	0.003	7.57
P70-P75	0.014	26.45	-0.041	-36.21	0.004	10.19
P75-P80	0.019	34.16	-0.048	-42.81	0.006	13.38
P80-P85	0.026	47.50	-0.055	-49.99	0.009	21.22
P85-P90	0.037	67.26	-0.062	-56.77	0.015	33.81
P90-P95	0.054	96.85	-0.067	-62.10	0.022	51.79
P95-P97.5	0.075	113.49	-0.068	-57.66	0.028	56.76
P97.5-P99	0.093	117.74	-0.068	-52.45	0.029	48.58
P99-P99.9	0.128	122.88	-0.058	-39.29	0.023	30.22
P100	0.164	52.69	-0.049	-14.22	-0.012	-5.27
Reference Group						
P40-P50	0.748	2013.27	1.061	1235.45	0.655	2230.83

Table III
International CAPM Portfolio Loadings and Net Wealth

This table reports regressions of household portfolios' betas on the Swedish and the global market factor on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. The Swedish market factor is the return on the SIXRX index and the global market factor is drawn from Ken French's data library. Local and global betas are estimated jointly at the asset level. Standard errors are clustered at the household level. One should read the table as follows: on its risky portfolio, the average household in the top 0.1% of the distribution of net wealth has a local market beta equal to 0.846 (=0.659+0.187) and a global market beta equal to 0.169 (=0.225-0.056).

	Dependent Variable: Loading on Local/Global Market Factor											
	Risky Portfolio				Stock Portfolio				Fund Portfolio			
	Local Beta (1)		Global Beta (2)		Local Beta (3)		Global Beta (4)		Local Beta (5)		Global Beta (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	0.001	3.08	-0.004	-13.77	-0.009	-8.34	-0.006	-7.48	-0.001	-3.76	-0.003	-11.20
P55-P60	0.007	13.84	-0.005	-14.31	-0.013	-11.26	-0.008	-9.79	0.002	5.30	-0.003	-10.64
P60-P65	0.011	20.08	-0.007	-19.23	-0.018	-15.36	-0.014	-15.92	0.004	9.57	-0.004	-14.28
P65-P70	0.015	27.18	-0.009	-25.47	-0.021	-17.77	-0.018	-21.32	0.005	13.32	-0.006	-18.78
P70-P75	0.019	35.75	-0.012	-34.76	-0.026	-22.36	-0.023	-27.73	0.007	17.87	-0.008	-25.20
P75-P80	0.025	46.39	-0.016	-46.17	-0.029	-24.87	-0.031	-37.69	0.009	22.76	-0.009	-30.83
P80-P85	0.034	61.86	-0.019	-54.83	-0.031	-27.16	-0.041	-49.77	0.013	31.42	-0.010	-32.56
P85-P90	0.045	82.70	-0.021	-59.92	-0.032	-28.77	-0.052	-63.37	0.018	43.61	-0.009	-29.59
P90-P95	0.064	113.95	-0.024	-68.08	-0.031	-27.44	-0.066	-82.07	0.025	60.15	-0.007	-22.93
P95-P97.5	0.086	128.82	-0.028	-66.59	-0.025	-20.38	-0.081	-90.21	0.030	61.49	-0.004	-11.95
P97.5-P99	0.106	131.05	-0.032	-62.56	-0.019	-14.29	-0.094	-92.93	0.029	49.39	0.000	-0.80
P99-P99.9	0.146	136.27	-0.045	-64.59	0.003	2.12	-0.126	-107.45	0.019	24.33	0.011	18.77
P100	0.187	59.88	-0.056	-24.55	0.027	8.24	-0.167	-62.11	-0.027	-11.50	0.037	19.76
Reference Group												
P40-P50	0.659	1776.19	0.225	910.05	0.896	1008.49	0.330	524.08	0.575	2044.55	0.205	991.13

Table IV
International Fama-French Portfolio Loadings and Net Wealth
Risky Portfolio

This table reports regressions of household stock portfolios' betas on the Swedish and global Fama-French factors on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. The Swedish market factor is the return on the SIXRX index and the Swedish size and value factors are computed as in Betermier, Calvet and Sodini (2015) using the FINBAS data. Global Fama-French factors are drawn from Ken French's data library. All factor loadings are estimated jointly at the asset level. Standard errors are clustered at the household level. One should read the table as follows: on its risky portfolio, the average household in the top 0.1% of the distribution of net wealth has a local market beta equal to 0.846 (=0.659+0.187), a global market beta equal to 0.169 (=0.225-0.056), a local size beta equal to 0.029 (=0.038-0.009), a global size beta equal to -0.035 (=-0.162+0.127), a local value beta equal to -0.055 (=-0.043-0.012) and a global value beta equal to 0.127 (=0.000+0.127).

	Dependent Variable: Loading on Risk Factor											
	Market Factor				Size Factor				Value Factor			
	Local (1)		Global (2)		Local (3)		Global (4)		Local (5)		Global (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	0.001	3.09	-0.003	-11.32	-0.001	-2.61	0.004	10.74	0.001	4.51	0.003	6.75
P55-P60	0.007	14.30	-0.003	-10.20	-0.001	-3.58	0.005	11.51	0.002	7.57	0.005	10.06
P60-P65	0.011	21.12	-0.004	-13.39	-0.001	-5.03	0.005	11.50	0.005	14.01	0.007	13.33
P65-P70	0.015	28.70	-0.006	-17.99	-0.002	-8.46	0.005	12.50	0.006	18.64	0.010	17.63
P70-P75	0.020	37.73	-0.008	-24.90	-0.003	-12.31	0.006	15.77	0.008	24.01	0.013	23.83
P75-P80	0.025	48.86	-0.011	-33.57	-0.004	-15.59	0.009	21.28	0.010	30.31	0.016	30.41
P80-P85	0.034	65.28	-0.012	-37.27	-0.005	-20.49	0.012	28.20	0.012	36.15	0.024	44.65
P85-P90	0.046	87.01	-0.012	-36.22	-0.006	-24.51	0.016	38.25	0.013	38.81	0.033	61.66
P90-P95	0.064	119.66	-0.011	-34.83	-0.008	-30.64	0.023	56.01	0.015	43.01	0.049	88.77
P95-P97.5	0.086	135.09	-0.011	-27.37	-0.009	-30.80	0.034	68.48	0.016	37.03	0.070	108.99
P97.5-P99	0.106	137.10	-0.010	-21.70	-0.010	-28.60	0.046	74.78	0.015	29.05	0.091	117.85
P99-P99.9	0.142	140.37	-0.017	-27.50	-0.011	-20.79	0.068	81.61	0.010	14.47	0.112	106.66
P100	0.175	59.20	-0.024	-12.25	-0.009	-4.18	0.127	44.55	-0.012	-4.80	0.127	33.54
Reference Group												
P40-P50	0.660	1854.10	0.204	908.11	0.038	213.09	-0.162	-576.50	-0.043	-186.35	0.000	0.83

Table V
International Fama-French Portfolio Loadings and Net Wealth
Stock Portfolio

This table reports regressions of household stock portfolios' betas on the Swedish and global Fama-French factors on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. The methodology is the same as in the previous table. One should read the table as follows: on its fund portfolio, the average household in the top 0.1% of the distribution of net wealth has a local market beta equal to 0.543 (=0.578-0.034), a global market beta equal to 0.224 (=0.184+0.040), a local size beta equal to -0.009 (=0.003-0.012), a global size beta equal to -0.046 (=-0.145+0.099), a local value beta equal to -0.080 (=-0.042-0.038) and a global value beta equal to -0.006 (=-0.017+0.011).

	Dependent Variable: Loading on Risk Factor											
	Market Factor				Size Factor				Value Factor			
	Local (1)		Global (2)		Local (3)		Global (4)		Local (5)		Global (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	-0.009	-8.24	-0.002	-3.03	-0.010	-12.87	0.002	1.41	0.006	7.87	0.014	9.37
P55-P60	-0.013	-11.00	-0.003	-3.53	-0.016	-20.26	-0.001	-0.89	0.011	13.06	0.021	12.96
P60-P65	-0.017	-14.68	-0.006	-7.19	-0.022	-27.57	-0.005	-3.70	0.020	22.27	0.029	17.06
P65-P70	-0.019	-16.91	-0.009	-10.73	-0.029	-37.51	-0.009	-7.39	0.027	30.12	0.034	20.12
P70-P75	-0.024	-21.35	-0.012	-14.70	-0.038	-49.16	-0.013	-11.06	0.032	37.20	0.042	25.50
P75-P80	-0.026	-23.56	-0.017	-21.77	-0.047	-62.09	-0.016	-13.52	0.039	45.12	0.052	31.99
P80-P85	-0.028	-25.08	-0.022	-28.16	-0.056	-75.66	-0.013	-11.17	0.047	55.11	0.072	45.13
P85-P90	-0.029	-26.00	-0.028	-35.64	-0.065	-90.08	-0.007	-6.07	0.053	62.06	0.095	60.88
P90-P95	-0.026	-23.60	-0.034	-44.80	-0.077	-108.27	0.008	6.90	0.060	70.93	0.131	85.52
P95-P97.5	-0.019	-16.24	-0.041	-47.72	-0.089	-118.06	0.030	24.62	0.062	66.84	0.170	104.89
P97.5-P99	-0.014	-10.93	-0.048	-49.57	-0.102	-124.99	0.055	41.20	0.059	57.90	0.200	115.11
P99-P99.9	0.005	3.06	-0.078	-69.71	-0.115	-123.21	0.095	63.21	0.050	42.66	0.202	105.77
P100	0.019	5.82	-0.122	-51.07	-0.123	-48.50	0.178	50.17	0.024	7.79	0.161	35.00
Reference Group												
P40-P50	0.920	1067.78	0.297	490.01	0.169	286.75	-0.227	-252.41	-0.064	-96.32	-0.008	-6.46

Table VI
International Fama-French Portfolio Loadings and Net Wealth
Fund Portfolio

This table reports regressions of household fund portfolios' betas on the Swedish and global Fama-French factors on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. The methodology is the same as in the previous table. One should read the table as follows: on its fund portfolio, the average household in the top 0.1% of the distribution of net wealth has a local market beta equal to 0.543 (=0.578-0.034), a global market beta equal to 0.224 (=0.184+0.040), a local size beta equal to -0.009 (=0.003-0.012), a global size beta equal to -0.046 (=-0.145+0.099), a local value beta equal to -0.080 (=-0.042-0.038) and a global value beta equal to -0.006 (=-0.017+0.011).

	Dependent Variable: Loading on Risk Factor											
	Market Factor				Size Factor				Value Factor			
	Local (1)		Global (2)		Local (3)		Global (4)		Local (5)		Global (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	-0.001	-3.43	-0.002	-9.87	0.000	3.75	0.003	12.87	0.001	6.52	0.002	4.60
P55-P60	0.002	5.47	-0.002	-8.73	0.000	2.03	0.004	15.83	0.001	6.02	0.002	6.06
P60-P65	0.004	9.46	-0.003	-12.40	0.000	-1.20	0.006	21.09	0.002	6.75	0.002	5.85
P65-P70	0.005	13.06	-0.004	-16.63	-0.001	-5.23	0.007	25.81	0.002	7.62	0.003	7.81
P70-P75	0.007	17.52	-0.006	-22.43	-0.001	-8.12	0.010	33.65	0.002	9.68	0.004	10.74
P75-P80	0.009	22.04	-0.007	-27.46	-0.002	-12.13	0.013	44.95	0.003	10.62	0.005	12.24
P80-P85	0.013	30.10	-0.007	-28.19	-0.003	-19.82	0.016	56.62	0.002	8.12	0.006	14.84
P85-P90	0.017	41.30	-0.006	-23.79	-0.004	-29.19	0.021	71.39	0.000	1.37	0.007	17.78
P90-P95	0.024	56.34	-0.004	-15.34	-0.005	-41.53	0.027	91.24	-0.002	-8.69	0.008	20.11
P95-P97.5	0.028	56.99	-0.001	-3.06	-0.007	-41.36	0.035	98.34	-0.006	-18.58	0.010	22.27
P97.5-P99	0.026	44.70	0.003	8.49	-0.007	-37.22	0.042	98.10	-0.010	-26.21	0.013	22.43
P99-P99.9	0.014	18.56	0.014	26.64	-0.009	-32.42	0.059	97.38	-0.018	-37.18	0.010	11.54
P100	-0.034	-14.65	0.040	23.09	-0.012	-12.17	0.099	48.78	-0.038	-25.24	0.011	3.67
Reference Group												
P40-P50	0.578	2036.59	0.184	1043.12	0.003	33.36	-0.145	-735.84	-0.042	-243.98	-0.017	-63.01

Table VII
Expected Return and Net Wealth

This table reports regressions of household portfolios' expected excess returns on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. Expected excess returns on the risky portfolio are computed by multiplying the risk loadings from Tables II to IV with the corresponding historical mean annual arithmetic returns over the period 1991-2007. Expected excess returns on the financial portfolio are computed by multiplying the expected excess return on the risky portfolio by the risky share of the financial portfolio. Standard errors are clustered at the household level. One should read the table as follows: using an international Fama-French asset pricing model, the average household in the top 0.1% of the distribution of net wealth has an expected excess return of 10.28% (=0.0775+0.0253) on its risky portfolio and of 7.12% (=0.0531+0.0181) on its financial portfolio.

	Expected Return on Complete Portfolio						Expected Return on Risky Portfolio					
	Local CAPM (1)		International CAPM (2)		International Fama French (3)		Local CAPM (4)		International CAPM (5)		International Fama French (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	0.0029	92.30	0.0030	92.44	0.0029	93.99	0.0000	-0.66	-0.0001	-2.36	0.0003	5.13
P55-P60	0.0042	122.43	0.0044	122.56	0.0044	125.00	0.0006	9.93	0.0004	7.90	0.0012	17.27
P60-P65	0.0056	154.33	0.0059	154.41	0.0059	158.98	0.0008	14.88	0.0007	12.11	0.0018	26.13
P65-P70	0.0074	195.69	0.0077	195.85	0.0078	201.42	0.0012	20.31	0.0010	16.67	0.0025	35.14
P70-P75	0.0096	244.21	0.0100	244.35	0.0102	251.21	0.0015	26.45	0.0013	21.56	0.0033	45.99
P75-P80	0.0119	292.35	0.0124	292.45	0.0127	300.26	0.0020	34.16	0.0017	27.77	0.0042	58.66
P80-P85	0.0147	343.89	0.0153	344.03	0.0159	352.72	0.0028	47.50	0.0024	39.75	0.0057	80.36
P85-P90	0.0182	401.65	0.0190	402.06	0.0198	409.28	0.0039	67.26	0.0035	58.55	0.0078	107.47
P90-P95	0.0231	465.36	0.0240	466.18	0.0254	470.10	0.0058	96.85	0.0053	86.79	0.0110	148.87
P95-P97.5	0.0289	430.22	0.0299	431.69	0.0320	428.11	0.0080	113.49	0.0074	103.72	0.0149	169.86
P97.5-P99	0.0340	376.15	0.0351	377.86	0.0382	369.49	0.0100	117.74	0.0093	108.70	0.0184	173.59
P99-P99.9	0.0415	310.14	0.0427	311.58	0.0468	298.22	0.0137	122.88	0.0128	113.34	0.0230	162.43
P100	0.0482	115.78	0.0496	115.18	0.0531	107.35	0.0176	52.69	0.0164	47.76	0.0253	58.85
Reference Group												
P40-P50	0.0189	837.56	0.0200	843.37	0.0181	799.37	0.0800	2013.27	0.0849	2082.96	0.0775	1594.96

Table VIII
Portfolio Risk and Net Wealth

This table reports regressions of household portfolios' expected standard deviation of annual returns on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. The variance of a household's portfolio is equal to the square of the risky share times the variance of its risky portfolio. The variance of a household's risky portfolio is computed using the historical variance-covariance matrix of the returns of all the risky assets held by the household. The idiosyncratic variance of the portfolio is equal to the variance of the portfolio minus the systematic variance of the portfolio. We assume that all exposures to local and global Fama-French factors are systematic; then we compute the systematic variance of a household's portfolio using the historical variance-covariance matrix of those factors weighted by the household's loading on each factor. The ratio of idiosyncratic to total variance is only computed on the risky part of the portfolio. Versions of this ratio for the fund and the stock portfolio are computed similarly except that we consider only the household's fund and stock holdings. respectively. In the last column, the ratio as well as the wealth ranks are computed as if asset holdings worth more than 0.5% of the total market cap for the security were not measured. Standard errors are clustered at the household level. One should read the table as follows: the average household financial portfolio in the top 0.1% of the distribution of net wealth has a total standard deviation equal to 26.17% (=0.1221+0.1396) and a total idiosyncratic standard deviation equal to 15.44% (=0.0639+0.0905); the ratio of idiosyncratic variance over total variance is on average equal to 33.81% (=0.2837+0.0544) for the risky portfolio of those households.

	Complete Portfolio Return				Share of Idiosyncratic Variance in Portfolio Variance							
	Total Standard Deviation (1)		Idiosyncratic Standard Deviation (2)		Risky Portfolio (3)		Stock Portfolio (4)		Fund Portfolio (5)		Risky Portfolio w/o Controlling Blocks (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	0.0151	93.59	0.0074	60.88	-0.0029	-8.08	-0.0060	-16.57	-0.0018	-5.13	-0.0037	-10.90
P55-P60	0.0211	118.63	0.0104	77.09	-0.0061	-15.47	-0.0095	-24.41	-0.0070	-18.44	-0.0077	-20.80
P60-P65	0.0271	145.75	0.0134	94.45	-0.0081	-20.07	-0.0118	-29.87	-0.0109	-28.21	-0.0107	-28.14
P65-P70	0.0342	179.63	0.0168	114.55	-0.0109	-26.65	-0.0158	-40.05	-0.0148	-38.18	-0.0143	-37.23
P70-P75	0.0417	216.29	0.0202	135.01	-0.0140	-34.22	-0.0208	-52.91	-0.0190	-49.25	-0.0184	-48.06
P75-P80	0.0490	252.14	0.0237	154.76	-0.0170	-41.48	-0.0267	-68.28	-0.0231	-59.96	-0.0224	-58.70
P80-P85	0.0570	290.14	0.0276	175.51	-0.0203	-49.48	-0.0346	-88.38	-0.0290	-75.70	-0.0272	-71.60
P85-P90	0.0663	332.38	0.0322	198.35	-0.0232	-56.40	-0.0455	-115.77	-0.0359	-94.44	-0.0321	-84.54
P90-P95	0.0776	381.85	0.0381	224.33	-0.0252	-60.41	-0.0633	-158.68	-0.0436	-115.13	-0.0372	-97.99
P95-P97.5	0.0894	366.08	0.0449	209.48	-0.0244	-49.95	-0.0870	-185.14	-0.0490	-112.87	-0.0403	-91.66
P97.5-P99	0.0986	333.19	0.0512	190.49	-0.0187	-32.11	-0.1125	-199.12	-0.0487	-94.35	-0.0379	-73.18
P99-P99.9	0.1137	293.78	0.0637	174.97	0.0004	0.57	-0.1464	-197.36	-0.0378	-55.68	-0.0239	-36.02
P100	0.1396	114.87	0.0905	75.81	0.0544	24.45	-0.1617	-72.32	0.0115	5.16	0.0138	7.24
Reference Group												
P40-P50	0.1221	1005.80	0.0639	710.08	0.2837	1005.31	0.5104	1807.88	0.2046	759.50	0.2614	978.65

Table IX
Return Loss from Underdiversification and Net Wealth

This table reports regressions of household portfolios' main drivers of underdiversification costs on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth who participate in the stock market. In the first column, the outcome is the expected return loss implied by not investing in a perfectly diversified portfolio (the "benchmark" portfolio) with similar systematic risk characteristics as the portfolio actually chosen by the household. It can be decomposed into the sum of three terms, which we regress in columns 2 to 4: the risky share of the financial portfolio, the beta of the risky portfolio and a non-linear and increasing transformation of the relative Sharpe ratio loss from investing in a less mean-variance efficient risky portfolio than the benchmark portfolio. All four outcomes are in absolute values and log transformed. We assume that compensated risk factors are spanned by local and global Fama-French factors and the "benchmark" portfolio is the combination of these factors that maximizes the Sharpe ratio. Standard errors are clustered at the household level. One should read the table as follows: the average household risky portfolio in the top 0.1% of the distribution of net wealth has a level of underdiversification that makes the return loss from underdiversification 5.89% higher than in the typical risky portfolio held by the median household.

	Return Loss on Complete Portfolio		Components of the Return Loss					
			Risky Share		Market Beta		Diversification Loss	
	$\log(RL_h)$		$\log(\omega_h)$		$\log\lvert\beta_h\rvert$		$\log\lvert RSRL_h/(1-RSRL_h)\rvert$	
	(1)		(2)		(3)		(4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P55	0.0215	9.20	0.0350	20.09	0.0088	8.42	-0.0223	-11.43
P55-P60	0.0494	19.49	0.0585	30.87	0.0249	21.73	-0.0340	-16.14
P60-P65	0.0713	27.36	0.0849	43.53	0.0365	31.09	-0.0500	-23.13
P65-P70	0.1039	39.56	0.1197	61.10	0.0474	40.07	-0.0632	-29.05
P70-P75	0.1455	55.36	0.1631	83.22	0.0612	51.87	-0.0788	-36.20
P75-P80	0.1881	71.51	0.2072	105.81	0.0772	65.54	-0.0963	-44.26
P80-P85	0.2412	91.00	0.2568	130.22	0.1040	88.66	-0.1195	-54.99
P85-P90	0.3193	119.10	0.3166	159.29	0.1385	118.88	-0.1358	-62.59
P90-P95	0.4243	154.73	0.3939	195.17	0.1897	163.92	-0.1592	-73.22
P95-P97.5	0.5540	166.98	0.4805	200.64	0.2500	191.85	-0.1765	-70.36
P97.5-P99	0.6850	168.60	0.5484	190.49	0.2977	198.56	-0.1611	-54.95
P99-P99.9	0.8918	169.84	0.6438	175.35	0.3526	189.92	-0.1047	-28.30
P100	1.1469	76.00	0.7163	66.24	0.3718	65.39	0.0589	4.99
Reference Group								
P40-P50	-5.5488	-3100.85	-1.3520	-1008.98	0.0346	42.02	-1.4584	-975.76

Table X
Risk-Adjusted Stock Performance and Net Wealth

This table reports regressions of a household stock portfolio's alpha on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample has one observation per calendar month and household and includes all stock portfolios of Swedish households above the 40th percentile of the distribution of net wealth. We consider that the household uses a buy-and-hold strategy for either 3 months or 1 year after December 31st of each year. Each monthly alpha is then annualized. Risk adjustments on realized returns are made using an international Fama-French 3-factor model. In columns (3) to (6), we weigh the households' alpha by the share of its stock portfolio in its risky and financial portfolio, respectively. Standard errors are clustered at the calendar month level. One should read the table as follows: using an international Fama-French asset pricing model, the average household in the top 0.1% of the distribution of net wealth has an alpha on its stock portfolio equal to -0.1% (=0.0045-0.0055) a year over the first three months after its holdings are observed on December 31st.

	Average Alpha of Stocks in Household Portfolio											
	Stocks Weighted By Share in Stock Portfolio				Stocks Weighted By Share in Risky Portfolio				Stocks Weighted By Share in Complete Portfolio			
	3-Month Holding Period (1)		1-Year Holding Period (2)		3-Month Holding Period (3)		1-Year Holding Period (4)		3-Month Holding Period (5)		1-Year Holding Period (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	-0.0025	-0.4950	-0.0012	-0.6494	-0.0007	-1.0860	-0.0001	-0.2875	-0.0004	-0.8029	0.0000	0.1856
P55-P60	-0.0023	-0.3384	-0.0009	-0.3647	-0.0003	-0.2697	0.0002	0.5346	-0.0004	-0.5576	0.0001	0.2409
P60-P65	-0.0042	-0.4600	-0.0017	-0.4998	-0.0013	-1.1167	0.0002	0.4024	-0.0008	-0.8512	0.0000	0.1272
P65-P70	-0.0051	-0.4448	-0.0020	-0.4554	-0.0015	-1.1146	0.0002	0.3483	-0.0010	-0.8216	0.0000	0.0879
P70-P75	-0.0071	-0.5186	-0.0029	-0.5564	-0.0022	-1.3551	0.0000	-0.0367	-0.0014	-1.0348	-0.0001	-0.1193
P75-P80	-0.0069	-0.4271	-0.0039	-0.6336	-0.0022	-1.1625	-0.0001	-0.0565	-0.0016	-0.9171	-0.0001	-0.1372
P80-P85	-0.0088	-0.4681	-0.0062	-0.8638	-0.0030	-1.3704	-0.0006	-0.5761	-0.0019	-0.8988	-0.0003	-0.2661
P85-P90	-0.0105	-0.4729	-0.0087	-1.0133	-0.0041	-1.5773	-0.0010	-0.7429	-0.0026	-0.9507	-0.0003	-0.2683
P90-P95	-0.0153	-0.5637	-0.0136	-1.2746	-0.0059	-1.6399	-0.0020	-1.0485	-0.0036	-0.9288	-0.0005	-0.3143
P95-P97.5	-0.0207	-0.6241	-0.0188	-1.4185	-0.0085	-1.4969	-0.0031	-1.0684	-0.0054	-0.9566	-0.0007	-0.2618
P97.5-P99	-0.0242	-0.6157	-0.0228	-1.4179	-0.0097	-1.1341	-0.0035	-0.8190	-0.0067	-0.8558	-0.0003	-0.0767
P99-P99.9	-0.0227	-0.4876	-0.0232	-1.1766	-0.0085	-0.5882	-0.0011	-0.1660	-0.0073	-0.5834	0.0020	0.3362
P100	-0.0055	-0.1011	-0.0064	-0.2630	-0.0002	-0.0058	0.0123	1.0174	-0.0048	-0.2042	0.0122	1.1966
Reference Group												
P40-P50	0.0045	0.0684	0.0256	0.9474	-0.0023	-0.1676	0.0035	0.6074	-0.0003	-0.0836	0.0007	0.5159

Table XI
Fund Skill and Net Wealth

This table reports regressions of the historical performance of funds chosen by each household on dummies for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The sample has one observation per year and household and includes all fund portfolios of Swedish households above the 40th percentile of the distribution of net wealth. The historical performance of each fund is computed using its alpha (gross or net of fees) measured over the period 1991 to 2007. Fund alphas are computed using an international Fama-French 3-factor model. Fund alphas are then weighted by their value in each household's portfolio in order to form a household's fund performance measure. In columns (3) to (6) we weigh the households' alpha by the share of its fund portfolio in its risky and financial portfolio, respectively. Standard errors are clustered at the household level. One should read the table as follows: using an international Fama-French asset pricing model, the average household in the top 0.1% of the distribution of net wealth picks funds with an alpha net of fees equal to 0.55% (=0.0069-0.0014).

	Average Alpha of Mutual Funds in Household Portfolio											
	Funds Weighted By Share in Fund Portfolio				Funds Weighted By Share in Risky Portfolio				Funds Weighted By Share in Complete Portfolio			
	Gross Alpha (1)		Net Alpha (2)		Gross Alpha (3)		Net Alpha (4)		Gross Alpha (5)		Net Alpha (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P55	-0.0002	-3.68	-0.0001	-2.68	-0.0002	-7.29	-0.0001	-3.65	0.0002	22.12	-0.0001	-11.84
P55-P60	-0.0002	-4.89	-0.0002	-4.04	-0.0004	-11.38	-0.0002	-4.93	0.0003	26.84	-0.0002	-16.66
P60-P65	-0.0004	-8.20	-0.0003	-7.14	-0.0006	-17.24	-0.0003	-7.61	0.0004	31.41	-0.0003	-22.93
P65-P70	-0.0005	-11.31	-0.0005	-9.74	-0.0009	-23.56	-0.0004	-10.49	0.0005	38.97	-0.0003	-29.70
P70-P75	-0.0007	-13.61	-0.0006	-11.63	-0.0011	-29.45	-0.0004	-12.55	0.0006	47.18	-0.0004	-36.94
P75-P80	-0.0007	-13.93	-0.0006	-11.55	-0.0012	-34.60	-0.0005	-13.00	0.0007	55.98	-0.0005	-41.34
P80-P85	-0.0007	-14.13	-0.0006	-11.58	-0.0015	-41.52	-0.0005	-13.54	0.0008	61.44	-0.0006	-46.95
P85-P90	-0.0005	-10.45	-0.0004	-8.04	-0.0017	-46.69	-0.0004	-10.27	0.0010	69.19	-0.0007	-47.95
P90-P95	-0.0002	-4.68	-0.0001	-2.84	-0.0020	-54.92	-0.0002	-5.19	0.0011	73.23	-0.0007	-46.85
P95-P97.5	0.0004	6.15	0.0005	7.24	-0.0022	-53.81	0.0002	5.66	0.0012	62.40	-0.0005	-28.15
P97.5-P99	0.0012	14.57	0.0012	15.32	-0.0026	-54.17	0.0007	15.84	0.0012	49.83	-0.0003	-11.52
P99-P99.9	0.0029	23.80	0.0029	24.31	-0.0033	-57.74	0.0016	28.47	0.0010	29.43	0.0002	7.33
P100	0.0069	14.86	0.0069	15.10	-0.0049	-33.66	0.0022	15.94	0.0000	0.34	0.0006	6.33
Reference Group												
P40-P50	0.0125	378.46	-0.0014	-41.95	0.0090	359.64	-0.0016	-63.87	0.0022	316.67	-0.0003	-45.64

Table XII
Portfolio Heterogeneity and Inequality Dynamics

This table reports estimates of the moments suggested by Campbell (2015) in order to trace the contribution of returns' heterogeneity to wealth inequality. We compute estimates of these moments in each sample year for the entire cross-section of households with positive financial wealth (excluding bonds, derivatives, insurance accounts and other investment vehicles for which returns are not observable); we then provide here the time-series average of these cross-sectional moments. We assume households use a buy-and-hold strategy in the twelve months following December 31st of each year. We present the results using three different asset pricing models (the ones used above) and assume that households do not generate any alphas.

	Decomposition of Yearly Change in the Cross-Sectional Variance of Log Financial Wealth				
	Cross-Sectional Moments			Predicted	Average
	Variance of Expected Return $Var^*(E_t r_{h,t+1})$	Variance of Unexpected Return $Var^*(r_{h,t+1} - E_t r_{h,t+1})$	Cov. of Financial Wealth and Expected Return $2Cov^*[E_t r_{h,t+1}; \log(W_{h,t+1})]$	Yearly Change in Variance of Financial Wealth	Yearly Change in Variance of Financial Wealth
	(1)	(2)	(3)	(4)	(5)
Asset Pricing Models					
Local CAPM	0.0009	0.0135	0.0448	0.0592	0.0390
International CAPM	0.0009	0.0137	0.0466	0.0612	0.0390
International Fama-French	0.0009	0.0130	0.0476	0.0615	0.0390

Table A
Definition of Household Variables

This table summarizes the main household variables used in the paper.

Variable	Description
Cash	Bank account balances and Swedish money market funds.
Fund portfolio	Portfolio of mutual funds other than Swedish money market funds.
Stock portfolio	Portfolio of directly held stocks.
Risky portfolio	Combination of the stock and fund portfolios.
Risky share	Proportion of risky assets in the portfolio of cash and risky financial assets.
Financial wealth	Value of holdings in cash, stocks, funds and other financial vehicles (bonds, derivatives, capital insurance accounts), excluding defined-contribution retirement accounts.
Gross wealth	Sum of financial wealth and real estate wealth.
Net wealth	Gross wealth minus outstanding household debt.
Number of stocks	Number of assets in the stock portfolio.
Number of funds	Number of assets in the fund portfolio.
Residential real estate wealth	Value of primary, secondary, and foreign residences.
Commercial real estate wealth	Value of rental, industrial, agricultural, and other property.
Leverage ratio	Total debt divided by the sum of financial and real estate wealth.

Figure 1
Wealth Concentration in Sweden (1999-2007)

This figure illustrates the average shares of total household wealth held by the upper brackets of the wealth distribution in Sweden between 1999 and 2007. The shares are reported for gross wealth, net wealth, and financial wealth. All variables are described in Appendix Table A. P90-P95 refers to households whose wealth places them between the 90th and the 95th percentile of the wealth distribution; P95-P95 corresponds to the interval between the 95th and the 99th percentile; P99-P99.5 corresponds to households in the bottom half of the top centile of the distribution; P99.5-P99.9 represents those between the 995th and the 999th thousandth of the distribution; P99.9-P99.95 is for those in the bottom half of the top thousandth of the distribution; P99.95-P99.99 refers to households between the top 0.05% and the top 0.01% of the distribution; P100 corresponds to households in the top 0.01% of the wealth distribution. Wealth brackets are specific to each wealth concept we use, and so is the denominator of the wealth shares. For example, the graph shows that the top 0.01% of the distribution of financial wealth own on average 7.96% of total financial wealth held by Swedish households.

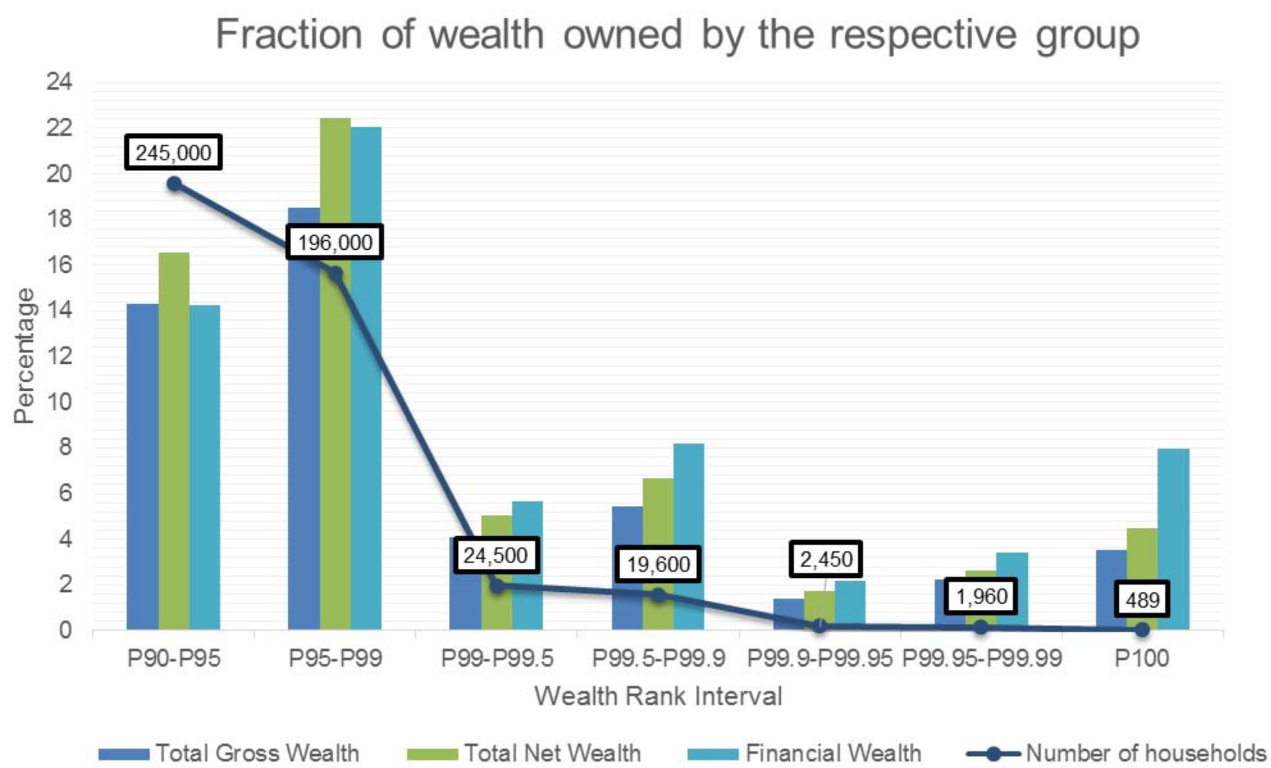

Figure 2

Allocation of Gross Wealth

Real Estate and Financial Assets

This figure illustrates the average share of households' gross wealth pertaining to financial wealth, real wealth and debt for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. All variables are described in Appendix Table A. The leverage ratio is equal to households' debt outstanding over gross wealth. For the bottom half of the population (P0-P50), the leverage ratio is well over 100% on average due to households incurring personal debt to finance consumption or investments into assets we do not measure here (e.g., human capital). P50-P75 refers to households whose wealth places them between the median and the 75th percentile of the distribution of net wealth; P75-P90 corresponds to households whose wealth places them between the 75th and the 90th percentile of the distribution of net wealth; P90-P95 corresponds to households whose wealth places them between the 90th and the 95th percentile of the distribution of net wealth; P95-P99 corresponds to the interval between the 95th and the 99th percentile; P99-P99.5 corresponds to households in the bottom half of the top centile of the distribution; P99.5-P99.9 represents those between the 995th and the 999th thousandth of the distribution; P100 corresponds to households in the top 0.1% of the distribution of net wealth. One should read the graph as follows: households in the top 0.1% of the distribution of net wealth on average invest 49.9% of their gross wealth into financial assets, 50.1% into real assets and their outstanding debt represents 9.6% of their gross wealth.

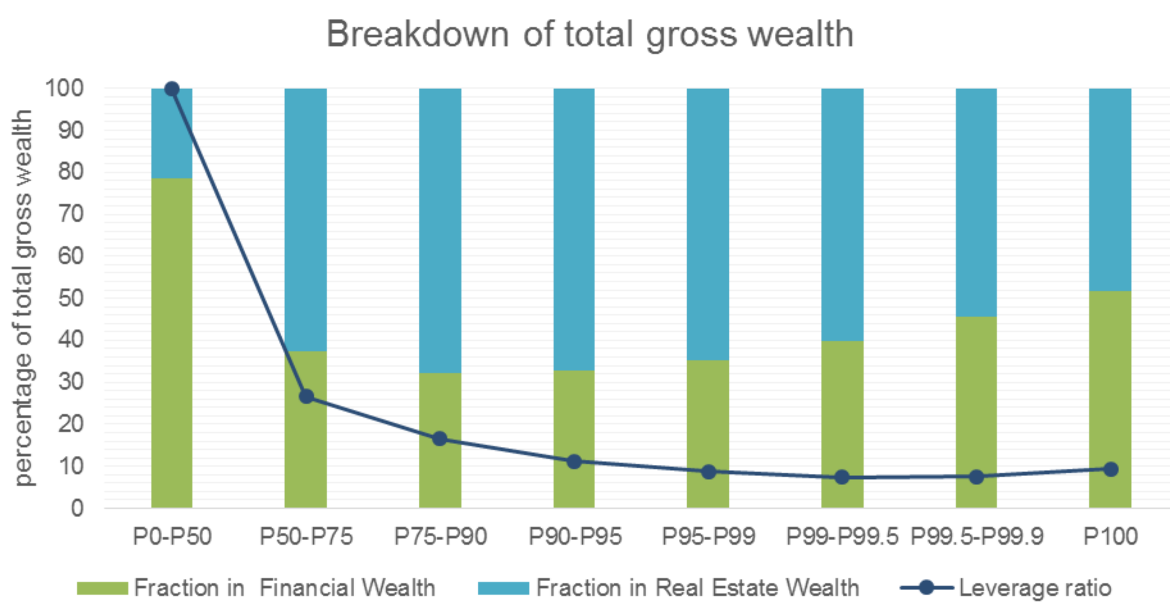

Figure 3
Labor Income

This figure illustrates the average and the median amount of annual labor income earned by households located in different brackets of the distribution of net wealth in Sweden between 1999 and 2007. Labor income is measured before income tax and displayed in thousands of Swedish kronor. By December 31st, 2007 10 kronor were worth 1.55 USD. One should read the graph as follows: the average household in the top 0.1% of the distribution of net wealth earns 678,000 Swedish kronor (about 105,000 USD) a year while the median labor income earned by households in that wealth bracket is equal to 317,000 Swedish kronor (about 49,000 USD) a year.

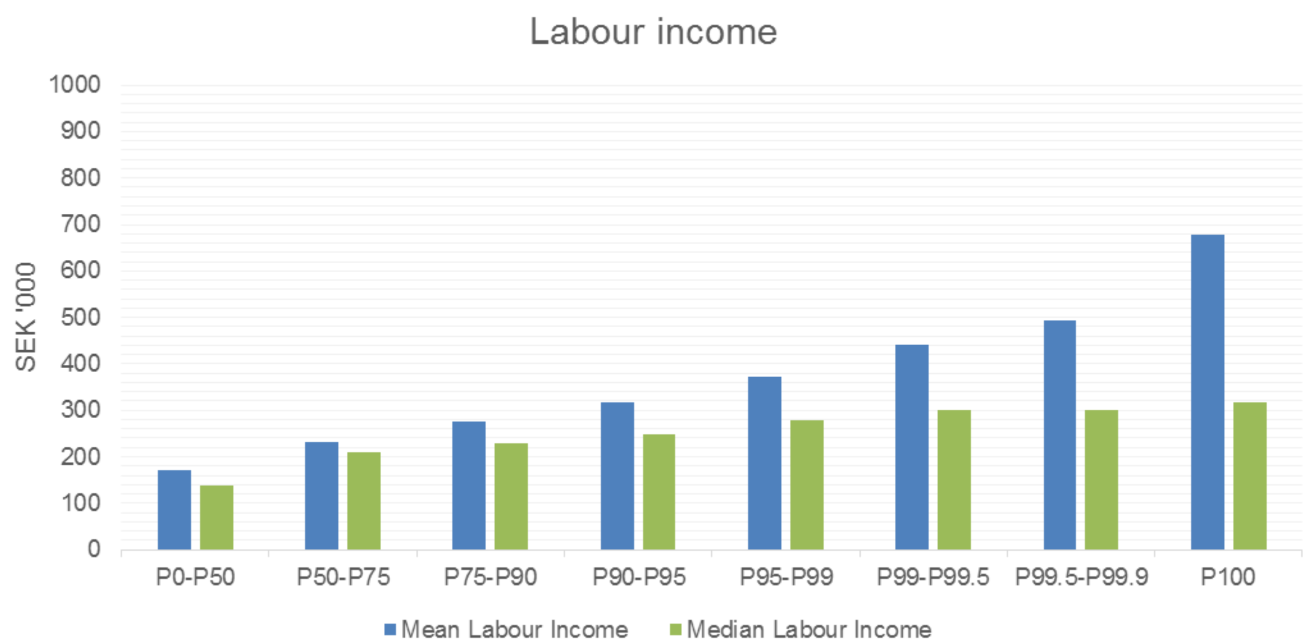

Figure 4
Allocation of Gross Wealth
Cash, Risky Financial Assets, and Residential and Commercial Real Estate

This figure illustrates the average share of households' gross wealth pertaining to various asset types for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. Risky financial wealth includes stocks, funds, capital insurance, bonds, derivatives and other financial assets. All other variables are described in Appendix Table A. One should read the graph as follows: the average household in the top 0.1% of the distribution of net wealth has 10% of its total wealth in cash, 12.4% in residential real estate, 41.6% in risky financial assets and 36% in commercial real estate.

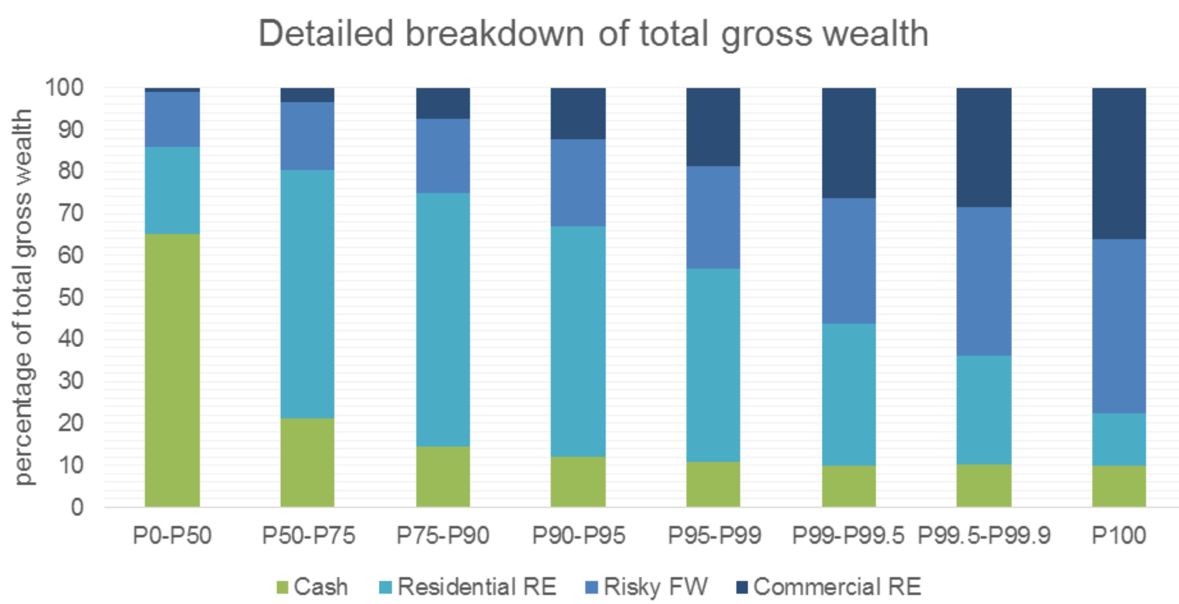

Figure 5
Allocation of Real Estate Portfolio

This figure illustrates the average share of households' real estate wealth pertaining to various property types for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. The first four categories are self-explanatory. Other properties mainly include foreign housing and industrial properties of sole proprietors. All variables are described in Appendix Table A. One should read the graph as follows: the average household in the top 0.1% of the distribution of net wealth has 36.3% of its real estate portfolio invested in its own main residences, 12.4% in its holiday homes, 21.7% in agricultural properties, 26.6% in rental housing and 2.9% in other property types.

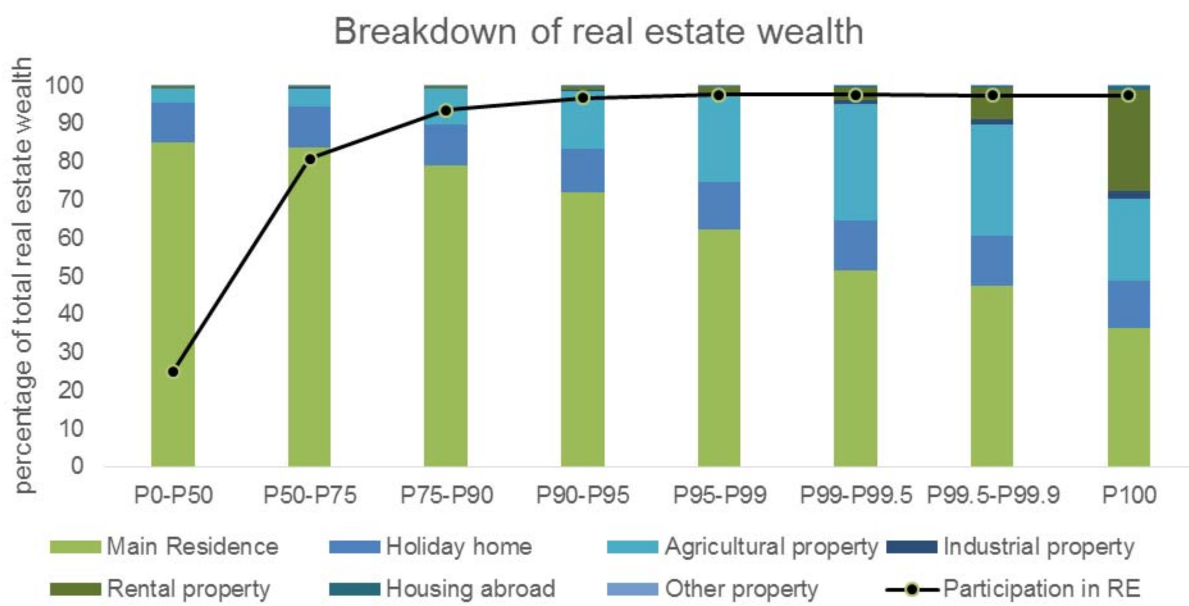

Figure 6
Allocation of Financial Wealth

This figure illustrates the average share of households' financial wealth pertaining to various financial investment vehicles for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. Stocks refer to directly-held stocks. Funds refer to mutual funds other than money-market funds. Capital insurance accounts are tax-favored savings accounts whose proceeds can be invested either in mutual funds or in riskless assets. All other variables are described in Appendix Table A. One should read the graph as follows: the average household in the top 0.1% of the distribution of net wealth has 28.5% of its financial portfolio invested in cash, 49.9% in directly-held stocks, 12.9% in mutual funds, 1.4% in bonds, 0.1% in derivatives, 5.3% in capital insurance accounts and 1.9% in other investment vehicles.

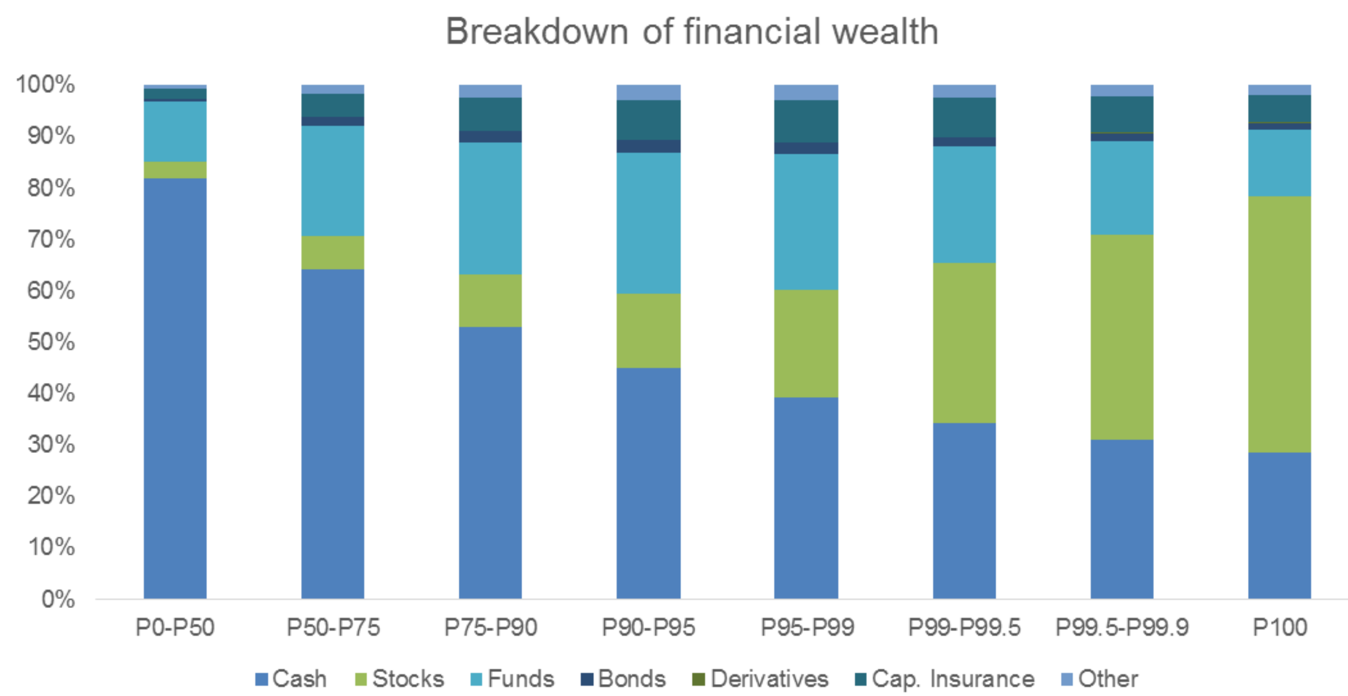

Figure 7
Stock Market Participation

This figure illustrates the average rate of stock market participation for different brackets of the distribution of net wealth in Sweden between 1999 and 2007. Stocks refer to directly-held stocks. Funds refer to mutual funds other than money-market funds. The propensity to own at least 5 directly-held stocks is measured conditional on directly holding stocks. One should read the graph as follows: among households belonging to the top 0.1% of the distribution of net wealth, 78.6% own both stocks and funds, 16% own stocks but not funds, 3.1% own funds but not stocks, and among those who own stocks, 86% own at least 5 different stocks.