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

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Abstract

This paper empirically investigates the compositions of household gross and net wealth and their implications for the dynamics of inequality. Using an administrative panel of all Swedish residents, we show that the mean return on *gross* wealth is monotonically increasing in household net worth: the mean return is on average 3.6% higher per year for the top 0.01% compared to the median household, primarily because the rich select high levels of systematic risk. We also document that the middle class hold aggressively levered positions in real estate and thereby earn high returns on *net* wealth. Thus, in contrast to gross wealth, the mean return on net wealth is a U-shaped function of household net worth. Abnormal risk-adjusted returns, linked for instance to informational advantages or exceptional investment skill, contribute only marginally to these patterns. Implications for inequality dynamics and public policy are discussed.

Keywords: Household finance, inequality, risk-taking, factor-based investing.

JEL Classification: D12, D31, G11.

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 assets. Their holdings should also be measured exhaustively, preferably at the level of each asset or security. Traditional data sets do not meet these conditions. For instance, the U.S. Survey of Consumer Finances (SCF) contains only about 700 households from the top 1% of the wealth distribution and the response rate in the top percentile is only 12% (Kennickell 2009). 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).

The Swedish Income and Wealth Registry, which contains the wealth tax records of every Swedish resident between 2000 and 2007, satisfies the aforementioned key requirements. The registry contains each year about 40,000 households from the top 1% of the wealth distribution. The Swedish Income and Wealth Registry is also one of the most detailed and comprehensive sources on 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 asset on December 31st of each year, which we match with the corresponding price data. The disaggregated holdings allow us to estimate the systematic and idiosyncratic risk exposures of household portfolios.

Our paper makes several contributions to the literature. First, we show that wealthier households allocate a substantially higher fraction of *gross* wealth to risky assets compared to the median household. The share of risky assets increases monotonically with net worth, reaching 62% for the top 1%-0.5% and 94% for the top 0.01%. Higher holdings of risky financial assets, private equity, and commercial real estate all contribute to the increase in the riskiness of gross wealth.

Second, the mean return on gross wealth is a monotonically increasing function of household net-worth. Compared to the median household, the mean return on gross wealth is 2% per year higher for the top 10% of households, 2.9% per year higher for the top 1%-0.5%, and 3.6% per year higher for the top 0.01.

Third, in contrast to gross wealth, the mean return on *net* wealth is a U-shaped function of household net-worth. The explanation is that households in the middle of the distribution are highly levered, primarily to invest in risky real estate. We also document that the middle class pay higher debt costs than wealthier households. Overall, the positive impact of high-risk taking dominates the negative impact of higher debt costs, and the middle class earn higher mean returns than wealthier households. Households at higher levels of wealth tend to have lower levels of debt and lower mean returns; at the very top households also have low leverage but achieve higher mean returns by selecting higher exposure to systematic risk. Put slightly differently, one main difference between the middle class and the top is that the former group strives to reduce leverage over time, while the latter group maintains a high risk exposure across the years. As a consequence, mean returns on net wealth are more persistently high for the rich and than for the middle class.

Fourth, the high systematic exposure of the wealthy are achieved (i) by allocating a high share of their wealth to risky assets, and (ii) by picking risky assets that load aggressively on common risk factors, such as market, size, and value. The aggressive investment strategies chosen by the wealthy entail a large increase in the volatility of their returns. The returns on gross wealth held by the top 0.01% have a standard deviation of about 20% per year on average, as compared to 7.6% for the median household and 14% for the top 1%-0.5%. The share of idiosyncratic risk in total portfolio risk steeply increases with wealth. This is in no small part driven by the higher incidence of private equity holdings among very wealthy households, which more than compensates the influence of a lower weight of real estate in their portfolio. What is more surprising is that financial portfolios of the rich are not better diversified, which also contributes to low levels of diversification overall. The main reason is that 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. It is only at the very end of the wealth distribution that control motives play a role in explaining the lack of diversification of financial portfolios.

Fifth, we find some support for the hypothesis that the richest households have investment skill within some asset classes. We do not detect that the rich have the ability to better pick stocks and choose stock portfolios with higher alphas than other households. We acknowledge, however, that our tests have weak power given the variability of returns on individual stocks. When we focus instead on mutual funds, we obtain more precise results and establish that the top 1% select fund portfolios with significantly higher alphas than the median household. However, this fund-picking ability contributes very little to the returns of the rich compared to the effect of systematic risk. Furthermore, the alpha of the fund portfolio net of fees is negative for all wealth groups.

Sixth, 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 dynamics 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.[1] 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 equilibrium models (Benhabib Bisin and Zhu 2011) can be strengthened by incorporating the empirical features of household portfolios uncovered in this paper. The homogeneity of return variance assumed in theoretical work does not hold in the data, because idiosyncratic variance tends to increase as households grow wealthier.

[1] 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).

Our empirical analysis shows that portfolio heterogeneity is empirically important and may help theorists explain higher levels of wealth inequality, especially at the top.

To our knowledge, the present paper is the first to use comprehensive micro data to analyze the joint distribution of household wealth and investment returns, and tie them to systematic differences in portfolio characteristics. Fagereng et al. (2016) use Norwegian data to provide evidence on the heterogeneity and persistence of returns on the gross wealth held by individuals. In line with the empirical literature on wealth inequality, our unit of analysis is the household instead of the individual.

Fagereng et al. (2016) focus on realized returns, while we study both expected returns and realized returns. For the realized return method, it is essential to average returns over very long periods before the true long-term return emerges from the data. By contrast, estimates based on expected returns require the knowledge of household asset holdings at a given point in time together with exhaustive price series on each asset; a standard asset pricing models can then be used to determine the expected return and the risk exposure of any household portfolio. The asset-pricing approach does not use annual capital income reported on income tax forms to measure wealth returns. It is therefore free of biases due to the mismatch between the capital stock at year-end and taxable capital income accrued during the year, the endogenous realization of capital gains and losses, and the difficulty of disentangling labor income and capital income using tax data, which is especially acute in countries such as Norway and Sweden that have strong tax incentives to shift labor income to the capital income tax base.

Another major difference in methodology is that Fagereng et al. (2016) restrict their attention to gross financial wealth while we consider all components of wealth, including real estate and debt, which represent the largest part of wealth for a majority of households. We share the finding that richer households obtain higher returns on gross wealth but, in contrast to their results, we establish that the positive relationship between mean return and wealth is fully consistent with an increase in systematic risk exposure.[2] We also find

[2] As a result, the Sharpe ratio of financial portfolios is only marginally increasing with wealth and stays between 0.32 and 0.37, while they find that the Sharpe ratio goes from about 0.35 for the median individual to 0.95 for the top percentile.

evidence that the mean return on net wealth is U-shaped in net worth, which implies that the middle class are prime beneficiaries of financial markets, at least in early stages of the life-cycle. The two papers therefore have profoundly different normative implications.

The rest of the paper is organized as follows. Section 1 describes the data and main variables. Section 2 documents the risk and return characteristics of the total wealth held by households across different wealth brackets. Sections 3 to 5 investigate respectively the main components of household gross wealth: financial assets, real estate, and private equity. Section 6 derives the implications of our empirical findings for the dynamics of wealth inequality. Section 7 concludes. An Appendix available online (Bach, Calvet, and Sodini 2016) presents details of data construction and estimation methodology.

1. Data and Definition of Variables

1.1. Household Panel

Disaggregated information on the holdings 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, stock and mutual fund investments, and real estate holdings are observed at the level of each account, security, or property. 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.

We retrieve information on private equity holdings from Swedish K-10 income tax forms, which are specific to income derived from non-listed companies. The forms provide the number of shares in an unlisted limited liability company held by any Swedish resident actively participating in the firm. Because the tax status is more favorable for "active" than for "passive" dividends from unlisted companies and the definition of active ownership is very loose (Alstadsæter and Jacob, 2015), our dataset encompasses almost all stakes in private companies held by individuals.[3] The K-10 dataset starts in the year 2000 and covers a very large subset of Swedish households including more than 80% of the entire population.[4]

1.2. Price Data

Data on Nordic stocks and mutual funds for the 1983 to 2009 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 exclude stocks and funds with less than two years of available data, and filter out stocks worth less than 1 krona. 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.[5]

Real estate prices are provided by Statistics Sweden and are based on two main sources. First, tax authorities assess the market value of all real estate properties every five to ten years. This assessment is made using the hedonic method based on detailed information on the characteristics of each property.[6] Second, Statistics Sweden collects data on all real estate transactions. For every transaction, the actual price is collected together with the most recent value assessed by the tax authority. These observations permit the construction of sales-to-tax-value multipliers, which can be computed at very detailed levels of geographic precision for each kind of property. One can then build an estimate of yearly

[3] Using an extract of the data for which information on "passive" dividends is available, we find that less than 5% of all dividends from private companies received by Swedish residents are passive, which is likely an overestimate of the value of passive shares since firms with passive owners are more likely to pay dividends rather than capital gains in the first place (Michaely and Roberts 2012).

[4] The remaining 20% is also represented through sampling weights. In the rest of the paper we only display results adjusted with the sampling weights provided by Statistics Sweden.

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

[6] The type of information collected depends on whether the property is residential, agricultural or rental. Up to 20 different characteristics are measured by the tax authority (Englund, Quigley, and Redfearn 1998). Condominium properties are only assessed as a whole, not separately for each unit.

capital gains returns on properties from the comparison of sales-to-tax-value multipliers across years.

For each household, we observe total debt outstanding at year end and the interest paid during the year. We proxy the cost of household debt by the average interest rate paid in years t and $t+1$ divided by total debt at date t. We winsorize the 5% right tail, and impute the interest rate spread, that is the rate paid in excess of the average risk-free rate in years t and $t+1$.

The valuation of unlisted business equity must address the lack of regular price information. Fortunately, it is practiced very frequently by corporate buyers, private equity funds, banks, national accountants, and tax authorities (Damodaran 2012). The methodology typically consists of computing a set of valuation multiples among listed firms that are comparable to the unlisted firm of interest. We focus on market-to-book multipliers, which have been shown to be fairly robust to the high prevalence of business groups among European listed firms (Picart 2003). Due to leverage, some firms might have negative book equity. For this reason, we first estimate the market value of a private firm's total assets using multiples, and then subtract financial debt.

1.3. Definition of Main Variables

We use the following definitions throughout the paper. We measure the household's *gross financial wealth* at date t as the total value of bank account balances, mutual funds, stocks, and other investment vehicles (bonds, derivatives, and capital insurance), excluding from consideration illiquid assets such as defined contribution retirement accounts. It is useful to distinguish between *cash,* which consists of bank account balances and Swedish money market funds, and *risky financial wealth,* which consists of all other financial assets.[7]

Real estate wealth consists of residential properties (primary and secondary residences) that provide housing services to the household, and commercial properties (rental, indus-

[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.

trial, and agricultural property) that serve primarily as investment vehicles. *Private equity* consists of the shares of unlisted companies. *Debt* is the sum of mortgages and all other liabilities contracted by the household.

We define *total gross wealth* as the sum of financial wealth, real estate, and private equity. *Net wealth* is equal to gross wealth minus household debt. The leverage ratio is defined as total debt divided by gross wealth. In all our results, households are ranked by net wealth, consistent with the empirical literature on wealth concentration.[8]

2. Total Wealth

This Section empirically investigates the main characteristics of the total wealth in the population. In Section 2.1, we report the distribution of gross and net wealth across households, along with the distribution of financial wealth and private equity. In Section 2.2, we document that there exists a strong relationship between net worth and the allocation of gross wealth to three main asset classes (financial securities, real estate, and private equity), even at the very top. Section 2.3 investigates how the risk and return on total wealth, as well as the cost of debt, vary with household net worth.

2.1. Cross-Sectional Distribution of Wealth

We investigate the level of wealth inequality in Sweden and assess how representative Sweden is of other developed economies. In Figure 1, we sort households by net wealth and report the shares of gross and net wealth held by each group. The top 1% hold on average 25.7% of total net wealth in Sweden between 2000 and 2007, as compared to 36.8% in the United States.[9] The concentration at the top is especially pronounced for private equity and to a lesser extent for financial wealth, as the figure also shows. Thus wealth inequality is substantial in Sweden, if somewhat less pronounced than in the United States. Furthermore, our measures of wealth inequality in Sweden are likely to be underestimates

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

[9] The U.S. estimate is based on the 1998, 2001, 2004 and 2007 surveys of the SCF, and excludes retirement accounts and consumer durables from the definition of wealth.

because the richest Swedish residents hold substantial foreign assets that are undeclared to tax authorities (Roine and Waldenström 2009).[10]

To put these estimates into perspective, at the end of 2007, 11,643,000 Swedish kronor, or about 1.8 million dollars, are needed to enter the top 1% of Swedish households, while 4.3 million dollars are required to enter the top 1% in the United States (Saez and Zucman 2015). Thus wealthy Swedes would enter a slightly lower bracket if they entered the U.S. wealth distribution, but they are still be wealthy by American standards. Furthermore, 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.[11] In both countries, wealth is therefore much more concentrated than income.

The distribution of wealth is very sticky, especially at the top. In the Internet Appendix, we provide the transition probabilities between the household's rank in the wealth distribution in 2000 and its rank in 2007, conditional on the survival of the household. Despite very significant movements in asset prices between 2000 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. Such high persistence suggests that the current wealth rank of a household may be tied to its asset allocation, as we now show.

2.2. Asset Allocation

Figure 2 illustrates the allocation of gross wealth to the three main asset classes: financial assets, real estate, and private equity. The top 1% of Swedish households invest 41.9% of their wealth in commercial and residential property. By contrast, the top 1% of U.S. households invest only 27.8% of gross wealth in real estate according to the SCF between 1998 and 2007. This cross-country difference has two likely causes. First, wealth concen-

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

[11] The Swedish cross-sectional distribution of income is provided in the Appendix. The U.S. estimates are obtained from the World Top Incomes database and include realized capital gains in the definition of income.

tration 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.[12] 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.[13] 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.

Figure 2 also illustrates how households in different net wealth brackets allocate gross wealth to cash, risky financial assets, private equity, and residential and commercial real estate. In the absence of leverage, residential properties provide a hedge against variation in the cost of housing and in this sense reduce household risk exposure. Furthermore, due to indivisibilities and moving costs, their contribution to wealth creation may be diminished 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 unambiguously increases the risk of household portfolios. For these reasons, we define the risky share as the weight of risky financial assets, private equity and commercial real estate in household gross wealth. As Figure 2 shows, the total risky share is only 12.3% of the total for the median household but then gradually increases to 31.8% for households in the top 10%-5%, 61.5% for households in the top 1%-0.5%, and 94.4% for households in the top 0.01%. The total risky share therefore

[12] The Swedish data confirms this stylized fact: the average share of real estate in gross wealth is only 16.6% in the top 0.1% of the distribution of net wealth, as opposed to 41.9% in the top 1% and 61.5% in the top 10%.

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

quickly increases with wealth, especially within the top decile.

The top 1% of Swedish households hold 7.5% of gross wealth in cash, 23.9% in residential real estate, 23% in risky financial wealth, 27.7% in private equity and 18.1% in commercial real estate. By comparison, the top 1% of U.S. households hold 4.8% in cash, 20% in residential estate, 26.7% in risky financial wealth, 36.6% in private equity and 7.9% in investment real estate.[14] 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 (68.8%) and the top 1% U.S. households (71.2%). One interesting difference between Sweden and the U.S. is that wealthy Swedish households invest proportionally more in investment real estate and less in private equity than their U.S. counterparts, which may be due to the fact that U.S. households widely invest in the property market via private firms and investment vehicles such as Real Estate Investment Trusts (REITs).

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.

2.3. Risk and Return on Total Wealth

In Table I, we report the risk and return on total gross wealth. The results are computed by computing the mean return on the financial portfolio, real estate, and private equity, as is explained in Sections 3 to 5. The median household earns 2.62% per year in excess of the Swedish Treasury bill. Like its U.S. counterpart, the Swedish Treasury bill rate is very correlated with inflation and has been about 1 percentage point higher than the Swedish inflation rate since 2000. The median household correspondingly takes a low level of risk, with a standard deviation of returns equal to 7.6% per year. As we know from Section 2.1, the median household takes a low level of financial risk and allocates most of its wealth to

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

real estate.

The mean return on gross wealth grows monotonically with net wealth. Households in the top 0.01% earn an average excess return of 6.24% ($= 0.0262 + 0.0362$) per year. This higher return corresponds to higher levels of systematic risk and total risk. The standard deviation of returns on total gross wealth is thus 20.25% (=0.0761+0.1264). As we know from Section 2.1, the higher risk exposure stems from aggressive positions in risky financial assets, real estate and private equity.

In Table II, we report the implied interest rate paid across wealth brackets. The median household pays a spread of 3.10% relative to the Swedish Treasury bill. The interest rate paid by households monotonically decreases with net wealth. The cost of debt is 1.73% lower per year for the top 0.01% compared to the median household. Thus, the cost of debt declines with wealth, but its range is lower than the range of mean returns on gross wealth.

In Table III, we investigate the return on net wealth,

$$R_{Net} = R_{Gross} + (R_{Gross} - R_{Debt})\frac{\text{Debt}}{\text{Net Wealth}},$$

which takes into account the effects of leverage and the debt costs.[15] The average return on net wealth is U-shaped in net wealth. The median household owns a leveraged position in real estate and earns a high excess return on net wealth of 6.65% per year. The return on net wealth then monotonically decreases with net wealth, reaching a minimum of 5.23% (=0.0665-0.0142) per year for households in the top 20%-5%. This decrease corresponds to a reduction in leverage. At the top, the average return increases with net wealth, reaching 6.50% per year for the top 0.01%. The wealthiest household take high financial and entrepreneurial risk. As a result, the mean return is U-shaped in net wealth.

In Figure 3, we illustrate the mean and standard deviation of the return on total wealth. Consistent with Table III, we obtain that the risk and return of net wealth are U-shaped across net wealth brackets.

[15]Debt is winsorized at 95% of gross wealth to make sure outliers do not influence the computation of the return on net wealth. Less than 0.1% of households are affected by the winsorization.

In Table IV, we investigate the cross-sectional heterogeneity and time persistence of expected wealth returns. The cross-sectional variance of the return on *gross* wealth within a wealth bracket is quite small at about 2% in annual units. Furthermore, this estimate is approximately constant across brackets. By contrast, the return on *net* wealth return has a substantially higher cross-sectional variance, which reaches 11% for the median household and monotonically declines to 2% for the top 0.01%. The striking fact is that the middle class experiences a very large dispersion in net wealth returns, which can only be due to leverage. Some households own no real estate, are not leveraged, and earn low returns. By contrast, other households have leveraged positions in the housing market, which can generate extreme returns. Leverage goes down dramatically in higher brackets, as Figure 2 illustrates, so that gross and net wealth do not differ substantially.

We also report the 1-year autocorrelation of expected returns at the household level. The returns on gross wealth are highly persistent. The autocorrelation coefficient is 0.87 for the median household. It is a hump-shaped function of net wealth in higher brackets, declining to about 0.77 for the top 0.01%. This high autocorrelation suggests that, when needed, households actively rebalance their gross portfolios to maintain a stable risk exposure remains similar over time.[16] As a result, households who choose a large risk exposure enjoy persistently high expected returns on their gross wealth. By contrast, net wealth exhibits lower autocorrelation, equal to 0.57 for the median household and increasing to 0.83 for the top 0.01%. Middle class households who earn high expected returns due to their leverage make continuous efforts to repay their debt. As a result, their risk exposure systematically declines over time and their expected returns do not stay high as long as in richer segments of the population.

Put slightly differently, our results both confirm and temper the widespread view that the wealthy are the main beneficiaries of financial markets. While average returns on *gross* wealth increase with net worth, the middle class are aggressively leveraged and earn the higher returns on *net* wealth than more affluent households. As households age, they tend

[16] Calvet, Campbell, and Sodini (2009a) provide evidence of rebalancing at the level of the *financial* portfolio.

to migrate to higher net wealth brackets, reduce their leverage ratios, and therefore earn lower average returns. In this sense the high returns earned by the middle class are a temporary phenomenon over the life-cycle.

In Sections 3 to 5, we consider the three main components of gross wealth: financial wealth, real estate, and private equity. We investigate their respective contributions to the risk and return of gross wealth.

3. Financial Wealth

This Section investigates household portfolios of financial assets.

3.1. Asset Allocation

We begin with some useful definitions. *Risky mutual funds* refer to all funds other than Swedish money market funds. We call a household's portfolio of these assets the *fund portfolio*, while the *stock portfolio* contains directly held stocks. The *complete portfolio* contains cash and the risky portfolio. The risky share is the weight of the risky portfolio in the complete portfolio. A market participant has a strictly positive risky share. We exclude assets with less than 3 months of return data from the quantitative analysis of portfolios.[17]

Figure 4 illustrates how the asset allocation of the complete financial portfolio varies with the net wealth rank. Cash declines rapidly as one climbs the wealth ladder. Households in the bottom half of the distribution hold 83% of their financial wealth in cash. The share of cash falls down to 46% for the top 10%-5%, and 37% for the top 1%. Thus, the share of risky assets in the financial portfolio increases rapidly with household net worth.

In top brackets, direct stockholdings increase rapidly and largely account for the positive relationship between the risky share and net worth. By contrast, the share of mutual funds declines steeply with wealth. Below the 90th percentile of the wealth distribution, more

[17] 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.

than two-thirds of risky financial wealth is held through funds. In the top 0.01%, the picture is completely reversed as 70% of the risky portfolio is directly invested in stocks.

Stockmarket participation does not explain the positive relationship between the financial risky share and net worth at the top. In the Internet Appendix, we show that the rate of participation is 92% in the top decile of net wealth and reaches 96% 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.

Like the middle class, high-net-worth households hold mutual funds. Only 18% of households in the top 0.01% 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. Relatedly, the share of hedge funds is very close to 0% outside the top 1% of households but reaches 8% among the top 0.1%.[18]

Overall, while most of the population, including within the top decile of the wealth distribution, relies on index-like mutual funds to obtain a diversified return on their risky portfolio, households at the very top 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. In the next section, we examine whether this translates into a higher level of diversification, more compensated risk, or better risk-adjusted performance.

[18]While most individuals owning hedge funds are very wealthy, this asset class never corresponds to more than 1% of a household's financial savings, even for the wealthiest households. This fact 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 2000 so hedge funds may now have a slightly higher weight in individual portfolios.

3.2. Exposure to the Domestic Stock Market

How do mean 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, the sample average takes a long time to converge to the population mean. Given that we only have eight 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). The data allow us to measure each security's exposure to systematic and idiosyncratic risk, as we now explain.

We use as a starting point the simplest existing model, the domestic 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 month t. We index stocks and funds by $i \in \{1, \ldots, I\}$. For each asset i, we estimate the local CAPM:

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

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.[19] 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.[20] The historic alpha of a portfolio, $a_{h,t}$, is similarly defined.

[19] Excess returns on individual assets are winsorized at the 1% level before each estimation.

[20] 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

In Table V, 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.[21]

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 0.81 for the top 10%, 0.86 for the top 1%, and 0.87 for the top 0.1%. This means that the amount of compensated risk-taking taken by richer households is substantially underestimated if one only looks at the share of risky assets in the complete portfolio. Consider for example 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 2.4 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 2.9 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.

3.3. Exposure to International Fama-French Factors

One of the main results in asset pricing in the last few decades is that investors may earn predictable premia by correlating their portfolio with a broad set of factors beyond the market risk. Various explanations, risk-based or behavioral, have been given for why these

assets, which permit the precise estimation of b_i.

[21] 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 estimation conditional on participation. In addition, households in the bottom 40% hold a negligible share of national wealth.

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 on a multifactor model with local and global market factors, as in Hou, Karolyi, and Kho (2011).[22] For every asset i, we estimate:

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

where G_MKT_t is the global market factor, G_HML_t the global value factor, G_SMB_t the global size factor, $EXCH_t$ is the exchange rate factor, and $\varepsilon_{i,t}$ is a residual uncorrelated to the factors. The exchange rate factor consists of monthly returns on the carry trade in which the investor is long the U.S. Treasury bill and short its Swedish equivalent. The three international factors are obtained from the AQR data library.

The market beta and size of stocks are readily available to investors. The value loading 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 between small and large stocks, and may therefore have a sense of the risk and return trade-offs involved with their equity investments.

In Table VI, we regress a household's portfolio loadings on its wealth rank. There are significant differences in exposure to value and size factors: the top 1% of households have both their value and size loadings equal to 0, as compared to -0.10 and -0.14 for the median household. The difference in mean returns between rich and poor households is amplified

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

by style investing.

It is important to investigate how operationally rich households manage to load their risky portfolios on the factors. In the Internet Appendix, we regress the Fama-French loadings of the stock and fund portfolios on wealth ranks. Over the 2000 to 2007 period, 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 verify that richer households do not expose themselves via mutual funds to the value risk but only to the small-cap risk. 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 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.

3.4. Mean Return

How does this active search for premia among the wealthiest households translate into excess returns? In Table VII, we report estimates of the additional mean return implied by the compensated factors sought by richer households. Columns 1 and 2 apply the CAPM and the international Fama and French model to the complete portfolio, while columns 3 and 4 apply these models to the risky portfolio.[23]

The average return on financial wealth increases rapidly with the net wealth rank. The median household earns an excess return of 1.58% per year. By contrast, a household in the top percentile earns an additional 3% (CAPM) to 3.5% (International Fama French) per year compared to the median household. Because richer households load more heavily on all risk factors, the average return is higher under the multifactor model.

These large differences are primarily driven by the increase in the risky share as households get richer. However, columns 3 and 4 of Table VII show that differences in risky portfolio returns are also substantial. Under the CAPM, households in the top percentile earn an extra 1% per year on average on their risky portfolios compared to the median

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

household. The extra return earned by the top percentile reaches 1.6% under the International Fama and French model. 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 50% with respect to what would be implied by the observed differences in risky shares and homogeneous risky portfolios.

3.5. Return Risk and Diversification

Wealthy households earn higher mean 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.

We compute the variance of the financial wealth return as in Calvet, Campbell, and Sodini (2007). For every asset i, we compute the return variance, σ_i^2, by using all the monthly data available between 1983 and 2009. Similarly, for every i and j, we estimate the return covariance, $\sigma_{i,j}$, using the entire monthly data available over the same period. The total variance of the risky portfolio held by household h is then given by

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

where $w_{i,h}$ is the share of asset i in household h's portfolio. It is also insightful to compute the Sharpe ratio, that is the ratio of the mean to the standard deviation of household portfolio excess returns. We compute the mean return using our most exhaustive asset pricing model, the international Fama-French model.

In Table VIII, we regress the standard deviation of the complete portfolio return (column 1) and the Sharpe ratio of the risky, stock, and fund portfolios (column 2 to 4) on net wealth rank dummies. The standard deviation of the complete portfolio grows quickly with household wealth, ranging between 12% per year for the median household to 26% for households in the top 0.01%.

The Sharpe ratio of the risky portfolio, which coincides with the Sharpe ratio of the complete portfolio, varies only slightly with wealth. The Sharpe ratio goes from 0.32 for the median household to 0.37 for household in the top 2.5%-1%, and then declines to 0.35 for households in the top 1%. The increase of the Sharpe ratio with wealth might have two separate causes. First, richer households load their portfolio on value factors, which have a particularly high Sharpe ratio (0.58 for the global value portfolio from 1983 to 2016), possibly at the expense of a higher exposure to recession risk. Second, richer households may diversify better and reduce the standard deviation of their portfolios while keeping their mean return constant. This is what we test in the rest of this section. Decomposing the total variance of household portfolios into systematic and idiosyncratic risk 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.

In Table IX, we regress the standard deviation and the variance share of idiosyncratic portfolio returns on dummies for different brackets of the wealth distribution. Like systematic risk, the standard deviation of idiosyncratic risk increases rapidly with wealth for the complete portfolio (column 1). Furthermore, as column 2 shows, the share of idiosyncratic risk in the total risk of the risky portfolio decreases mildly from 27.2% for the median household to 24.8% for the top 5%-2.5%. The idiosyncratic share increases rapidly in the highest brackets, reaching 37.7% for the top 0.01%. Overall, these patterns suggest a weak and nonmonotonic relationship between wealth and idiosyncratic portfolio risk.

3.5.1. The Origins of Underdiversification Among the Wealthy

The large idiosyncratic risk of households at the very top has a number of possible sources: (i) a willingness to enjoy private benefits of concentrated ownership, (ii) stock-picking behavior, (iii) the stock-based compensation of top management, or (iv) exposure to other systematic risk factors.

In Table IX, column 3, we test hypothesis (i) by removing direct stock holdings that represent more than 5% the votes at the general assembly. The idiosyncratic share is now lower, especially for the richest households, but not by much: among the top 0.01% households, the idiosyncratic share of the risky portfolio goes from 37.7% to 37.4%. Therefore 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.

In Table IX, columns 4 to 5, we investigate the idiosyncratic share of the stock portfolio across wealth quantiles. Stock holdings are in general much less diversified than fund holdings: for the median household, the idiosyncratic share is 55% for the stock portfolio and 20% for the fund portfolio. Interestingly, the idiosyncratic share decreases rapidly with wealth, from 55% for the median household to 41% for the top 0.1%-0.01%, and goes up very slightly at the very top. These results show that stock-picking can only be a secondary cause of the tendency of the wealthy to directly hold stocks.

In Table IX, column 6, we consider the idiosyncratic share of the fund portfolio. 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. For the median household, the idiosyncratic share of the fund portfolio is 20%, which is lower than the idiosyncratic share that the richest households achieve in their stock holdings. The idiosyncratic share of the fund portfolio is approximately constant across other quantiles. Therefore, by moving away from funds into stocks, richer households naturally expose themselves to more idiosyncratic risk.

3.6. Risk-Adjusted Performance

Very wealthy investors earn greater mean 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.

3.6.1. 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. In contrast to earlier sections, we focus on the realized monthly returns $R_{h,t}$ earned by each household. Since we observe holdings only at year-end, we need to assume that households choose a buy-and-hold strategy over the next 6 or 12 months. This imputation method may underestimate portfolio performance since expert stock-pickers would likely trade at higher frequencies. In order to understand the size of this bias, we vary the length of the holding period.

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 $R^*_{h,t} = \beta'_h R_t$ for every household h. We obtain the household monthly alpha by simply subtracting the expected return from the realized return:

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

Finally, we report differences in performance by we weighing the alpha realized on the stock portfolio by the share of directly-held stocks in the risky portfolio or the entire financial portfolio of the household. This scheme guarantees that households owning very few stocks do not carry too much weight in the estimation, which helps us achieve higher statistical efficiency (Seasholes and Zhu, 2010). It also provides results that are directly comparable to the expected returns discussed in earlier Sections.

In Table X, we investigate how household portfolio alphas vary with net wealth rank. Households are ranked at the end of year t and the alpha is computed over the first 6 or 12 months of year $t + 1$. We weigh stocks by theirs weights in the stock portfolio in columns

1 and 2, their weights in the risky portfolio in columns 3 and 4, and their weights in the complete portfolio in columns 5 and 6. 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). Unsurprisingly, because they are derived from realized returns, household monthly alphas are very noisy. In all regressions, no wealth group earns an alpha that is significant from zero over any holding period. We take these results with a note of caution given the large standard errors.

3.6.2. 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. It is therefore more efficient to follow the methodology proposed by Fama and French (2010). To identify fund 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.

In Table XI, we investigate how historical fund alphas vary across net wealth brackets. Household alphas are computed using the International Fama-French model. We measure fund fees and can therefore 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 (columns 1 and 2), risky portfolio (columns 3 and 4), and complete portfolio (columns 5 and 6).

The risk-adjusted net performance is negative for all wealth groups. The top 1% earn an alpha higher than the median by 58 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 0.01% get an additional 6 basis points a year on their total return from their ability to pick funds.

3.7. 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 29% on average for the period 2000-2006, which is substantially higher than the wealth share we measure in our data (e.g., 25.7% 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 money-market, bond, and equity funds) represent 37% of the total, while the remainder (39%) is comprised of directly-held stocks and bonds.[24] In our data, the top 1% hold 38% of their financial portfolios (excluding derivatives and capital insurance accounts) in cash, 24% in mutual funds and 38% 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.

[24] 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.

4. Real Estate

4.1. Asset Allocation

Figure 5 illustrates the composition of the real estate portfolio across net wealth brackets. The share of residential real estate decreases monotonically with the net wealth. Up to the 70th percentile, real estate owners allocate more than 90% to their own residences. The proportion of residential housing then drops sharply to 62% for households in the top 1%-0.5% and less than half for the top 0.01%.

Rich Swedes own significantly more commercial real estate than rich U.S. households. Commercial real estate represents 19% of the real estate portfolio for the top 1% in the U.S.,[25] compared to 29% for the top 1% in Sweden. This difference largely stems from the weight of agricultural property in Sweden: 35% of the top 1% own some agricultural property, most often in the form of forestry.[26] Owning a forestry allows wealthy Swedes to earn a risky yield by harvesting trees through specialized companies. From a portfolio perspective, since commercial properties do not provide a hedge against housing costs, the contribution of real estate to total portfolio risk is a steeply increasing function of net wealth.

4.2. Pricing Model

The dataset allows us to classify real estate properties into 290 primary residence types, 130 vacation home types, 21 farmland types and one rental category, as the Appendix explains. For each of these asset classes, we need to estimate an expected excess return. Since the net-of-depreciation rental yield is notoriously hard to measure, we rely on Poterba (1984)'s user cost of housing formula, which expresses that a household should be indifferent between renting and owning. The precise expression is

$$\frac{R_{i,t}}{P_{i,t}} = r_{f,t} + \delta_t - g_{i,t+1} + \gamma\sigma_i, \tag{4.1}$$

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

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

where R_{it} is the rent on a home in location i during year t, $P_{i,t}$ is the price at the beginning of year t, $r_{f,t}$ is the risk-free rate, δ_t is the annual rate of depreciation, $g_{i,t+1}$ the expected rate of growth of property prices during year t, γ the risk premium required for taking one unit of price risk, and σ_i the volatility of real estate price growth in location i.[27]

The expected excess return on real estate, $\mathbb{E}(r_{i,t})$, is given by:

$$\mathbb{E}(r_{i,t}) = \frac{R_{i,t}}{P_{i,t}} - \delta_t + g_{i,t+1} - r_{f,t}.$$

Plugging this definition into equation (4.1), one obtains that average excess return on real estate is equal to the risk premium :

$$\mathbb{E}(r_{i,t}) = \gamma\sigma_i, \tag{4.2}$$

as in Cannon, Miller, and Pandher (2003). One can then further decompose the price appreciation $g_{i,t+1}$:

$$g_{i,t+1} = \alpha_{i,t+1} + \gamma\sigma_i. \tag{4.3}$$

This decomposes house price growth into a risk-adjusted performance $\alpha_{i,t+1}$ and a compensation for risk. Together with equation (4.1), equation (4.3) implies that any risk-adjusted price increase leads to an offsetting decline in rental yields as investors choose to rent less often in anticipation of a risk-adjusted growth in house prices. What is therefore left of the excess return on real estate is the compensation for risk.

Using data on real estate price growth across geographic areas, one can measure γ by estimating a cross-sectional version of equation (4.3), and then infer from (4.2) a location-specific excess return on real estate. Measuring price volatility σ_i is therefore crucial for two reasons: this will obviously be essential in building an estimate of the volatility of the real estate portfolio but it turns out to also be the main input for the estimation of mean excess returns on the real estate portfolio. At an annual frequency, the volatility of real estate

[27] Our version of the user cost formula disregards the impact of taxes. This is because property taxes and mortgage interest deductions were both important in Sweden in the early 2000s and they would counteract each other if they were to be included in the user cost of housing formula.

price indices tends to be very low in comparison with mean annual returns. This leads to the conclusion that real estate properties have a much higher Sharpe ratio than equities, which is misleading because, contrary to equities, real estate returns are very positively autocorrelated and at the same time the holding horizon for real estate is typically longer than a year. We propose a simple correction which consists in measuring the volatility of T-year moving average returns divided by the square root of T. In the absence of autocorrelation, this volatility measure is the same as the annual volatility. However, once returns become positively autocorrelated our volatility measure is significantly bigger. In Sweden, there is substantial autocorrelation in returns over a horizon of three years; this is why we choose to measure volatility using three-year moving averages.[28] We can then estimate equation (4.3) for each of the 440 real estate asset classes.

In the Internet Appendix, we show that this simple equation fits the data particularly well in Sweden: mean annual returns are strongly positively associated with price volatility. This could simply be due to the fact that real estate classes with high total volatility also have a higher covariance with nationwide housing indices. However, we also show that the volatility of residuals from a housing beta model (based on a national housing benchmark) predicts higher returns, implying that idiosyncratic volatility is also priced. We conclude that equation (4.3) is a good approximation of the risk premium required by real estate investors in Sweden.

4.3. Risk and Return

In Table XII, we investigate how the risk and return characteristics of the real estate portfolio vary with household net worth. The return on the real estate wealth is 5.15% per year for the median household, reaches 5.55% for households the top 1%-0.5%, and stays approximately flat in higher brackets. The variation in mean return is rather moderate compared to the variation in the mean return on financial wealth across wealth groups. Volatility follows a similar patterns, increasing from 11.1% per year for the median household to about 12% in top brackets.

[28] Results do not differ much if one picks instead two-year or four-year averages.

The share of idiosyncratic risk decreases with net wealth, from 44% for the median household to 32% for the households in the top 0.01%. Richer households own more properties, which naturally decreases their exposure to idiosyncratic risk. Like the mean and standard deviation of real estate returns, the Sharpe ratio is approximately constant. Across wealth brackets, the main difference is the level of diversification, as captured by the idiosyncratic share. The risk and return characteristics of the real estate portfolio are otherwise quite homogeneous across wealth groups.

5. Private Equity

5.1. Pricing Model

Besides valuation challenges, the absence of a market price makes it difficult to measure the risk and return of owning unlisted shares. First, capital gains returns cannot be measured on an annual basis due to the lack of trades. When there are trades, these are likely to be very endogenous to the share price, which may often lead to inflated returns. Meanwhile, capital losses in such firms are often only revealed by bankruptcies, which are events rare enough that monetary returns on private equity may appear safe and high for a very long time before extreme losses show up.

Second, private companies tend to be entrepreneurial companies in which owners also work as managers. In such cases, the remunerations of capital and managerial labor are not distinguishable. Depending on what is most tax-efficient, entrepreneurs may pay themselves mostly through dividends or through wage payments; in the former case, the dividend yield is overestimated (in the sense that it partly reflects labor efforts not capital returns) and it is underestimated in the latter case. In the United States, capital income from unlisted firms falls under the same progressive schedule as labor income, and Moskowitz and Vissing-Jørgensen (2002) estimate that returns on private equity decline by 4 percentage points a year once the owners' remuneration for work in their firm is deducted. Because Nordic countries have a flat tax on capital income, there is a very strong incentive to compensate labor via dividend payments. An overwhelming body of empirical evidence confirms that such income shifting behavior is widespread among entrepreneurs.[29] We therefore expect the gap between returns measured using taxable capital income flows and "pure" returns on capital invested to be even larger in this region of the world.

To bypass this problem, we select for every private firm the same comparable listed firms we use for share valuation, and measure their average exposure to the Swedish market index, total standard deviation and idiosyncratic standard deviation. The mean return on shares of a private firm is then equal to the average beta exposure of comparable listed firms times the mean return on the Swedish market index.[30]

5.2. Risk and Return

In Table XIII, we investigate how the risk and return characteristics of the private equity portfolio vary with household net worth. The mean return on private equity is 7.22% per year for the median household and goes down slightly with wealth, reaching 6.55% for households in the top 0.01%. The variation in mean return is rather moderate compared to the variation in the mean return on financial wealth across wealth groups. Volatility follows a similar patterns, decreasing from 44.5% per year for the median household to about 39% in top brackets.

The share of idiosyncratic risk decreases with net wealth, from 78% for the median household to 67% for the households in the top 0.01%. This is likely due to richer households often using private companies as investment vehicles. Better diversification at the top is associated with a higher Sharpe ratio. As column 4 shows, the Sharpe ratio increases from 0.167 for the median household to 0.200 for the top 0.01%. We note that the Sharpe ratio

[29] See Alstadsæter (2007) for Norway, Alstadsæter and Jacob (2015) for Sweden, and Pirttilä and Selin (2011) for Finland.

[30] In doing so, we make two important assumptions. First, private firms should expose themselves to market risk just as much as their listed equivalents. Second, entrepreneurial firms should not exhibit substantial and systematic risk-adjusted performance once the remuneration for their managerial labor is deducted. In their study of private equity returns in the US, Moskowitz and Vissing-Jorgensen (2002) confirm the validity of these assumptions: private equity return indices have a beta of one with respect to public equity indices, and individual private equity returns do not exhibit any average over-performance relative to investments in public equity. In the Internet Appendix, we replicate this exercise using Swedish data and we can confirm that (i) dividend yields follow a very similar time series pattern across listed and private firms (ii) accounting returns on equity are of similar magnitude across the two equity groups.

is generally lower for private equity than for financial or real estate wealth. Across wealth brackets, the main difference is the level of diversification, as captured by the idiosyncratic share and the Sharpe ratio. The risk and return characteristics of the private equity portfolio are otherwise quite homogeneous across wealth groups.

6. Risk Exposures 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.

6.1. 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 mean return with the same amount of idiosyncratic risk; there is also no attention given to differences in exposure to 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:

$$\mathbb{E}[Var^*(f_{h,t+1}) - Var^*(f_{h,t})] = \mathbb{E}[Var^*(\mathbb{E}_t r_{h,t+1})] + \mathbb{E}[Var^*(\tilde{r}_{h,t+1})] + 2\mathbb{E}[Cov^*(\mathbb{E}_t r_{h,t+1}; f_{h,t})],$$

where $f_{h,t}$ 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 $\tilde{r}_{h,t+1}$ 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.[31] 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.[32] The sample comprises all Swedish households with positive financial wealth. We assume that the mean 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 verify the robustness of our results by using both the local CAPM and the international Fama-French model. Premia are historical annual returns for each of these factors during the period 1983 to 2016. To compute realized returns, we assume that households choose their holdings on December 31st and remain passive over the next 12 months. In order to keep track of the impact of capital income taxes, we report these return moments using both pre-tax and post-tax returns on financial wealth. This is easy in the context of Sweden, because the government levies a flat tax on capital income, at the same rate for dividends and net realized capital gains. Its level is substantial (30%), so we may expect a significant impact of income taxes on our estimates.

In Table XIV, we report empirical estimates of the variance decomposition. Between 2000 and 2007, the variance in the logarithm of financial wealth increased on average by 0.0365 every year. The sum of the three pre-tax return terms in the above equation

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

[32] 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.

equals about 0.059. This means that heterogeneity in returns is an essential driver of the reinforcement of inequality in financial wealth. This effect is substantially, albeit far from fully, offset by capital income taxes: the sum of the return terms goes from 0.059 pre-tax to 0.037 post-tax. This last estimate is very close to the actual increase in inequality observed in Sweden between 2000 and 2007. This means that in comparison with the impact of returns, other potential drivers of inequality, such as heterogeneity in financial saving rates, are residual.

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 less than 1% of the overall effect of pre-tax returns. However, as we have shown in the previous sub-sections, it turns out that those investment strategies that deliver the highest mean 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 25% 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.

6.2. 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 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.

7. 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.[33] 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

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

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.

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Table I
Risk and Return on Gross Wealth

This table reports regressions of (1) the mean yearly return on household gross wealth, (2) the standard deviation of the yearly gross wealth return, (3) the share of idiosyncratic risk, and (4) the Sharpe ratio of household gross wealth on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. Idiosyncratic risk refers to risk uncorrelated to the Swedish stock market index and the Swedish real estate index. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: on average, a household in the top 0.01% of the distribution of net wealth has an average return of 6.24% (=0.0262+0.0362) and an average standard deviation of 20.28% (=0.0738+0.1290) in annual units.

	Mean Return (1)		Standard Deviation of Return (2)		Share of Idiosyncratic Risk (3)		Sharpe Ratio (4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P60	0.0096	187.59	0.0167	125.00	-0.0209	-34.90	0.0528	118.03
P60-P70	0.0140	261.13	0.0236	168.97	-0.0480	-75.20	0.0761	164.92
P70-P80	0.0159	300.25	0.0277	198.48	-0.0781	-124.33	0.0804	176.79
P80-P90	0.0180	342.53	0.0330	235.63	-0.1100	-177.10	0.0794	178.27
P90-P95	0.0204	351.79	0.0395	251.41	-0.1280	-180.50	0.0769	165.66
P95-P97.5	0.0227	333.71	0.0456	233.16	-0.1274	-145.12	0.0743	142.48
P97.5-P99	0.0255	309.78	0.0529	199.97	-0.1131	-98.49	0.0722	117.56
P99-P99.5	0.0287	226.50	0.0638	121.39	-0.0968	-51.93	0.0663	71.35
P99.5-P99.9	0.0311	197.54	0.0770	87.21	-0.0877	-31.88	0.0553	37.86
P99.9-P99.99	0.0332	109.65	0.0902	36.82	-0.0651	-10.65	0.0538	15.88
Top 0.01%	0.0362	55.94	0.1290	16.47	0.0765	3.97	0.0302	2.72
Reference Group								
P40-P50	0.0262	621.46	0.0738	639.01	0.3838	752.16	0.3322	835.80

Table II
Interest Rate Paid on Household Debt

This table reports the average interest rate spread paid on household debt. The spread is computed relative to the yield on the Swedish T-bill. Standard errors are clustered at the household level.

	Estimate	t-stat
Wealth Group		
P50-P60	-0.0041	-40.04
P60-P70	-0.0062	-58.75
P70-P80	-0.0080	-77.98
P80-P90	-0.0096	-94.65
P90-P95	-0.0106	-98.11
P95-P97.5	-0.0113	-95.43
P97.5-P99	-0.0119	-91.92
P99-P99.5	-0.0123	-72.40
P99.5-P99.9	-0.0124	-63.64
P99.9-P99.99	-0.0147	-39.45
Top 0.01%	-0.0173	-23.28
Reference Group		
P40-P50	0.0310	342.41

Table III
Risk and Return on Net Wealth

This table reports regressions of (1) the mean yearly return on household net wealth, (2) the standard deviation of the yearly net wealth return, (3) the share of idiosyncratic risk, and (4) the Sharpe ratio of household net wealth on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. Idiosyncratic risk refers to risk uncorrelated to the Swedish stock market index and the Swedish real estate index. For the computation of the Sharpe ratio, the interest rate spread is winsorized below at 0 and winsorized above at the household's mean return on gross wealth. The sample includes all portfolios of Swedish households above the 40^{th} percentile of the distribution of net wealth. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: on average, a household in the top 0.01% of the distribution of net wealth has an average return of 6.51% (=0.0658-0.0007) and an average standard deviation of 22.24% (=0.2245-0.0021) in annual units.

	Mean Return (1)		Standard Deviation of Return (2)		Share of Idiosyncratic Risk (3)		Sharpe Ratio (4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P60	-0.0035	-23.61	-0.0363	-80.74	-0.0209	-34.90	0.0616	159.94
P60-P70	-0.0080	-52.54	-0.0641	-139.08	-0.0480	-75.20	0.1001	249.35
P70-P80	-0.0115	-76.65	-0.0812	-178.00	-0.0781	-124.33	0.1183	300.76
P80-P90	-0.0134	-90.05	-0.0908	-200.81	-0.1100	-177.10	0.1292	336.91
P90-P95	-0.0134	-88.57	-0.0934	-203.70	-0.1280	-180.50	0.1345	332.37
P95-P97.5	-0.0121	-77.23	-0.0910	-191.03	-0.1274	-145.12	0.1356	291.43
P97.5-P99	-0.0097	-58.98	-0.0853	-165.52	-0.1131	-98.49	0.1357	241.60
P99-P99.5	-0.0067	-34.30	-0.0741	-103.94	-0.0968	-51.93	0.1310	149.05
P99.5-P99.9	-0.0044	-19.86	-0.0587	-53.76	-0.0877	-31.88	0.1200	86.33
P99.9-P99.99	-0.0026	-7.42	-0.0409	-16.13	-0.0651	-10.65	0.1171	36.82
Top 0.01%	-0.0007	-0.92	-0.0021	-0.28	0.0765	3.97	0.0950	8.91
Reference Group								
P40-P50	0.0658	459.65	0.2245	512.44	0.3838	752.16	0.2588	781.80

Table IV
Cross-Sectional Heterogeneity and Time Persistence of Expected Wealth Return

This table reports regressions of the cross-sectional variance and time persistence of expected wealth returns on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. The dependent variables are respectively: (1) the cross-sectional standard deviation of the expected return on gross wealth, (2) the cross-sectional standard deviation of the expected return on net wealth, (3) the average autocorrelation in two consecutive years of a household's expected return on gross wealth, and (4) the 1-year autocorrelation of a household's expected net wealth return. All left-hand side variables are computed on a yearly basis and then averaged over the 2000 to 2007 period. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. One should read the table as follows: the standard deviations of returns across households in the top 0.01% of the net wealth distribution is equal to 1.87% (=0.0219-0.0032); the gross wealth return of a household in the top 1% has an average 1-year autocorrelation of 0.7733 (=0.8657 -0.0924).

	Cross-Sectional Standard Deviation of Expected Return		1-Year Autocorrelation of Expected Return	
	Gross Wealth (1)	Net Wealth (2)	Gross Wealth (3)	Net Wealth (4)
Wealth Group				
P50-P60	-0.0028	-0.0479	0.0040	0.1586
P60-P70	-0.0055	-0.0699	0.0077	0.2576
P70-P80	-0.0069	-0.0807	0.0165	0.3183
P80-P90	-0.0079	-0.0873	0.0247	0.3466
P90-P95	-0.0084	-0.0911	0.0271	0.3530
P95-P97.5	-0.0083	-0.0922	0.0215	0.3659
P97.5-P99	-0.0075	-0.0922	0.0003	0.3321
P99-P99.5	-0.0061	-0.0912	-0.0140	0.3017
P99.5-P99.9	-0.0044	-0.0903	-0.0524	0.2925
P99.9-P99.99	-0.0033	-0.0896	-0.0906	0.2152
Top 0.01%	-0.0032	-0.0905	-0.0924	0.2663
Reference Group				
P40-P50	0.0219	0.1108	0.8657	0.5657
Total Population	0.0164	0.0383	0.8867	0.7929

Table V
Market Beta of Risky Financial 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 2000 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: on average, a household in the top 0.01% of the distribution of net wealth has a market beta of 0.852 (=0.741+0.111) for the risky portfolio, 0.931 (=0.989-0.058) for the stock portfolio and 0.672 (=0.666+0.006) for the 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-P60	0.003	3.98	-0.005	-5.22	0.000	0.10
P60-P70	0.010	10.51	-0.010	-9.29	0.004	4.60
P70-P80	0.017	17.61	-0.017	-15.52	0.007	8.23
P80-P90	0.032	34.96	-0.022	-20.46	0.017	19.75
P90-P95	0.055	54.70	-0.023	-20.16	0.030	32.02
P95-P97.5	0.074	67.22	-0.021	-17.54	0.040	38.90
P97.5-P99	0.091	76.00	-0.021	-15.63	0.047	41.57
P99-P99.5	0.111	68.17	-0.016	-8.85	0.053	35.80
P99.5-P99.9	0.123	67.68	-0.012	-5.91	0.050	29.00
P99.9-P99.99	0.129	38.74	-0.016	-4.65	0.034	10.44
Top 0.01%	0.111	11.74	-0.058	-6.90	0.006	0.57
Reference Group						
P40-P50	0.741	1009.55	0.989	1097.24	0.666	987.42

Table VI
International Fama-French Loadings
Risky Financial Portfolio

This table reports regressions of household portfolio loadings on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. The loadings are computed relative to (1) the Swedish stock market, (2) the global stock market, (3) the global size factor, (4) the global value factor, and (5) the currency factor. The Swedish market factor is the return on the SIXRX index and the global Fama and French factors are drawn from the AQR data library. The currency factor consists of monthly returns on the carry trade in which the investor is long the U.S. Treasury bill and short the Swedish Treasury bill. All factor loadings are estimated jointly at the asset level. The reported regressions are based on all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: on average, the risky portfolio of a household in the top 0.01% of the net wealth distribution has a local market beta of 0.710 (=0.603+0.107), a global market beta of 0.294 (=0.299-0.005), a size beta of 0.134 (=-0.140+0.274), a value beta of 0.042 (=-0.101+0.143), and a currency beta of 0.129 (=0.196-0.067).

	Dependent Variable: Loading on Risk Factor									
	Market Factor				Other Fama and French Factors					
	Local (1)		Global (2)		Size (3)		Value (4)		Currency (5)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group										
P50-P60	0.005	5.83	-0.003	-3.96	0.004	5.02	0.004	3.01	-0.003	-3.95
P60-P70	0.013	15.13	-0.006	-8.34	0.006	6.68	0.012	8.26	-0.011	-12.26
P70-P80	0.023	26.25	-0.012	-17.11	0.010	11.37	0.021	13.73	-0.017	-19.79
P80-P90	0.041	46.40	-0.013	-19.64	0.020	23.19	0.038	25.53	-0.023	-27.78
P90-P95	0.063	65.70	-0.011	-14.61	0.038	39.66	0.064	37.69	-0.028	-30.59
P95-P97.5	0.080	75.30	-0.006	-6.88	0.061	54.54	0.089	44.75	-0.029	-28.38
P97.5-P99	0.096	80.90	-0.002	-2.17	0.085	67.11	0.105	45.77	-0.031	-25.82
P99-P99.5	0.112	69.02	0.000	-0.14	0.118	61.77	0.105	30.27	-0.027	-16.55
P99.5-P99.9	0.122	64.33	-0.003	-2.31	0.153	66.79	0.096	25.36	-0.024	-13.23
P99.9-P99.99	0.124	37.82	-0.001	-0.54	0.207	35.82	0.102	13.37	-0.039	-11.05
Top 0.01%	0.107	12.63	-0.005	-0.61	0.274	20.25	0.143	7.98	-0.067	-9.37
Reference Group										
P40-P50	0.603	869.31	0.299	543.70	-0.140	-204.67	-0.101	-85.32	0.196	288.35

Table VII
Mean Excess Return on Financial Wealth
Complete and Risky Portfolios

This table reports regressions of household portfolios' mean excess returns on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. The sample includes all portfolios of Swedish households above the 40th percentile of the distribution of net wealth. Mean excess returns on the risky portfolio are computed by multiplying the risk loadings from Tables V and VI with the corresponding historical mean annual arithmetic returns over the 1983 to 2016 period. Mean excess returns on the complete financial portfolio are computed by multiplying the mean excess return on the risky portfolio by the risky share of the financial portfolio. All regressions include year fixed effects and 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 0.01% of the net wealth distribution earns an expected excess return of 4.96% (=0.0148+0.0348) in annual units on the complete financial portfolio and 8.29% (=0.0661+0.0168) on the risky portfolio.

	Mean Return on Complete Portfolio				Mean Return on Risky Portfolio			
	Local CAPM (1)		International Fama French (2)		Local CAPM (3)		International Fama French (4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P60	0.0026	51.46	0.0026	51.39	0.0003	3.98	0.0005	4.61
P60-P70	0.0050	87.76	0.0052	88.16	0.0009	10.51	0.0016	13.17
P70-P80	0.0087	141.99	0.0089	142.78	0.0015	17.61	0.0026	21.67
P80-P90	0.0136	208.36	0.0141	208.83	0.0030	34.96	0.0050	41.96
P90-P95	0.0189	231.11	0.0200	226.36	0.0050	54.70	0.0084	63.57
P95-P97.5	0.0234	221.88	0.0252	214.92	0.0068	67.22	0.0115	76.00
P97.5-P99	0.0267	201.69	0.0291	195.41	0.0084	76.00	0.0139	82.49
P99-P99.5	0.0299	148.57	0.0326	140.27	0.0102	68.17	0.0154	66.63
P99.5-P99.9	0.0309	126.90	0.0336	116.72	0.0113	67.68	0.0156	61.84
P99.9-P99.99	0.0299	63.13	0.0328	55.98	0.0118	38.74	0.0163	34.56
Top 0.01%	0.0309	26.88	0.0348	25.30	0.0102	11.74	0.0168	15.52
Reference Group								
P40-P50	0.0158	402.29	0.0148	377.86	0.0680	1009.55	0.0661	696.63

Table VIII
Standard Deviation and Sharpe Ratio of Financial Portfolios

This table reports regressions of the standard deviation and Sharpe ratio of household portfolio annual returns on dummies for different brackets of the distribution of net wealth. The sample includes all portfolios of Swedish households between 2000 and 2007 above the 40th percentile of the distribution of net wealth. The standard deviation of the complete portfolio is equal to the risky share times the standard deviation of the risky portfolio. The standard deviation of the risky portfolio is computed using the historical variance-covariance matrix of the returns of all the risky assets held by the household. The Sharpe ratio of a household portfolio is equal to its mean return divided by its standard deviation. The mean return is obtained by multiplying its international Fama-French risk loadings with the corresponding historical mean annual arithmetic returns over the 1983 to 2016 period. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: the average household financial portfolio in the top 0.01% of the distribution of net wealth has a complete portfolio return with a total standard deviation of 25.73% (=0.1234+0.1339) and a complete/risky portfolio with a Sharpe ratio of 0.3519 (=0.3234+0.0285).

	Complete Portfolio Return		Sharpe Ratio					
	Total Standard Deviation (1)		Risky Portfolio (2)		Stock Portfolio (3)		Fund Portfolio (4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P60	0.0158	53.16	0.0043	13.66	0.0069	12.20	0.0029	9.92
P60-P70	0.0273	82.09	0.0091	26.31	0.0132	21.82	0.0061	19.65
P70-P80	0.0409	122.47	0.0146	42.20	0.0210	35.15	0.0093	30.15
P80-P90	0.0567	171.65	0.0232	67.51	0.0340	57.85	0.0137	45.43
P90-P95	0.0713	193.78	0.0324	83.86	0.0486	76.75	0.0169	51.68
P95-P97.5	0.0817	198.58	0.0401	90.30	0.0616	88.44	0.0189	51.35
P97.5-P99	0.0898	192.55	0.0441	84.09	0.0698	89.98	0.0184	43.13
P99-P99.5	0.0978	149.03	0.0416	54.97	0.0659	65.47	0.0147	24.17
P99.5-P99.9	0.1081	155.71	0.0338	38.72	0.0547	49.42	0.0110	15.43
P99.9-P99.99	0.1220	73.35	0.0274	16.35	0.0478	24.92	0.0057	3.78
Top 0.01%	0.1339	39.84	0.0285	5.07	0.0544	11.45	0.0031	0.82
Reference Group								
P40-P50	0.1234	508.31	0.3234	1207.00	0.2881	585.72	0.3253	1347.73

Table IX
Idiosyncratic Portfolio Returns

This table reports regressions of the standard deviation and the variance share of idiosyncratic portfolio returns on dummies for different brackets of the distribution of net wealth. The sample includes all portfolios of Swedish households between 2000 and 2007 above the 40th percentile of the distribution of net wealth. The systematic variance of a portfolio is computed by using the historical variance-covariance matrix of the factors weighted by household loadings on each factor. The idiosyncratic variance of the portfolio is obtained by subtracting the systematic variance of the portfolio from its total variance. The idiosyncratic share is the ratio of idiosyncratic portfolio variance to total portfolio variance. In regressions (3) and (5), we exclude from consideration asset holdings providing control over more than 5% of the votes at the general assembly of the issuing company. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows. The average household financial portfolio in the top 0.01% of the distribution of net wealth has a total idiosyncratic standard deviation equal to 15.75% (=0.0621+0.0954) in annual units; the ratio of idiosyncratic variance over total variance is on average equal to 37.75% (=0.2722+0.1053) for the risky portfolio.

	Complete Portfolio		Share of Idiosyncratic Variance in Portfolio Variance									
	Idiosyncratic Standard Deviation (1)		Risky Portfolio (2)		Risky Portfolio w/o Controlling Blocks (3)		Stock Portfolio (4)		Stock Portfolio w/o Controlling Blocks (5)		Mutual Fund Portfolio (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P60	0.0075	37.74	-0.0040	-5.63	-0.0050	-0.24	-0.0091	-17.52	-0.0090	-17.45	-0.0048	-6.46
P60-P70	0.0129	57.49	-0.0085	-10.94	-0.0183	-0.96	-0.0162	-28.85	-0.0161	-28.75	-0.0126	-15.57
P70-P80	0.0190	82.98	-0.0140	-18.09	0.0101	0.52	-0.0282	-50.39	-0.0281	-50.19	-0.0197	-24.49
P80-P90	0.0264	114.13	-0.0203	-26.67	0.0095	0.53	-0.0456	-81.19	-0.0456	-81.02	-0.0317	-40.59
P90-P95	0.0338	125.64	-0.0235	-28.51	-0.0064	-0.29	-0.0680	-107.77	-0.0679	-107.92	-0.0421	-51.40
P95-P97.5	0.0393	124.48	-0.0243	-26.45	-0.0162	-0.81	-0.0915	-123.46	-0.0914	-123.90	-0.0473	-52.67
P97.5-P99	0.0442	119.02	-0.0216	-21.46	0.0186	0.91	-0.1120	-127.94	-0.1120	-128.69	-0.0483	-49.96
P99-P99.5	0.0502	93.18	-0.0124	-8.59	0.0068	0.34	-0.1281	-101.72	-0.1281	-101.80	-0.0448	-36.33
P99.5-P99.9	0.0598	94.63	0.0069	4.20	0.0250	1.27	-0.1350	-87.92	-0.1348	-88.12	-0.0371	-24.69
P99.9-P99.99	0.0760	50.57	0.0457	13.06	0.0788	3.86	-0.1364	-48.62	-0.1387	-49.40	-0.0165	-5.71
Top 0.01%	0.0954	26.34	0.1053	12.03	0.1211	6.00	-0.1151	-16.66	-0.1289	-20.06	0.0132	1.56
Reference Group												
P40-P50	0.0621	379.98	0.2722	443.87	0.2532	14.88	0.5481	1229.01	0.5481	1228.60	0.1994	311.08

Table X
Risk-Adjusted Performance
Household Stock Portfolios

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 2000 and 2007. Alphas are expressed in annual units. 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 over a period of 6 months or 12 months following the end of each year. 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 weighing stocks with their shares in the household's stock or risky portfolios. All regressions include year fixed effects and standard errors are clustered at the calendar month level. One should read the table as follows: using an international Fama-French asset pricing model, a household in the top 0.01% of the net wealth distribution earns an average alpha of 0.22% (=-0.0107+0.0129) in yearly units on the stock portfolio over the first half of year t given its holdings at the end of year t-1.

	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			
	6-Month Holding Period (1)		12-Month Holding Period (2)		6-Month Holding Period (3)		12-Month Holding Period (4)		6-Month Holding Period (5)		12-Month Holding Period (6)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group												
P50-P60	-0.0013	0.4947	-0.0008	0.9680	0.0023	0.7498	0.0015	0.8048	-0.0003	1.1971	-0.0004	1.1545
P60-P70	-0.0033	0.4675	-0.0003	1.2828	0.0020	0.6372	0.0021	0.9550	-0.0010	1.0042	-0.0006	1.2777
P70-P80	-0.0062	0.0886	-0.0007	1.0099	0.0022	0.3949	0.0022	0.7315	-0.0016	0.8715	-0.0010	1.1885
P80-P90	-0.0085	0.2015	-0.0023	0.8388	0.0018	0.3970	0.0020	0.6515	-0.0023	0.8755	-0.0014	1.1436
P90-P95	-0.0125	0.2532	-0.0069	0.4658	-0.0008	0.3120	-0.0002	0.3692	-0.0038	0.7076	-0.0022	0.8081
P95-P97.5	-0.0164	0.2449	-0.0118	0.1190	-0.0035	0.2353	-0.0023	0.1315	-0.0057	0.4544	-0.0032	0.3663
P97.5-P99	-0.0213	0.1602	-0.0168	-0.1799	-0.0052	0.1453	-0.0033	-0.0917	-0.0070	0.2701	-0.0037	-0.0075
P99-P99.5	-0.0193	0.0166	-0.0160	-0.4679	-0.0049	-0.0033	-0.0024	-0.3602	-0.0090	-0.1137	-0.0044	-0.5782
P99.5-P99.9	-0.0095	0.0434	-0.0057	-0.3242	-0.0036	-0.1007	0.0013	-0.3349	-0.0106	-0.3736	-0.0035	-0.6185
P99.9-P99.99	-0.0050	0.0902	0.0006	-0.2034	-0.0016	-0.0076	0.0052	-0.2115	-0.0093	-0.1832	-0.0005	-0.2475
Top 0.01%	0.0129	0.7683	0.0197	0.7417	0.0140	0.8659	0.0227	1.0330	0.0051	1.1782	0.0139	1.5110
Reference Group												
P40-P50	-0.0107	-0.4601	0.0019	-0.4010	-0.0101	-0.5061	-0.0044	-0.6665	-0.0005	-0.8641	-0.0004	-1.3279

Table XI
Risk-Adjusted Performance
Household Fund Portfolios

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 2000 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 1983 to 2009 period. 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. All regressions include year fixed effects and 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 0.01% of the distribution of net wealth picks funds with an alpha net of fees equal to 0.98% (=-0.0115+0.0112).

	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-P60	0.0000	-0.57	0.0000	-0.16	-0.0001	-1.46	0.0001	1.97	0.0001	3.31	-0.0003	-16.17
P60-P70	0.0001	1.73	0.0002	2.44	0.0000	0.84	0.0005	8.01	0.0001	6.76	-0.0005	-27.30
P70-P80	0.0004	4.71	0.0005	6.00	0.0002	2.80	0.0009	14.95	0.0002	11.40	-0.0008	-42.87
P80-P90	0.0008	10.70	0.0009	11.97	0.0004	6.36	0.0016	26.91	0.0004	19.30	-0.0011	-51.46
P90-P95	0.0013	14.78	0.0013	15.48	0.0004	7.01	0.0023	37.47	0.0005	22.04	-0.0011	-46.38
P95-P97.5	0.0017	15.83	0.0017	16.06	0.0004	5.67	0.0030	43.50	0.0006	21.50	-0.0010	-33.68
P97.5-P99	0.0018	14.31	0.0018	14.44	0.0001	1.27	0.0035	45.72	0.0005	14.54	-0.0008	-23.18
P99-P99.5	0.0019	9.55	0.0018	9.40	-0.0004	-4.19	0.0039	41.00	0.0003	5.68	-0.0005	-9.95
P99.5-P99.9	0.0019	7.86	0.0018	7.59	-0.0008	-7.52	0.0042	37.72	0.0000	0.08	-0.0003	-5.07
P99.9-P99.99	0.0023	4.45	0.0022	4.33	-0.0011	-4.70	0.0048	19.30	-0.0004	-2.30	-0.0001	-0.76
Top 0.01%	0.0058	3.81	0.0058	3.79	-0.0006	-1.02	0.0061	9.94	-0.0001	-0.19	0.0006	1.28
Reference Group												
P40-P50	0.0024	40.12	-0.0115	-191.59	0.0016	36.00	-0.0089	-189.07	0.0006	45.09	-0.0020	-151.08

Table XII
Risk and Return on Real Estate

This table reports regressions of (1) the mean yearly return on household real estate wealth, (2) the standard deviation of the yearly return on real estate, (3) the share of idiosyncratic risk, and (4) the Sharpe ratio of household real estate on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. Idiosyncratic risk refers to risk uncorrelated to the Swedish real estate index. The sample includes all Swedish households above the 40^{th} percentile of the net wealth distribution. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: the average household in the top 0.01% of the distribution of net wealth has a real estate portfolio with an average return of 5.55% (=0.0515+0.0040) and a standard deviation of 12.13% (=0.1111+0.0102) in annual units.

	Mean Return (1)		Standard Deviation of Return (2)		Share of Idiosyncratic Risk (3)		Sharpe Ratio (4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P60	0.0006	47.02	0.0016	20.27	-0.0265	-43.10	-0.0034	-26.38
P60-P70	0.0011	94.32	0.0032	37.75	-0.0482	-71.46	-0.0061	-42.50
P70-P80	0.0017	143.84	0.0047	55.14	-0.0672	-100.42	-0.0078	-52.93
P80-P90	0.0025	208.67	0.0065	77.23	-0.0882	-131.96	-0.0095	-64.33
P90-P95	0.0032	246.55	0.0083	89.72	-0.1023	-137.52	-0.0107	-64.00
P95-P97.5	0.0037	242.37	0.0091	88.54	-0.1007	-113.86	-0.0104	-53.93
P97.5-P99	0.0041	225.87	0.0100	84.68	-0.0915	-88.45	-0.0111	-50.19
P99-P99.5	0.0042	154.96	0.0105	67.19	-0.0872	-63.54	-0.0114	-39.77
P99.5-P99.9	0.0039	136.68	0.0093	52.14	-0.0982	-61.31	-0.0100	-27.73
P99.9-P99.99	0.0036	68.86	0.0077	27.25	-0.1117	-39.87	-0.0080	-14.12
Top 0.01%	0.0040	23.39	0.0102	14.58	-0.1225	-19.74	-0.0117	-9.40
Reference Group								
P40-P50	0.0515	5165.92	0.1111	1583.69	0.4384	825.51	0.4760	4271.53

Table XIII
Risk and Return on Private Equity

This table reports regressions of (1) the mean yearly return on household private equity, (2) the standard deviation of the yearly private equity return, (3) the share of idiosyncratic risk, and (4) the Sharpe ratio of household private equity on dummies for different brackets of the distribution of net wealth in Sweden between 2000 and 2007. Idiosyncratic risk refers to risk uncorrelated to the Swedish stock market index. The sample includes all Swedish households above the 40^{th} percentile of the distribution. All regressions include year fixed effects and standard errors are clustered at the household level. One should read the table as follows: the average household in the top 0.01% of the distribution of net wealth has a private equity portfolio with an average return of 6.55% (=0.0722-0.0067) and a total standard deviation of 39.04% (=0.4454-0.0550) in annual units.

	Mean Return (1)		Standard Deviation of Return (2)		Share of Idiosyncratic Risk (3)		Sharpe Ratio (4)	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Wealth Group								
P50-P60	-0.0006	-2.43	-0.0020	-1.30	-0.0046	-3.80	0.0015	3.92
P60-P70	-0.0010	-4.36	-0.0057	-3.99	-0.0098	-8.39	0.0030	8.53
P70-P80	-0.0010	-4.33	-0.0080	-5.92	-0.0228	-20.06	0.0072	20.76
P80-P90	-0.0010	-4.49	-0.0173	-13.24	-0.0441	-39.24	0.0136	40.24
P90-P95	-0.0010	-4.72	-0.0259	-19.57	-0.0681	-55.13	0.0208	56.42
P95-P97.5	-0.0010	-4.43	-0.0342	-25.23	-0.0869	-62.10	0.0265	63.80
P97.5-P99	-0.0010	-4.34	-0.0407	-29.88	-0.1065	-69.80	0.0323	72.57
P99-P99.5	-0.0017	-7.49	-0.0439	-30.04	-0.1148	-55.87	0.0349	58.76
P99.5-P99.9	-0.0034	-14.54	-0.0463	-32.58	-0.1087	-56.92	0.0333	59.33
P99.9-P99.99	-0.0056	-19.46	-0.0465	-25.56	-0.1116	-30.85	0.0337	32.76
Top 0.01%	-0.0067	-11.46	-0.0550	-12.99	-0.1077	-16.19	0.0324	17.12
Reference Group								
P40-P50	0.0722	350.51	0.4454	363.59	0.7762	849.67	0.1671	596.13

Table XIV
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. Pre-tax estimates assume returns on capital remain untaxed. Post-tax estimates assume that net capital gains and dividends are taxed at a flat rate equal to 30%, as is the case in Sweden. We present the results using two asset-pricing models (the local CAPM and international Fama-French model used in earlier tables) and assume that the alphas of household portfolios are equal to zero.

	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 (pre-tax)					
Local CAPM	0.0006	0.0199	0.0388	0.0592	0.0365
International Fama-French	0.0006	0.0195	0.0389	0.0589	0.0365
Asset Pricing Models (post-tax)					
Local CAPM	0.0003	0.0094	0.0274	0.0371	0.0365
International Fama-French	0.0003	0.0092	0.0274	0.0369	0.0365

Table A.1
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

This figure illustrates the average shares of total household wealth held by households in upper brackets of the net wealth distribution in Sweden between 2000 and 2007. The shares are reported for gross wealth, net wealth, financial wealth, and private equity. All variables are described in Appendix Table A. P90-P95 refers to households ranked between the 90th and the 95th percentile of the net wealth distribution, P95-P99 to households between the 95th and 99th percentile of the net wealth distribution, and so on. The number of households in each bracket are illustrated by the black line and reported in boxes. The graph shows that the top 0.01% of the net wealth distribution consists of 487 households that own 4.6% of the gross wealth, 5.3% of the net wealth, 10.6% of the total financial wealth, and 24.4% of the private equity held by Swedish residents.

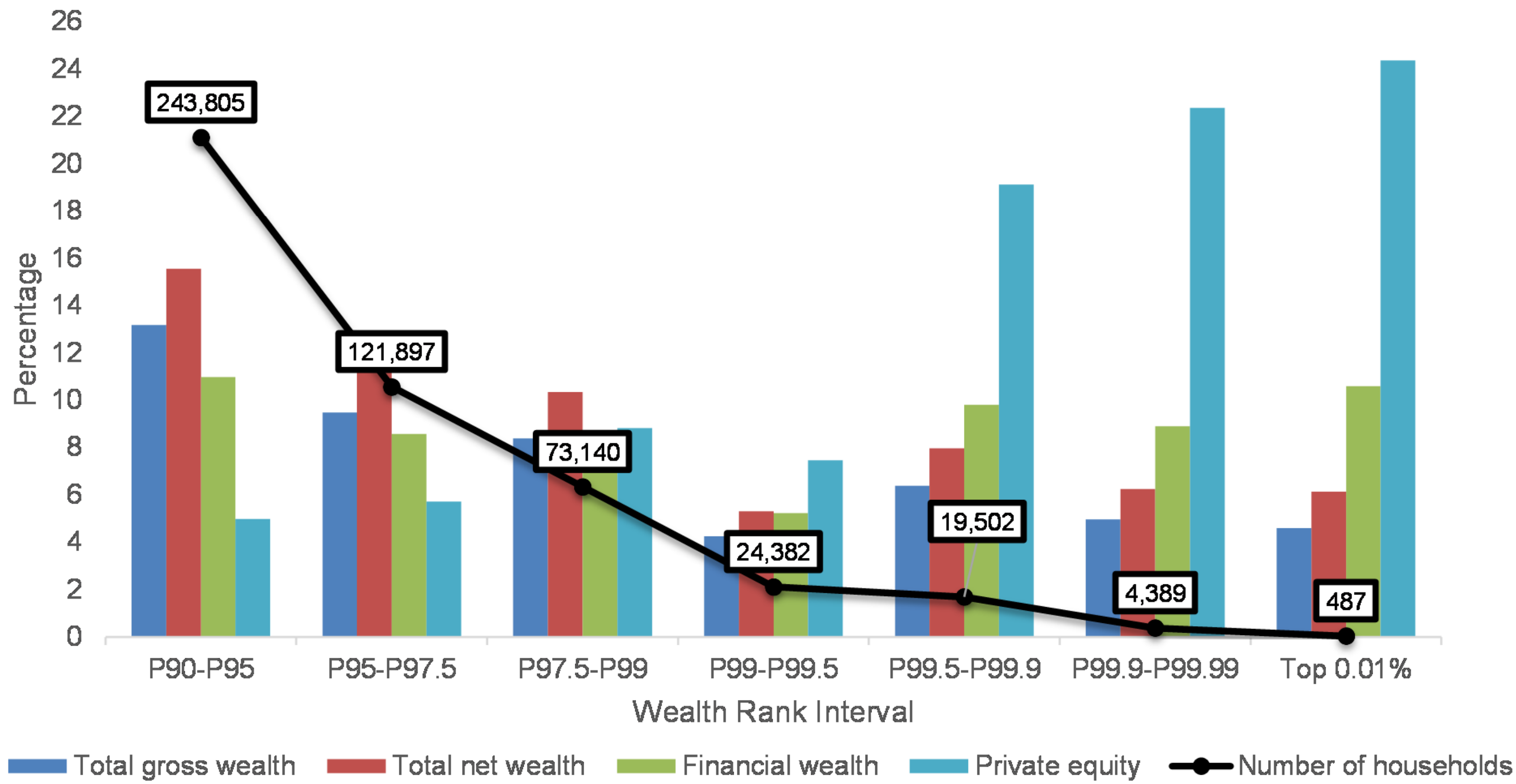


Figure 2
Allocation of Gross Wealth

This figure illustrates the average share of gross wealth held by households in different brackets of the net wealth distribution in Sweden between 2000 and 2007. The shares are reported for cash (bank account balances and money market funds), risky financial assets, residential real estate, commercial real estate, and private equity. The black line illustrates the leverage ratio, defined as the ratio of total household debt to gross wealth. P90-P95 refers to households ranked between the 90th and the 95th percentile of the net wealth distribution; P95-P99 to households between the 95th and the 99th percentile, and so on. All variables are described in Appendix Table A.

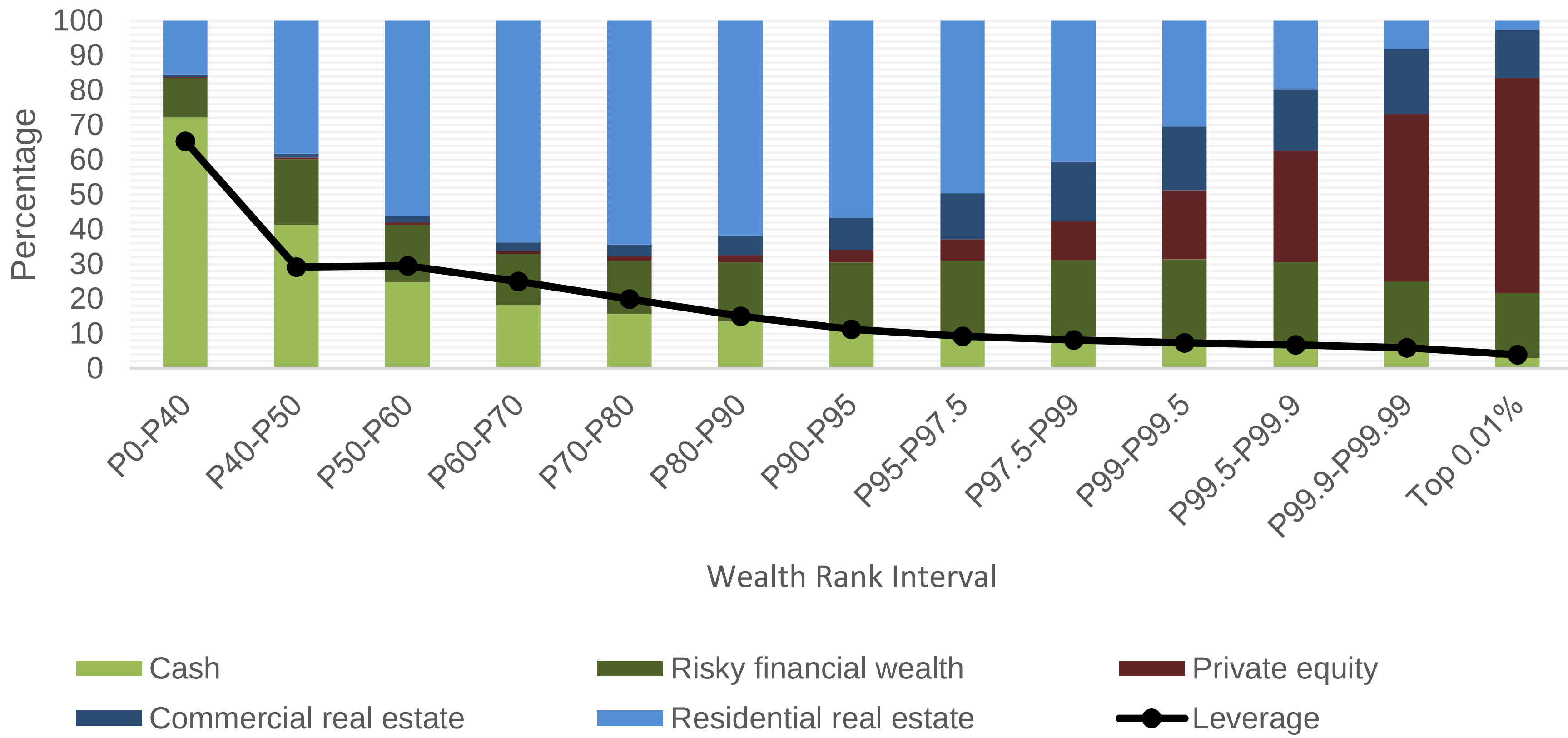
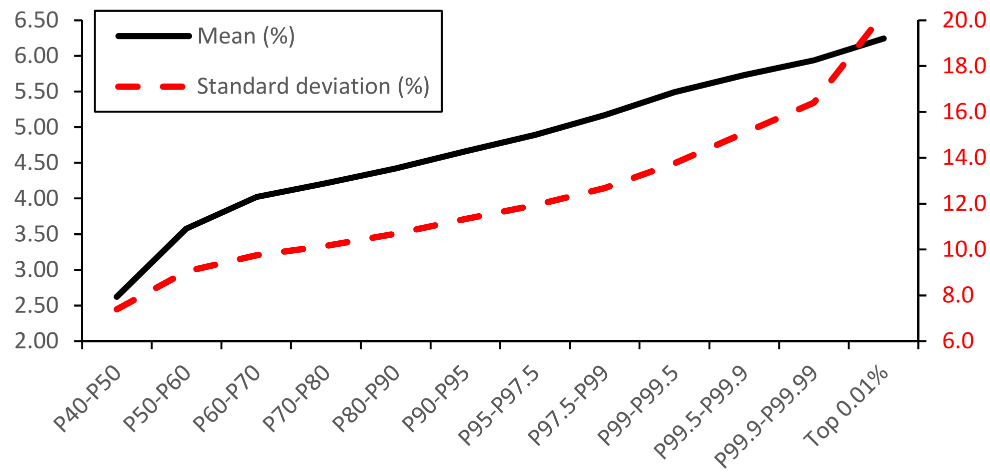


Figure 3
Mean and Standard Deviation of Return on Household Wealth

A. Gross Wealth



B. Net Wealth

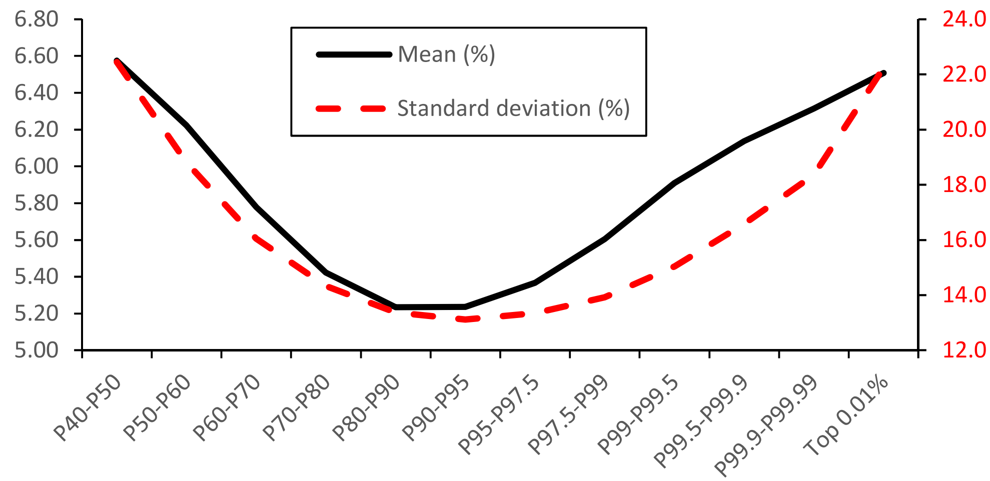


Figure 4
Allocation of Financial Wealth

This figure illustrates the average asset allocation of the financial wealth held by households in different brackets of the net wealth distribution in Sweden. The reported allocations are averages over the 2000 to 2007 period. We consider cash (bank account balances and money market funds), directly-held stocks, funds (mutual funds other than money-market funds), bonds, derivatives, capital insurance, and other assets. 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 allocates 28.5% of its financial portfolio to cash, 49.9% to stocks, 12.9% to funds, 1.4% to bonds, 0.1% to derivatives, 5.3% to capital insurance accounts, and 1.9% to other investment vehicles.

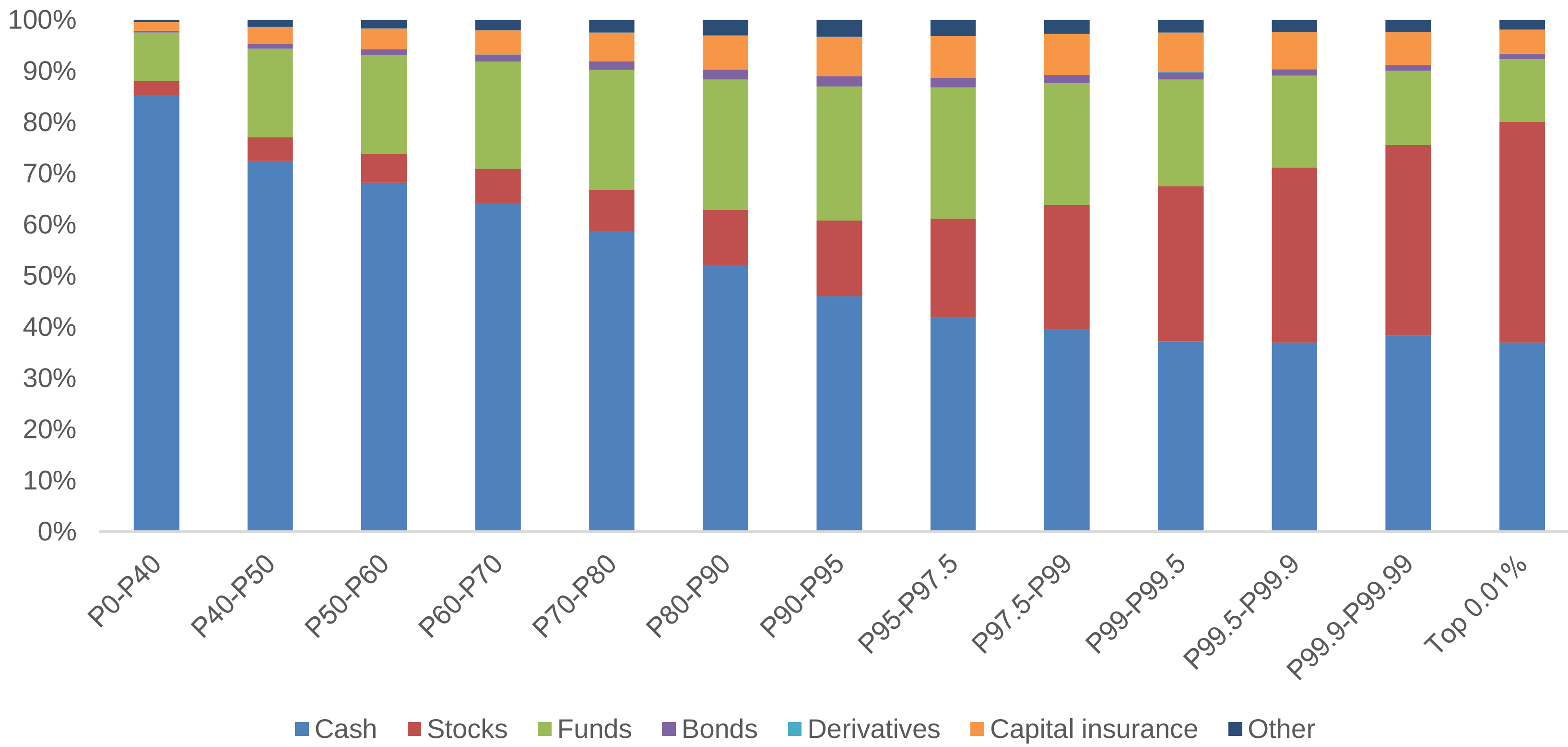


Figure 5
Allocation of Real Estate Wealth

This figure illustrates the average asset allocation of the real estate wealth held by households in different brackets of the net wealth distribution in Sweden. The black line plots the rate of participation rate in the real estate market. The reported asset allocations are averages over the 2000 to 2007 period. We consider the following five categories: primary residence, secondary residence, agricultural property, rental property, and other property. The latter category mainly includes foreign housing and the 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 allocates 36.3% of its real estate portfolio to its primary residence, 12.4% to secondary residences, 21.7% to agricultural property, 26.6% to rental property, and 2.9% to other property.