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Asset Allocation and Returns in the Portfolios of the Wealthy

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Abstract

There is little direct empirical evidence on the investment behavior of wealthy households. Based on a proprietary database of investment portfolios and returns, we document three new facts. First, wealthy households hold a larger share of alternative investments, such as private equity and hedge funds, and a lower share of liquid assets, such as public equities. Second, returns and risk-adjusted returns increase at the top of the wealth distribution, by a larger margin in risk-adjusted terms. This is driven by higher risk tolerance and better diversification. Third, we show that returns on alternative assets in particular are increasing in wealth.

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1 Introduction

There is little direct empirical evidence of the investment behavior of wealthy households in the United States, despite the fact that the top percentiles of the wealth distribution account for a large proportion of total wealth. Estimates of top wealth vary, and are sensitive to misreporting in survey data or assumptions about the mapping of tax income to wealth. With a growing focus on the effects of heterogeneity in macroeconomics and asset pricing, understanding differences in investor behavior across the wealth distribution is of critical importance.[1]

In this paper, we present novel data and analysis based on a proprietary database of investment portfolios and returns, which sheds light on the allocations and returns of a large sample of wealthy U.S. investors. This data covers roughly 180,000 investors with mean wealth of 10.5 million (median 0.6 million) between 2016 and 2022, and includes a significant number of portfolios large enough to provide evidence on the allocations and performance of the top 1, 0.1, and 0.01 percent. This includes investors who represent a large share of investment in a wide range of asset classes.

The data are nearly ideal, as it is based at the security level, including the value of positions and returns as recorded by wealth managers. For each portfolio, this includes an exhaustive breakdown of individual investments. The data allows us to calculate portfolio wealth, investment income, and returns including unrealized gains, at a monthly frequency.

Wealth advisors play an important intermediary role for households, in particular the super-wealthy, and track portfolio allocations, monitor investment returns and give detailed financial advice. As a consequence, our data on individual asset holdings and returns are highly scrutinized and likely to be comprehensive and accurate. Because we observe the same reported portfolio and returns as recorded by investors' wealth advisors, this data is

[1] Hubmer et al. (2020) and Kuhn et al. (2020) in particular emphasize the need for better data on portfolio heterogeneity and asset price movements to match short and medium run dynamics in wealth inequality.

unlikely to suffer from the bias inherent in survey data, under-reporting, or assumptions when mapping portfolio holdings to publicly available data on returns. Although our sample is limited to disclosed components of financial wealth, it includes data on wealth held in private businesses and real estate, at the values reported to or imputed by wealth managers. Based on this data, we document three new facts about high net worth investor portfolios.

First, asset allocations change strongly with total wealth. Wealthier households hold a larger share of illiquid alternative investments, such as private equity and venture capital, and a smaller share of fixed income and public equity. Investors with less than three million in total wealth allocate roughly half of their portfolio to public equities and less than ten percent to alternatives, while households with more than 100 million in total wealth hold less than one third of their assets in public equities and more than one quarter in alternatives. Overall, the share of wealth allocated to risky assets rises with wealth from 70 to 80 percent, consistent with declining risk aversion.

The allocation patterns we report differ from established academic benchmarks for the portfolio allocations of U.S. investors. The primary datasets used in academic research on household income and wealth in the U.S. are the Panel Study of Income Dynamics (PSID) and the Survey of Consumer Finances (SCF). The PSID does not track the upper end of the income and wealth distribution. The SCF is a cross-sectional survey, conducted triennially. While the SCF does oversample wealthy households, it is a voluntary survey. Survey completion among the top percentile of households is roughly 12 percent, and only around 700 households from the top percentile are included (Kennickell, 2017). By contrast, we observe approximately 40,000 investors with wealth above three million, which is estimated by Smith et al. (2022) to be the wealth threshold of the top percentile. The SCF also excludes the wealthiest 400 individuals as listed by Forbes. We observe approximately 18 percent of investors in the top 0.01 percent of the wealth distribution.[2]

[2]Based on the wealth thresholds estimated by Smith et al. (2022), the 2016 cutoff for the top 0.01 percent is 77.8 million, and this includes 23,900 individuals. At the end of 2022, we observe 4,196 portfolios with wealth greater than this cutoff. At the end of 2019, we observe 1,895 investors above this cutoff, which is 8

This also provides a different picture than the one generated by the capitalization method used in Saez and Zucman (2016) and Smith et al. (2022). This approach capitalizes the income earned on assets and reported in annual tax filings at an assumed rate of return to estimate portfolio allocations. There is considerable debate over the correct assumptions to use in this methodology. It is also possible that the structure of investments does not map cleanly to tax liabilities, especially for households with higher marginal tax rates (Poterba and Samwick, 2003). In particular, our data indicates that the extent of housing and other wealth among the top 0.01 percent is higher than estimated in the capitalization method.

Although we observe primarily financial wealth, our data has not only detailed portfolio allocations but also reports performance. The few datasets that include both returns and wealth in the U.S. are based on foundations and university endowments (Piketty, 2014; Saez and Zucman, 2016). Our simultaneous coverage of wealth, portfolio choices, and returns allows us to not only detail how allocations differ with wealth, but also how wealth is related to returns.

Second, we report precise estimates of returns at the top end of the wealth distribution, and show that overall portfolio returns increase by around a half a percent from those with less than three million to those with more than 100 million in wealth. Over the sample period, the average annualized portfolio return is 4.01 percent. Our measure of returns is based on reported performance at an investment level, which we aggregate up to sub-asset class, asset class, and portfolio levels using portfolio shares as weights. Because we observe performance, we do not need to calculate returns by scaling income flows over assets, which may be biased by the timing of asset purchases and sales (Dietz, 1968).[3] While we do not observe portfolio returns for the average or median U.S. investor, it is useful to note that the average annual return on a risk-free asset (i.e. one month T-bills) over this period was 1.0 percent, while the average value weighted stock market return was 11.1 percent.[4] Among investors with

percent of 23,900.

[3]In the data, security-level monthly returns are time-weighted.

[4]Based on the Fama-French market factor plus the risk free return.

less than three million in assets under management, the average return was 3.88 percent, while for investors with more than 100 million in wealth, the average return increases to 4.33 percent. Median returns increase less steeply with wealth, from 4.1 to 4.5 percent. The dispersion of returns across investors is 5.1 percent overall and for investors with less than three million in assets, and rises to 5.9 percent for the wealthiest investors in the sample.

Further, we show that wealthier investors have lower return volatility and higher risk-adjusted returns, earning on average a Sharpe ratio that is 0.02 higher for every ten fold increase in wealth. While returns are broadly similar across the top of the wealth distribution, the standard deviation of portfolio returns declines for the wealthiest, relative to less wealthy investors. Although the smoothing of alternatives returns may lead to underreported volatility, counterfactual portfolios in which private equity and venture capital returns are replaced with value-weighted market returns also show both returns increase with wealth, and portfolio volatility declines. This suggests that portfolio construction at the upper end of the wealth distribution reduces overall portfolio risk.

This relationship between returns and wealth is less stark than the findings of Bach et al. (2020) and Fagereng et al. (2020) in Sweden and Norway, respectively, and quantitatively novel among a subset of U.S. households for which accurate data has to date been limited. Relative to Bach et al. (2020) and Fagereng et al. (2020), we document a decline in the volatility of returns at the very top of the wealth distribution. This speaks to financial sophistication that drives higher returns at lower levels of risk. An analysis of returns based on the SCF finds average returns to wealth between 1990 and 2019 of 8.25 percent for the top percentile of wealth, implying a premium of 1.45 percent over the aggregate return of 6.8 percent, and a substantial premium over the bottom 90 percent who earn less than 4 percent (Xavier, 2020). With additional data on returns at the top, our analysis suggests that returns since 2016 increase with wealth even within the top percentile, but at a small premium.

Several factors may limit the external validity our results. Interest rates were very low throughout the sample period, yielding near-zero returns on many safe assets. At the same time, equity markets performed extremely well relative to risk-free assets, returning a premium of 10.2 percent from 2016-2022, relative to a premium of 5.5 percent from 1960-2022.[5] Greater dispersion among the returns of the wealthiest investors also implies that some extremely wealthy portfolios perform very well. At the 75th percentile of returns, the lowest wealth group earned 6.55 percent while the wealthiest earned 7.25 percent; at the 90th percentile returns for the lowest and highest groups rises to 9.26 and 10.48 percent, respectively.

We explore to what extent portfolio allocations explain the observed relationship between wealth and returns. While greater shares of equities, private business, and other assets (e.g. collectibles) are associated with higher returns on average, a substantial portion of the difference across wealth groups remains unexplained by portfolio shares at the asset class level (e.g. equities, alternatives). Building on this, we measure the share of variation in portfolio returns that cannot be explained by either wealth or portfolio shares interacted with year fixed effects, and show that this unexplained portion rises with wealth.[6]

Third, we explore the evidence for higher risk-adjusted returns among wealthier investors within narrow asset categories. In liquid, publicly investable assets, such as fixed income and public equities, returns do not increase steeply with wealth. Bank accounts, brokerage accounts, and money market funds ("cash and cash equivalents") and fixed income returns increase slightly, but not statistically significantly, with wealth. Within fixed income, wealthy investors typically have allocations to tax-exempt categories of bonds, such as municipal debt. In our data returns are on a pre-tax basis. Within equities, returns decline with wealth, also with differences that are statistically insignificant. Factor regressions indicate that wealthy investors appear to load less on the aggregate market, and more on small-cap and growth stocks. The share of equities invested in ETFs and mutual funds also falls with wealth.

[5] From 1960-2022, the average risk free return was 4.3 percent.

[6] In a canonical model, return heterogeneity in diversified portfolios should be fully explained by differences in the portfolio shares.

Greater global diversification and other equity positions (e.g. options) are associated with lower average returns. The former is a feature of the sample period that has been documented elsewhere (e.g. Blackrock, 2022); the latter indicates that derivatives are not being used to construct highly profitable equity strategies on average, despite the greater incidence of such positions in the portfolios of the wealthiest.

Returns are steeply increasing in wealth in alternative assets, on both reported and risk-adjusted bases. Wealthier investors hold a higher number of larger positions in alternatives. The differences in returns persist among investments that can be matched to external sources - and surprisingly, are both smaller and statistically insignificant among the investments that cannot be matched. This indicates that opaque, unknown investments are not driving the differences in alternatives returns. Using the characteristics of investments that can be matched to external data sources, we show that reported return differences across wealth groups are not driven by vintage effects or direct investments relative to funds of funds. We find some evidence that wealthier investors have better timing or negotiate better fees. Controlling for holding the same investment on the same date, the wealthiest investors' group earns 0.8 percentage points higher returns on average, relative to the least wealthy group. None of these factors fully explains the return differential on alternatives earned by the wealthiest investors in our data. There is, however, a marked difference in the riskiness of underlying positions in alternatives.

The underlying investments made by wealthier investors do not have higher returns on a risk-adjusted basis, which indicates that wealthier households do not appear to be better at picking investment opportunities individually. There is no pattern of increasing Sharpe ratios among alternative investments made by investors of higher wealth. Taken alone, this seems to indicate that risk tolerance increases with wealth. However, overall alternatives returns increase with wealth on a risk-adjusted basis. This shows that wealthier investors are diversifying across alternatives positions to substantially reduce their risk exposure, while also earning high returns in compensation for the underlying risk.

Highlighting the importance of diversification for alternatives performance, increasing the number of alternatives investments is also associated with higher risk-adjusted returns on alternatives investments overall. Having controlled for the number of investments in each sub-asset class, the relationship between wealth and risk-adjusted returns in alternatives becomes statistically insignificant. This indicates that diversification matters more than wealth. Although wealthier investors are more likely to diversify, investors who are well-diversified with lower levels of wealth also earn higher risk-adjusted returns to alternatives.

We further decompose alternatives allocations into the share invested in alternative funds, hedge funds, private equity, venture capital, and other alternatives (e.g. commodities). While alternatives funds are the largest share of alternatives for investors with less than three million in wealth, investors with more wealth invest more heavily in private equity, venture capital, and other funds. Higher venture capital shares and other shares are associated with higher returns on alternatives overall, on average. Having a greater number of private equity or venture capital investments is also associated with higher returns. The risk-adjusted return to alternatives also increases in the shares of alternatives allocated to hedge funds, private equity, venture capital, and other assets, with higher risk-adjusted returns to the latter three categories, relative to alternative funds.

Within the sub-asset classes reported in alternatives, alternatives funds returns are low, in particular for less wealthy investors, and increase with wealth on average and weakly on a risk-adjusted basis, but no differences are statistically significant. Private equity and venture capital investments have higher returns and risk-adjusted returns among investors with higher wealth. Investors' Sharpe ratios on private equity (overall, i.e. the weighted average of all private equity investments) increase by 0.12 as wealth increases by 10 times. On average, investors with more than 100 million in wealth earn a Sharpe ratio that is 0.23 higher in private equity than investors with less than three million in wealth. This is in contrast to Bach et al. (2020), where the expected return on private equity in Sweden is shown to decline slightly with net worth, and the Sharpe ratio is consistently between 0.22

and 0.26 for all wealth groups in the Swedish population.

Our finding of abnormal risk-adjusted returns on private equity is in contrast to the findings of Moskowitz and Vissing-Jorgensen (2002), but consistent with Kartashova (2014) in more recent data. Controlling for wealth, the risk-adjusted return to alternatives and private companies exceeds the risk-adjusted return to public equity, on average. This is also the case controlling for individual fixed effects. That said, there may be additional liquidity risk inherent in alternatives investing or private business wealth, which is not reflected in reported returns. Although GPs may understate the true volatility of alternatives investments, comparisons between the volatility of underlying investments (i.e. single funds) and overall alternatives returns demonstrates that a significant portion of the reduced volatility of alternatives arises from diversification within the asset class.

The large and systematic variation of risk-adjusted returns in illiquid alternative assets at the portfolio level - but not in liquid assets such as equities and bonds, or at the investment level among alternatives - indicates that diversification in alternatives play a large part in determining returns. In turn, this raises questions about the benefits of broadening access to delegated investing in private assets. Without addressing frictions that allow wealthier investors to generate higher returns in alternatives, such as minimum investment sizes, broadening access appears unlikely to outperform public equities for most ordinary investors.

Taken together, these results provide novel evidence of both wealth and capital income in the U.S. at a micro level. The frontier of academic research on wealthy individuals makes use of comprehensive administrative data in Sweden and Norway. The Swedish data analyzed in Bach et al. (2020) includes detailed position-level balance sheets for the full population, and shows that expected returns are both persistent and increasing in wealth, as evidenced by risk exposure. We can calculate expected returns using long-run rates of return from Jorda et al. (2019), and our observed portfolios. This implies a higher level but similar slope of returns to net worth. Fagereng et al. (2020) construct returns at an annual frequency using

Norwegian data, based on detailed financial holdings. In this setting, not only do returns increase with wealth due to increasing risk tolerance, but financial sophistication and talent also explain some of the return differentials. In our data, evidence of financial sophistication appears in greater diversification within asset classes.

This evidence also relates to a large literature on wealth inequality in macroeconomics (Nardi and Fella, 2017; Benhabib and Bisin, 2018). Benhabib et al. (2011) argue that capital income risk rather than labor income drives the observed right-skewness of wealth. The notion that returns are correlated with wealth, which is referred to as "scale dependence," has been shown by Gabaix et al. (2016) to be critical in matching the speed of changes in inequality experienced in the U.S.. In a related contribution, Hubmer et al. (2020) find evidence that the decline in tax progressivity and scale dependence as calibrated to match the evidence in Sweden (Bach et al., 2020) are both necessary to account for the changes in U.S. wealth inequality over the past forty years. However, the volatility of private equity returns in the Swedish data results in too much wealth inequality at the very top, and is scaled down by an arbitrary factor in their benchmark model to match the thickness of the extreme right tail in the data. Our results suggest that the volatility of private equity returns declines with wealth, due to diversification. Benhabib et al. (2019) similarly argue that stochastic idiosyncratic returns to wealth in Norway (Fagereng et al., 2020) appear close to what would be necessary to generate the cross-sectional distribution of wealth and social mobility in the United States. However, their model disregards return heterogeneity that arises from the risk composition of investment portfolios.

Our findings are also closely related to a number of theoretical papers that have suggested different explanations for the heterogeneity in returns across investors. These include differences in entrepreneurial ability (Lucas, 1978), information (Peress, 2004), and sophistication (Kacperczyk et al., 2019). Several recent empirical papers study return heterogeneity within a specific asset class, including financial wealth (Fagereng et al., 2016), bank deposits (Deuflhard et al., 2018), and stock portfolios (Campbell et al., 2019). As in Calvet et al. (2007), we

are able to analyze the majority of financial assets, but cannot observe undisclosed pension wealth and have limited data on debt. Like Bach et al. (2020), we find risk exposure to be an important driver of returns, and similar to Fagereng et al. (2020) we find that risk exposure does not explain the full extent of return heterogeneity, in particular in specific illiquid asset classes. Gabaix et al. (2022) also use the wealthy investors' data to explore households' asset demand and rebalancing behavior.

The remainder of the paper is structured as follows. Section 2 describes the data. Portfolio allocations are shown in Section 3, while portfolio returns are analyzed in Section 4. Section 5 explores returns within narrow asset classes, highlighting the differences between liquid assets (e.g. fixed income and public equities) and intermediated alternatives. The final section concludes.

2 Data

In this paper, we use anonymized portfolio-level data from Addepar, a leading technology provider for the wealth management industry. Addepar provides an advanced financial reporting and analysis software platform for private wealth advisors. These advisors range in scale from single family offices to large wealth management firms with thousands of individual advisors and client portfolios. Advisors use the platform to get a comprehensive picture of asset holdings and returns across investments in different asset and sub-asset classes, ranging from standard equity and fixed income investments to private equity, real estate and collectibles. While individual investors can access their own account data directly, advisors are the primary users of the software.

We observe over 180,000 portfolios on the platform by the end of 2022, each likely representing an individual household. Within these portfolios, there are nearly two trillion in assets, as shown in Figure 1 panel (a). Table 1 provides summary statistics for the average and

median wealth of an investor in the data at the end of 2016 and 2022, classified by how much total wealth they have at the end of each year. The range of total holdings ranges from the mid-six figures to multi-billion dollar portfolios, with an average total size of portfolios of 10.5 million (median 0.6 million) at the end of 2022. Among the 23,000 investors on the platform at the end of 2016, mean wealth was 12.0 million (median: 0.9 million).

Table 1 also shows summary statistics for five groups of investors that have wealth of below three million, 3-10 million, 10-30 million, 30-100 million, and over 100 million. A density plot of portfolios in the data by wealth is shown in Figure 1 panel (b). Although the majority of investors in the data have less than three million in total wealth, there is a considerable number of investors in the upper parts of the wealth distribution. To maintain confidentiality, the sizes of single positions in equity or alternatives in excess of one billion are not shown. There are 118 portfolios from which these assets are censored.[7]

Advisors tag each investment with some descriptive characteristics, including a sub-asset class, investment type and sub-type, and for some assets this is supplemented by data linked to investment identifiers from Morningstar, S&P, Preqin, and Pitchbook. Addepar generates asset classifications based on characteristics of securities input by wealth managers, third-party data providers (e.g. Morningstar, S&P, Six Financial), logic based on name matching algorithms, and manual revision by an operations team. We use the data from descriptive identifiers to reclassify some assets to what we believe to be more appropriate matches for each investment.For example, we identify ETFs and mutual funds separately within U.S. Equities, and reclassify investments in funds marketed by large asset managers in "alternative" strategy categories to be "Alternative Funds," as opposed to direct investments in hedge funds or private equity. Individual investments are mapped to sub-asset classes, each of which aggregated into a broad asset class, according to the categories set out in Table 2.

[7]Not all portfolios on the Addepar platform are included in the data being analyzed in this paper. In addition to censoring single positions above one billion, managers with large numbers of portfolios are randomly sampled so that no single manager's clients comprise more than ten percent of any data available for external analysis.

The broad asset classes are cash and cash equivalents, fixed income, equities, mixed allocation funds, alternative investments, private businesses, real estate, and other. Cash and cash equivalents include bank accounts, brokerage accounts, and liquid investments such as money market funds. Fixed income is broken down by types of U.S. bonds, including Treasuries, TIPS, investment grade and high yield corporate bonds, and bank loans, and international developed market bonds, emerging markets bonds, opportunistic bond funds, and other or unknown fixed income. For equities, we observe exposure by location (US, global, Americas, EMEA, Asia, emerging and frontier markets, other), and can also measure the breakdown between ETF, mutual fund, and single stock investment. Mixed allocation vehicles include any funds with a multi-asset investing strategy, or accounts that are held away such as 401Ks, in which the underlying asset composition cannot be observed. Alternatives are broken down into several intermediated investment types: alternative funds, hedge funds, private equity (and private debt), venture capital, and other alternatives. Investments in privately owned businesses are reported within alternatives in the Addepar data; we split this out separately for comparability to other datasets. Similarly, real estate investments include both real estate that is directly held, such as homes and apartments, and investments in real estate funds. Collectibles, cryptocurrency, and other non-financial assets are classified in our analysis as "Other." There are some assets where the underlying investment and its characteristics are not known, these are included in "Other" as unknown assets. The composition of assets in the data as of the end of 2019 is shown in Figure 2 at the end of 2019 in panel (a), and over time in panel (b).

We observe portfolio holdings and return data for all investments at a monthly frequency. For an investor i in month t, individual assets or investments j are reported with starting values, ending values, cash flows, and returns, such that:

$$a_{ij,t} = a_{ij,t-1} + f_{ij,t} + r^{\$}_{ij,t} \tag{1}$$

where $a_{ij,t}$ is the asset value, $f_{ij,t}$ is cash flows (e.g. buys, sells), and $r^{\$}_{ij,t}$ is returns in dollar terms (e.g. capital gains, dividends, interest).[8] Returns are also reported in percentage terms, where the return has been weighted according to the timing of cash flows (Dietz, 1968). We denote these time weighted returns by $r_{ij,t}$. Investment returns are reported directly from security custodians for liquid assets, and are manually entered by wealth advisors for alternative and private assets. While returns, flows, and portfolio allocations are updated on the platform daily, we observe portfolio positions and returns at a monthly frequency.[9]

The data coverage of individual asset holdings and returns is highly scrutinized and likely to be accurate and comprehensive. As wealth advisors play a critical intermediary role for individuals, especially the super-wealthy, they are charged with tracking portfolio allocations, monitoring investment returns and giving detailed financial advice. To avoid potential concerns about outliers, we clean the return data using two steps. First, we replace values that are above the 99.5th percentile or below the 0.5th percentile of the distribution for the sub-asset class and date of each investment with (i) the ratio of the total dollar return to starting asset values ($r^{\$}_{ij,t}/a_{ij,t-1}$), if the starting value of the investment is larger than one dollar, and the ratio is inside the 99.5th and 0.5th percentiles of the distribution for that sub-asset class on that date, or (ii) the ratio of the total dollar return to ending asset values ($r^{\$}_{ij,t}/a_{ij,t}$), if the ending value of the investment is larger than one dollar and the ratio is inside the 99.5th and 0.5th percentiles of the distribution for that sub-asset class on that date. Second, we winsorize any remaining investment returns at the 99.5th and 0.5th percentiles of the distribution for the sub-asset class and date. This reduces extreme values of performance in the aggregation.

Returns are calculated for each investor at the sub-asset class, asset class, or portfolio level

[8] If dividends or interest income are paid out, there is also a corresponding flow that indicates this.

[9] For private equity and venture capital, investors make a capital commitment to funds but the general partner can choose the point in time at which to call the funds. This means that investors hold on to the un-called but committed funds until the capital is deployed. Since these funds are held in other assets, often but not exclusively cash, we count the funds in the asset class where they are held until they are called and contributed to a fund.

using the lagged portfolio share of each investment in the broad category of interest, where the portfolio share is denoted:

$$\omega_{ijk,t} = \frac{a_{ijt}}{\sum_{j \in k} a_{ijt}} \tag{2}$$

where k denotes a sub-asset class or asset class. Aggregating returns amounts to calculating:

$$r_{ik,t} = \sum_{j \in k} \omega_{ijk,t-1} r_{ij,t}, \tag{3}$$

and at the portfolio level the overall return of investor i is calculated similarly $r_{i,t} = \sum_j \omega_{ij,t-1} r_{ij,t}$, where $\omega_{ij,t} = \frac{a_{ijt}}{\sum_j a_{ij,t-1}}$ is an individual asset's share of overall portfolio wealth. We make one additional modification in aggregating: for returns on options and short positions, we add the total dollar return directly. After aggregating, we again check whether outliers outside of the 99.5th and 0.5th percentiles of the distribution for the level of aggregation and date can be corrected using the ratio of the total dollar return to the starting value of assets, and then winsorize any remaining outliers. Allowing for different distributions across dates is important to avoid understating volatility in the time series, and doing this at the level of aggregation (e.g. sub-asset class level) preserves important differences in volatility across asset classes, and at the portfolio level.

Especially at higher wealth levels, advisors provide advice on a broad range of financial questions beyond investment portfolios, which provides a strong incentive to the end-client to provide full disclosure of all assets and liabilities. Crucially, this includes the introduction and sourcing of further investment managers, especially in the alternatives space (hedge funds, private equity or venture capital). In particular, advisors also play a crucial role in tax preparation for wealthy individuals, which would not be possible if advisors were responsible for only a subset of assets.[10]

[10]While we cannot test for this directly, anecdotal evidence from practitioners in the field indicates that households generally consolidate all their financial wealth with a single advisor, so that an individual household's finances should adequately be reflected in the observed investment portfolio.

In presenting our main results, we exclude portfolios with less than 100,000 in assets, or fewer than three investments, to exclude partially-captured portfolios from the analysis.[11] We also exclude portfolios observed for less than two years. Partially-captured portfolios may reflect new advisor-client relationships that involve the piecemeal transition of assets and investments.

For smaller clients at larger wealth management firms, it may not be of interest tto report all housing, pension, and non-financial wealth to their wealth advisor. We similarly do not observe many portfolios that report debt. While these components of wealth may be under-reported, we expect such under-reporting to be more likely for portfolios at the bottom end of the wealth distribution in our data, for which other sources of data already provide reasonable proxies for the overall allocation of total wealth. For ultra high net worth investors we are able to substantially improve on the understanding that is based on survey or administrative data, and because we have individual investment returns, we can compare these by investor wealth.

The sample of investors whose portfolios are shown in the data may not be representative of the population of wealthy households in the US. Given the voluntary nature of participation in the platform, the data may include individuals that are more financially sophisticated, as they have by construction selected a wealth manager or established a family office that elected to use Addepar for portfolio monitoring. Selection may also skew away from the best investors, whose skill is sufficiently high so as to not need an external manager or to have limited use for the services provided by a wealth management platform. Nonetheless, family offices cover a large and growing group of investors at the top end of the wealth distribution.

[11] Our results are unchanged by choosing a higher number of investments as the cutoff. Our results are also insensitive to excluding portfolios that have a wealth level of lower than 1 million, instead of 100,000.

3 Portfolio allocations

How portfolio allocations change with wealth among wealthy U.S. investors is a question for which prior data presents only a partial picture. In our data, there is a large shift in asset allocation as wealth increases. We present results for investors with less than three million in wealth – these investors are likely to be at or near the top 10 percent of the wealth distribution – relative to investors with 3-10 million, 10-30 million, 30-100 million, and more than 100 million in assets. Those above 100 million are likely to be in the top 0.01 percent. For all wealth groups, the portfolio share of cash and cash equivalents was roughly 8 percent, as shown for the end of 2019 in Figure 3 and Table 3. While we abstract from the non-pecuniary services that investors may derive from holding liquid assets, it appears that this drives allocations to short duration and cash-like securities, across the wealth distribution. Despite the consistency of cash and liquid assets, the patterns of asset allocation otherwise differ among the investors we observe.

The share of fixed income, public equities, and mixed allocation funds declines with wealth, from a total of 75 percent among investors with less than three million in assets, to 45 percent among the wealthiest group of investors. In contrast, the share invested in alternative asset classes, private businesses, housing, and other assets rises from 16 percent among the lowest wealth group, to almost 50 percent among the wealthiest investors. For the wealthiest investors, these findings are close to the averages reported by UBS (2018), which surveyed 311 family investment offices globally regarding their portfolio allocations. Among the respondents to this survey, the average cash allocation was 7 percent, fixed income was 16 percent, equities was 28 percent, alternatives were 46 percent, and commodities were 3.3 percent.[12]

The allocation patterns we report differ from established academic benchmarks for the wealth

[12]In our classification, commodities are in the sub-category "Other Alts," within the alternatives asset class.

and portfolio allocations of wealthy U.S. investors. The SCF is based on survey responses and survey completion among the top percentile of households is estimated to be only 12 percent, or 700 households (Kennickell, 2017). Bricker et al. (2019, 2020) add Forbes 400 families to the 2019 SCF to estimate asset allocations across the distribution of net worth, as shown in Figure 4. In their account, financial wealth, pensions, and private businesses comprise roughly 50 percent of assets of the bottom half of the wealth distribution, but more than 80 percent of the wealth of the top 1 percent.

By contrast, we observe 17,592 investors with wealth above 3.5 million in 2019, which is estimated by Smith et al. (2022) to be the wealth threshold of the top percentile. The top 1 percent based on SCF data is estimated to have wealth of 29 million. The average wealth of portfolios above 3.5 million in our data is 48 million, which is substantially higher than estimated by Bricker et al. (2020). The estimated share of financial wealth in the net worth of the top 1 percent based on SCF data implies financial wealth of roughly 13 million (including pensions); the corresponding amount of financial wealth in our data is three times higher (40 million), despite excluding single positions valued at over one billion.

We find substantially lower private business wealth is reported among our top 1 portfolios, relative to Bricker et al. (2020): the average private business wealth is 1 million, whereas the reported average business wealth in Bricker et al. (2020) is 11 million. For private business wealth, the censoring of positions held by owners that are valued at greater than 1 billion is likely to bias our estimate downwards. A simple back of the envelope correction is to calculate the average of 17,474 (=17,592-118) investors with private business wealth of 1 million and 118 investors with private business wealth of (conservatively) 1 billion. This would imply an average business wealth in our data of 8 million. If censored positions have an average value of 1.5 billion, this would imply a consistent average business wealth of 11 million. However, this increases the discrepancy between estimates of overall wealth.

Housing and other are closer in nominal terms, among the portfolios of the top 1 percent:

real estate assets are on average 2.1 million in the SCF data and 2.6 million in our portfolios, while other wealth is estimated to add 3.4 million in the SCF data and 4.3 million in our portfolios. While it is possible that some financial wealth in our data reflects the ownership of businesses that are private equity/hedge funds, on the whole, it appears that the financial wealth of the top 1 percent is underestimated in the SCF.

Below the top 1 percent of the wealth distribution, the portfolio allocations we observe appear to be missing important components of wealth. The average total wealth for investors below 3.5 million in assets in our data is 0.7 million in 2019; this is substantially lower than the estimated average for the next 9 group in the SCF (4.1 million). However, the financial wealth of these investors in the SCF is estimated to be 0.9 million. Since there may not be full reporting of pension wealth, private businesses, housing, and other wealth (e.g. vehicles) to wealth advisors among investors in these wealth groups, we take our data as being informative about the returns to financial wealth among this group, rather than the returns to net worth overall.

We can more closely compare our data to the portfolio allocations estimated by Smith et al. (2022), who capitalize the income reported on tax returns to infer the value of underlying assets. Based on the cutoffs for top percentiles of wealth in Smith et al. (2022), we first reclassify the portfolios observed in 2016 into groups that map to their thresholds for the bottom 90 percent, top 10-1 percent, top 1-0.1 percent, top 0.1-0.01 percent, top 0.01-0.001 percent, and top 0.001 percent. The wealth thresholds for the cutoffs of these groups are 0.6, 3.5, 17.2, 77.8, and 362.8 million. The numbers of portfolios we observe in each group when mapping to these thresholds are shown in Table 4, along with what percent of the group population our data appears to represent. While our coverage of overall wealth is likely to be incomplete for the less wealthy investors in the sample, we believe the data becomes closer to comprehensive for the ultra high net worth individuals mapped to the top percentiles of wealth.

We remap our data to make it more closely comparable to their estimates. First, we combine cash and cash equivalents and fixed income to compare with their fixed income category. Second, we assume mixed allocation, equity investments, and private businesses to represent C-corp equity. Third, we assume alternatives are structured as S-corps. In the Smith et al. (2022) data we add pensions and other together. On this basis, the asset allocations for the bottom 90, top intermediate, and top 0.001 wealth groups are shown in Figure 5. For households in the top 0.1-0.001 percent, our data on allocations comes very close to matching what has been imputed using the capitalization method. For lower wealth groups, our data appears to be missing housing and other components of wealth. For the top 0.001 percent, our data implies even more housing and other wealth than implied by the capitalization method.

Relative to Smith et al. (2022), our data allows the degree of return heterogeneity within asset classes to be measured directly. However, the mapping of returns to tax reporting is not clear. For example, fixed income investments that pay interest income versus those that pay dividends is not indicated. Investments yielding interest income could be classified in our data as cash and cash equivalents, fixed income, or alternatives (e.g. private debt). We can nonetheless compare the capitalization factors used in their analysis to the rates of returns earned on various asset classes, which we explore in the next section. Asset-class specific returns also allow us to construct counterfactuals for portfolio returns that use alternate asset allocations, for example, to take seriously the possibility that housing is underreported by less wealthy investors in our data.

There are also differences in portfolio allocations within asset classes. Within fixed income, wealthy investors have lower shares of corporate bonds and higher shares of municipal and tax exempt bonds, as shown in Figure 10. Within equities, wealthier households on average invest more in single stocks, whereas less wealthy investors rely more on ETFs and mutual funds, as shown in Figure 13. Within alternatives, shown in Figure 16, alternatives funds and hedge funds are the primary sub-assets held by households with less than three million

in wealth, while wealthier investors invest more in private equity, venture capital, and real estate funds.

Naturally one expects that these differences in portfolio allocation also leads to differences in portfolio returns. Testing this idea is the focus of the next section.

4 Overall portfolio returns

In the data, the average annualised portfolio return from 2016-2022 is 4.01 percent. This and further summary statistics for portfolio returns are shown in Table 5. The average annualised portfolio return increases as wealth increases, from 3.88 percent among investors with less than three million in assets under management, to 4.33 percent among investors with more than 100 million in wealth, shown in column (1) of panel (a). While median portfolio returns also increase with wealth in column (2), the increase is less steep than for the average. The low average return reflects in part the market correction in 2022, as well as the greater number of investors on the platform in recent years; the panel is unbalanced. In column (3) of panel (a), the dispersion of annual returns is shown to be larger for wealthier investors. In this table, wealth groups are assigned according to the initial wealth an investors is observed holding on the platform, plus the larger of average annual inflows and the maximum monthly inflow observed.[13] Further percentiles of the distribution of returns are shown in columns (1) to (5) of panel (b).

The standard deviation of returns (within investors, across time) decreases from 14.0 percent for the lowest wealth group to 11.7 percent for portfolios with more than 100m of initial wealth in our sample. The standard deviation of portfolio returns is calculated for the quarterly returns of each investor, and then annualized. Similar to the average, the median standard deviation decreases with wealth. These standard deviations reflect the higher

[13]This adjustment increases the estimated wealth of investors whose assets are only partially reported on the first date that they use the platform: it avoids mis-categorizing investors as having lower levels of wealth.

exposure to public equities in less wealthy investors' portfolios, as well as differences in portfolio construction by wealth. To address the potential for underestimation due to the smoothing of private equity and venture capital returns, we also calculate counterfactual returns in which all private equity and venture capital returns are replaced with the value-weighted market return in each month. Summary statistics for these counterfactual portfolios are shown in columns (6)-(8) of Table 5 panel (b). This reduces the extent to which average returns increase with wealth, and the average standard deviation of returns still does not increase.[14]

To test the relationship between returns and wealth, we run a linear panel data regression:

$$r_{it} = \delta\,\theta(Wealth_{i,t-1}) + \beta X'_{it} + \varepsilon_{it} \tag{4}$$

where r_{it} is the return on portfolio i in year t in percentage points, $\theta(\cdot)$ is a function of lagged initial wealth, and X'_{it} is a vector of controls. Portfolio performance is calculated each month using the weighted average of investments' reported performance and allocations at the start of each month. Returns on specific investments are winsorized at the top and bottom 0.5 percent of each sub-asset class on each date. The annual return is calculated using the sum of log returns over the months that each investor is in the data in each year. For θ we consider both logs (base 10) and a non-parametric specification that includes a dummy variable for each wealth group: wealth and wealth groups are measured with a one year lag. Because there are correlations in the returns earned in each period, and potentially correlations in the returns earned by specific investors over time, we double cluster standard errors at the portfolio and date level. To confirm that the improved coverage of portfolios in the more recent periods does not bias the results, in some specifications we weight the observations so that each period is equally represented.

Ideally, we would like to have enough variation in wealth within portfolios to control for

[14]It is possible that true private equity and venture capital returns are *more* volatile than public equities, in which case this counterfactual would be an underestimate.

individual fixed effects ("type dependence") independent from wealth ("scale dependence") (Gabaix et al., 2016). However, the wealth categories in our data are highly persistent. Of portfolios with less than three million or more than 100 million in wealth, 95 percent remain in the same group the next year, on average. Of individuals in intermediate groups, 83-84 percent remain in the same group the following year, with 8-9 percent moving up to the next group, and 5-6 percent moving down. The persistence of wealth groups and average transitions are shown in Table 6.

The results of regression (4) are shown for annual returns in Table 7. The dependent variable is expressed in percentage points, and the logarithm of wealth is base 10, so the first coefficient in column (1) indicates that as wealth increases by 10 times, the return to wealth increases by 0.20 percentage points, controlling for the shares allocated to non-cash asset classes (cash and cash equivalents is the reference group). The lagged portfolio shares allocated to non-cash asset classes are associated with higher returns in all cases except for fixed income, although only the alternatives share is statistically significant. The explanatory variables in column (1) include time fixed effects, which include both year fixed effects and partial-year fixed effects for portfolios that join the sample mid-year. This is to include the largest number of observations in the sample. Portfolios with less than 100,000 in lagged wealth, fewer than three underlying investments, or less than two years of data are excluded, as are those with positions in single equities or alternatives that exceed one billion in value.

In column (2), the regressions are weighted to estimate coefficients such that the seven years of data count equally. As in column (1), lagged portfolio shares explain higher average returns, but now there is greater statistical power. On average, an all equities portfolio earned a 9.44 percentage point higher annual return, while an all alternatives portfolio earned a 4.78 percentage point higher annual return, on average. Private business ownership and other shares are associated with statistically significantly higher annual returns of between three and four percentage points. In column (3), the lagged portfolio shares are interacted with year fixed effects, which improves the fit of the model slightly from an R-squared on 0.62

to 0.69. However, this model assumes that all investors earn the same returns within asset classes.

Interestingly, adding individual fixed effects to regression (4) increases the adjusted R-squared of the model only to 0.72 (from 0.69, in column (3) of Table 4); this indicates low persistence of individual returns beyond what is explained by the logarithm of lagged wealth and lagged portfolio shares interacted with year fixed effects. This is in contrast to the findings of Fagereng et al. (2020), where a specification similar to column (6) including dummies for wealth percentiles, age, years of education, years of business/economics education, gender, county, employment, marital status, leverage, βs, and shares*year fixed effects has an adjusted R^2 of 0.3, and individual fixed effects explain an additional 0.2 (increasing adjusted R^2 to 0.5).

Columns (4)-(6) repeat the specifications in columns (1)-(3), replacing the log of lagged wealth with dummy variables for the wealth groups above three million. This specification tests for a non parametric relationship between average returns and wealth. Although the differences are not statistically significant, in general the point estimates indicate that portfolio returns increase in particular for the group of investors with more than 100 million in financial assets. These regressions confirm that greater equity, alternatives, private business, and other shares are associated with higher returns.

We also calculate the volatility-adjusted portfolio return of investors in the data, using the average excess return observed over all years and the standard deviation of excess returns. The portfolio Sharpe ratio $S_i = \frac{\overline{r_{it} - r_{ft}}}{\sigma_i}$ is calculated as the ratio of the portfolio excess return and the standard deviation of excess returns for that portfolio over the sample. The standard deviation is calculated at quarterly frequency, and then annualized. We then regress the Sharpe ratio on the initial wealth of each investor, measured at the first point they are

observed on the platform:

$$S_i = \delta\,\theta(\text{Initial wealth}_i) + \beta X_i' + \varepsilon_i \tag{5}$$

where initial wealth is adjusted for subsequent inflows, to avoid erroneously classifying investors as less wealthy if they do not have all their assets on the platform initially. The control variables include fixed effects that capture variation that is common across investors who are present in the sample for the same period of time, similar to a time fixed effect. Requiring at least two years of data ensures that the standard deviation is calculated over eight quarters at minimum, but we also show the effect of weighting observations according to the length of time they appear in the data. Because there is only one observation per portfolio, the standard errors are clustered by groups that appear in the sample over the same range of dates.

These results are shown in Table 7. In column (1), the Sharpe ratio is shown to increase with initial wealth, by 0.025 for each 10x increase. Column (2) weights the observations according to how many months of data exists for each portfolio, and decreases the point estimate in column (1) to 0.019. In columns (3) and (4), the volatility-adjusted return is shown to increase by more for higher wealth groups, but by slightly less for the highest wealth group than implied by the the logarithmic specification in columns (1) and (2).

The relationship between returns and wealth can also be visualized by plotting mean portfolio returns and Sharpe ratios against initial wealth. Figure 6 panels (a) and (b) plot a binscatter of the mean portfolio return against the logarithm of initial wealth, showing the relationship between wealth and returns. Panel (a) uses the wealth groups used throughout the paper as bins; panel (b) uses integrated mean-squared error optimal bins (with lines and bands based on linear polynomials). Risk-adjusted returns are shown in panels (c) and (d).

Risk-adjusted returns increase because the standard deviation of portfolio returns declines with wealth. The relationship between the standard deviation of returns and wealth is shown

in panels (a) and (b) of Figure 7. This decline mirrors the summary statistics reported in Table 5, declining from 14 to under 12 percent, on average.

However, the dispersion of returns rises with wealth. This implies investors are more exposed to idiosyncratic risks as their wealth level increases. To measure the idiosyncratic component of portfolio returns, we take the ratio of the variance of the error terms in regression (4) relative to the sum of the variance of the error terms and the linear prediction, using the model estimated in column (3) of Table 7. This can be thought of as the idiosyncratic risk share of each investor, and is shown in panels (c) and (d) of Figure 7. This indicates that regression (4) explains on average more than 80 percent of the variation in the returns of investors with less than three million in wealth, the share that remains unexplained by wealth levels and portfolio shares is increasing in wealth.

Reported returns are potentially concerning for several reasons. First, it is possible that the returns to alternative assets are being smoothed by managers. This would lead to underestimates of portfolio volatility among investors that hold more alternative investments. Second, the period from 2016 to the present may not be representative of long-run returns. To address concerns about the representativeness of 2016 to 2022, we can construct a simple counterfactual return based on portfolios reported above and the rates of return over the longest possible historical time period, as presented in Jorda et al. (2019). To do this, we assume that (i) cash and cash equivalents earn the return to bills; (ii) fixed income and mixed earn the return to bonds; (iii) equities, alternatives, private companies, and other earn the equity return; and, (iv) real estate earns housing returns. On this basis, the wealth groups' expected returns are increasing in wealth, from 6.49 percent annual return for the lowest wealth group, to 6.97 percent for the wealthiest group.

The return differential that we document differs from the patterns documented in Sweden and Norway. Bach et al. (2020) documents that the excess arithmetic return increases steeply with wealth in Sweden, in our data the arithmetic mean return increases from 4.79

for investors with less than three million in wealth to 5.09 for those with more than 100 million, i.e. by less than the logarithmic mean, which more accurately reflects cumulative returns. Most striking is the finding that the standard deviation of portfolio returns declines with wealth in our data, in contrast to the rough doubling of the standard deviation of returns between the top 99-99.5th and top 0.01 percent in Sweden. Consequently, in Sweden, expected excess returns in logarithmic terms peak at the top 99-99.5th percentile of the wealth distribution, and decline by 36 percent for the top 0.01 percent. Fagereng et al. (2020) document convexity in the relationship between wealth and returns above the 80th percentile of the wealth distribution in Norway, which is driven in particular by private businesses. While we document substantial private business wealth in our data, we do not observe similarly convex patterns of portfolios returns. We explore to what extent the returns earned on specific asset classes in the following section, which can be compared more closely to the corresponding data in Norway and Sweden to understand what drives the differences in these results.

5 Do wealthy investors have an edge?

In this section, we explore how returns differ within narrow asset classes. This is of interest as it relates to other work on return heterogeneity in specific asset classes, and also because it can explain some of the differences between our findings at the portfolio level relative to the capitalization method, and returns in other studies. Although we observe both different portfolio allocations and higher returns among wealthy investors, that portfolio shares explain less of the variation in wealthier investors returns implies that higher returns are not solely driven by portfolio allocations.

Mean returns by asset class are plotted in Figure 8 panel (a), against the average standard deviation of returns in each asset class. Real estate, private businesses, and public equity have average returns of around 6 percent. On average, equities have a higher return than

alternatives. This implies that if an investor with average wealth were to shift their portfolio allocations towards the allocations of the wealthiest investors, who hold a smaller share of total wealth in public equities and more in alternative assets like private equity, the counterfactual return be lower than their actual return. There must therefore be different returns for wealthy investors within asset classes.

In the rest of this section, we test whether returns and risk-adjusted returns are higher among wealthy investors. We plot mean returns against the mean standard deviation of returns for each wealth group in each asset class in Figure 8 panel (b), where the size of the marker corresponds to the returns and risk for groups of increasing wealth. On average, wealthier investors earn higher returns in alternatives and private businesses. For private businesses, the higher returns are also associated with greater return volatility, on average. However, for alternatives, we see increasing returns but similar volatilities.

As a first statistical test, we run regression (4) on the returns of each portfolio within a broad asset class, where the return is calculated as the weighted average of returns on each investment in that asset class, with the share of wealth invested in each investment as the weight.

These results are shown in Table 9. The standard errors shown in parentheses are double clustered at both the portfolio and date level. In each column, the constant represents the mean annual return earned by investors with less than three million in wealth, over the sample period. We include time fixed effects to remove the average return in each period, and weight the observations in inverse proportion to the number of portfolios observed on any date, which avoids biasing the average return by the greater participation on the platform later in the sample.

Confirming the average returns shown in Figure 8 panel (b), the mean return earned on alternatives and private companies is shown to be statistically significantly higher for wealthier investors. In panel (a), the logarithm of wealth at the start of the year is used at the ex-

planatory variable. The coefficients can be interpreted as for an increase in wealth of 10 times, the return on alternatives increases by 1.35 percentage points.[15] For private companies, returns increase with wealth, but by 0.91 percentage points for a 10-fold increase in wealth, on average. The return on real estate decreases by 0.54 percentage points as wealth increases by 10 times, on average. Although returns decrease with wealth on cash, equities, mixed, and other investments, and increase with fixed income, these relationships are not statistically significant.

We also test for non-parametric relationships between wealth and asset-class returns, shown in Table 9 panel (b). This confirms the general results from panel (a), but further demonstrates that alternatives returns increase at an increasing rate with wealth, while for private companies higher returns are experienced by most wealthy investors. By contrast, real estate investments of investors with initial wealth above 30 million appear to underperform in particular.

In Table 10, we show the results of regression (5) of the risk-adjusted excess return for each portfolio invested in each asset class. Here, since each investor's excess return has been averaged and divided by the standard deviation of excess returns on that asset class, the number of observations corresponds to the number of portfolios we observe in each asset class. The relationship between risk-adjusted returns and wealth is stronger than the relationship between mean returns and wealth. Panel (a) shows that on average, increasing wealth is associated with a higher risk-adjusted excess return on cash, fixed income, alternatives, and other investments. However, for investors across all wealth groups in the sample, the implied risk-adjusted excess return on cash, fixed income, and other investments is negative or close to zero on average. On average, these asset classes do not outperform the risk free rate, as measured by the return on one-month Treasury bills. This is entirely possible given that our returns are observed net of fees, and many cash-like investments, collectibles, and other

[15] We can also scale the coefficients to be interpreted as percentage changes. Since $1.35/\log(10) = 0.59$ a one percent increase in wealth is associated with an increase in the return of 0.59/100 percentage points, i.e. 0.59 basis points.

assets have a return lower than short term Treasuries.

In the remaining sections, we explore the allocations and returns within fixed income, equities, alternatives, and private business wealth.

5.1 Fixed income

As shown in Table 9 column (2), among fixed income investments, a ten fold increase in wealth is associated with a return that increases by 7 basis points on average. However, investors with 30-100 million and more than 100 million in wealth earn an average return that is 30 and 17 basis points higher than those with less than 3 million in assets, respectively. This relationship between returns and wealth can be visualized in the binscatter plot shown in Figure 9 panels (a) and (b).

This return differential is substantially lower than the difference in returns on fixed income documented by Smith et al. (2022), but excludes both bank accounts and other cash-like investments that generate interest income, which are categorized as cash and cash equivalents, and boutique debt investments, some of which are categorized as private equity or other alternatives. It is perhaps worth noting that the returns on fixed income were very negative in 2022 (mean: -8.64 percent). Excluding 2022, the average return on fixed income assets in our data is 3.13 percent annually, and it declines with wealth from 3.18 percent among investors with less than three million to 2.87 percent among those with more than 100 million, on average.[16]

Surprisingly, the volatility of fixed income investments declines with wealth, as shown in Figure 9 panels (c) and (d). Although the volatility of the asset class is low on average,

[16]To compare directly with Smith et al. (2022), we can also look at returns to fixed income in 2016. There are 6,548 investors in the data with fixed income investments for all twelve months of 2016; their average return on fixed income investments was 2.99 percent. The return was higher for the lowest wealth group (3.16 percent) than for the highest wealth group (2.93 percent). This return represents investments in bonds types as listed in Table 2, as bank accounts and money market funds are categorized as "cash and cash equivalents." The returns on cash and cash equivalents in 2016 are on average zero. This may be due to wealth advisor fees being deducted from cash.

wealthier investors earn higher returns on fixed income investments and are exposed to less volatility in these investments. It is then unsurprising that the Sharpe ratio of fixed income increases with wealth, although on average the increase is small and the point estimate is the same among groups with wealth greater than 10 million.

Portfolio allocation within fixed income also varies with wealth. The categories of fixed income sub-assets we consider are municipal bonds ("munis"), US government debt and agency debt ("Treasuries"), Treasury Inflation-Protected Securities (TIPS), Investment Grade (IG) corporate bonds, High Yield (HY) corporate bonds, opportunistic bond funds (i.e. funds that invest across multiple credit categories), foreign (including non-US sovereign and corporate bonds), and other (e.g. preferred stock, derivatives such as swaps, CDS, forwards, and options).

Households with lower levels of wealth invest relatively more in investment grade and high-yield corporate bonds, as well as opportunistic bond funds. Higher-wealth portfolios hold more municipal bonds, likely reflecting their preferential tax treatment. These allocations are shown in Figure 10 panel (a). In panel (b), the mean return and mean standard deviation of fixed income returns is shown by sub-asset class and by wealth group. Among most sub-asset classes, the risk-return tradeoff is similar across wealth groups, with the exception of in investment grade and foreign bonds (although the outlier for foreign bonds is the 30-100m wealth group, not the wealthiest group).

5.2 Equities

Returns on public equity investments decline with wealth on average. This is shown in Table 11, where the mean return on equities is 6.75 percent, but the return of the wealthiest group of investors is 4.93 percent. These differences are not statistically significant, as shown in column (3) of Tables 9, indicating that there is considerable noise in equity returns across investors. Note that the estimated standard errors are large and increase with wealth

groups, which reflects greater volatility of wealthier investors' equity returns. This volatility in equities is in contrast to the volatility of overall portfolio returns, which declines with wealth. These patterns are also shown graphically in Figure 11, which plots mean equity returns and standard deviations against wealth. Risk-adjusted returns decline with wealth in a statistically significant sense, as shown in column (3) of Table 10, although the magnitudes are relatively small.

These patterns of risk and return could reflect different factor loadings, differing patterns of asset allocation within equities, a lack of diversification away from firms in which a large share is owned by management, or other portfolio choices. To explore these possibilities, we first test for systematic variation in the factor loadings in equity portfolios across the wealth distribution, using a three-factor model (Fama and French, 1993). Table 12 shows the average betas, alphas, and R-squared by wealth group for investors with equities portfolios in the data. Investors with greater wealth have a lower loading on the market beta, a larger loading on the size factor, and a generally lower loading on the value factor, relative to less wealthy investors. In addition, wealthier investors also have a lower average R-squared in a factor regression, indicating that wealthier investors are exposed to more idiosyncratic risk in their equity portfolios. The average alpha estimated in these regressions is -0.20, which is a monthly alpha, but on an annualized basis equivalent to roughly 2.4 percent. This could be due to fees, since returns are observed net of fees. Binscatter plots of the estimated loadings are shown in Figure 12.

Figure 13 shows equity allocations by asset class and wealth groups. The share of public equities that is held in the form of single stocks relative to ETFs or mutual funds is strongly increasing in wealth.[17] There is strong evidence for home bias across the top of the wealth distribution: roughly 80 percent of equities are invested in US equity markets, which persists

[17]This may also reflect the prevalence of separately-managed accounts (SMAs) among higher net-worth investors. SMAs are replications of existing mutual funds or investment funds within an investor's brokerage account. By owning the underlying securities directly, households preserve greater flexibility on the management of tax liabilities.

across the wealth distribution (French and Poterba, 1991). Global Equities captures funds without regional specialization, which are likely to be heavily exposed to US equity markets. Other includes equity derivatives (e.g. options).

Table 13 shows the number of positions held on average by portfolios in each wealth group. All wealth groups hold between 3-4 ETFs and 2-3 mutual funds, on average. However, wealthier investors hold many more single US equity positions and more global equities (which may include both funds and single stocks), as well as 8.5 other equity positions on average, relative to only 0.6 among the least wealthy group of investors.

To explore whether differences in allocation or diversification explain the differences in returns across investors, we run regression (4) for equity returns, adding controls for the shares held in various sub-asset classes and position counts. Within our sample, holding a greater share of global equities or other equities is associated with lower returns, on average. The lower return of global equities relative to US equities is a feature of the sample period (see, e.g. Blackrock, 2022). That other equities earn lower returns on average indicates that wealthier investors are not using derivatives in a way that generates significant outperformance, on average. There is some evidence to suggest that idiosyncratic single equity positions contribute to lower returns: we control for the natural log of the number of equities positions held, as well as the number of positions held in mutual funds, US equities, global equities, and other equities.[18] Holding fixed the level of wealth, increasing the number of US equity investments increases returns; conversely, an underdiversified portfolio will have lower returns, on average. The coefficients are negative for global equities, and for other equities, where it appears that neither global holdings nor derivatives are associated with higher average returns, irrespective of the number of positions held.

[18]The numbers of sub-asset class investments are adjusted by 1 to avoid excluding investors who do not hold any investments in one of the categories.

5.3 Alternatives

As alternatives are the main asset class in which risk-adjusted returns increase with wealth, understanding what accounts for the difference is of interest. In this subsection we explore not only the patterns of alternatives allocation and returns at the sub-asset class level (e.g. hedge funds, private equity), but also how the characteristics of individual investment positions differ, and to what extent they can explain return differentials. Several different methodologies have been used to measure private equity returns.[19] We report returns as they are entered by wealth managers, reflecting both actual cash flow events and changes in underlying valuations.

On alternatives overall, investors with less than three million in wealth earn an average return of 2.94 percent, as shown in Table 15. While this is low relative to public equities, wealthier investors earn systematically higher average returns in alternatives. For investors with between three and 10 million in assets, the average return is 4.12 percent. For those with between 10 and 30 million, the average return is 5.43 percent, and for investors in the top two groups, average alternatives returns are 6.38 and 7.58 percent, respectively. These returns are shown to be statistically significantly different in column (5) of Table 9. Figure 14 panels (a) and (b) shows this in binscatter plots of mean returns plotted against initial wealth.

The dispersion of alternatives returns decreases with wealth, while volatility is roughly equal across the top of wealth distribution. Consequently, risk-adjusted returns also increase with investors' wealth, shown to be statistically significantly different by wealth in column (5) of Table 10, and shown graphically in Figure 14 panels (c) and (d).

Using data on the portfolio holdings at the level of individual investment positions, we

[19] Fagereng et al. (2020) use the ratio of accounting earnings to the tax value of equity. Bach et al. (2020) instead apply a trading multiple based on unlisted firms' book equity, and the market-to-book ratio of listed firms in the same industrial sector. Gupta and Nieuwerburgh (2019) propose a new methodology to value private equity using a cash-flow replicating portfolio.

observe large differences in the average number and size of positions held across the top of the wealth distribution. As shown in Table 16, in 2019 investors with less than three million in assets held 3.1 alternatives investments, on average, with a mean size of 0.1 million. In contrast, investors with more than 100 million in assets hold 35.8 alternatives positions with an average size of 6.1 million.

One potential concern with the return differentials found on alternatives overall is that the performance of illiquid private assets may be marked infrequently. In column (3) of Table 16, we show that the frequency of updating is decreasing in wealth. This may be due to wealthier investors holding more opaque alternative assets whose performance is not managed by a custodian, but should make it less likely to find higher returns among the wealthiest investors.

Roughly half of all individual investment positions in our sample can be matched to a unique security captured by external data sources, including Preqin and Pitchbook. These matched investments account for more than 60 percent of the value of investors' portfolios, for all wealth groups. This is useful because external commercial data sources provide detailed information on assets, including security characteristics. We next explore to what extent these characteristics explain return heterogeneity within alternatives.

Our first set of tests compares the characteristics of individual investments, i.e., single funds. Are wealthier investors investing in better-performing funds? Lower-wealth investors may only receive access to hedge fund and private equity solutions that are distributed through advanced marketing networks and are originated by large platform operators. Funds that provide more accessibility may deliver worse performance (Eisfeldt et al., 2020).

Summary statistics for the individual investments made in alternatives are shown in Table 17. The average investment made in our data had a return of 5.50 percent, and a standard deviation of 18.1 percent. The average return and standard deviation increase monotonically with wealth, from returns of 3.52 percent to 7.88 percent, and standard deviations of 14.4

percent to 23.5 percent, across the wealth groups.

Regressing individual investments' returns on wealth in Table 18 shows that on average a ten-fold increase in wealth is associated with a return that is 81 basis points higher, in column (1). The highest wealth group's average alternatives investment earns a premium of 2.31 percentage points over the average fund held by investors with less than three million in wealth. In column (2), we show that return heterogeneity is much smaller and statistically insignificantly different across wealth groups in positions that cannot be matched to Preqin. By contrast, the differences in returns across wealth groups are much larger among the matched subset of alternatives investments, shown in column (3). This suggests that return heterogeneity is not due to systematic differences in the marking of individual securities, or opaque assets whose performance cannot be verified in external data.

Using the sub sample of identified positions, we can further test if specific asset characteristics are related to returns and return heterogeneity. First, we find that differences in returns by investor wealth are not explained by the vintage of underlying assets, implemented by adding dummy variables for each vintage interacted with each year in column (4). It is therefore not the case that wealthier investors earn higher returns in alternative assets simply because they own illiquid assets that are closer to redemption, for example. We also find evidence that levels of intermediation is negatively correlated with returns. In column (5), we show that investment vehicles that are classified as fund-of-funds deliver returns that are 1.3 percentage points lower on an annualised basis, on average evidence for fees imposed by the additional layer of management.

In column (6), we explore to what extent the returns on the same investment positions differ with wealth. This is implemented by including a fixed effect for each position interacted with a time fixed effect. Conditional on having invested in the same underlying asset, wealthier investors earn higher returns on average. A ten-fold increase in wealth is associated with a return that is 31 basis points higher, statistically significant at the 10 percent level. For

the wealthiest group of investors, the return is estimated to be 81 basis points higher, on average, relative to investors with less than three million in wealth. This may be due to lower negotiated fees. Higher-wealth investors may receive lower fees because they can offer larger amounts of funds at once, which reduces marketing and related overhead costs to the fund manager.

On a risk-adjusted basis, however, the investments made by wealthier investors do not have systematically higher returns. This is shown in Table 19, where the dependent variable is the investment-level Sharpe ratio. Risk-adjusted returns decline with wealth in columns (1)-(3), for an alternative investment on average, including both unmatched and matched investments. This implies that there are not differences in the underlying investments being made by wealthier investors on a risk-adjusted basis. Adding vintage-year fixed effects in column (4) and fund of fund dummies in column (5) makes most of the coefficients small and statistically insignificant. Having adjusted for risk, the differences in returns within positions in column (6) are now smaller and for the most part statistically insignificant.

That underlying alternatives investments have similar risk-adjusted returns implies that wealthier investors earn higher returns by investing in higher risk underlying assets. This is also reflected in the summary statistics shown in Table 17, where the average standard deviation of an investment in alternatives rises from 14.4 percent among the investors with less than three million in wealth, to 23.5 percent among investors with more than 100 million in wealth. On an asset-class basis, however, the standard deviation of returns on wealthy investors alternatives portfolios is not increasing in wealth, as shown in Table 15 and Figure 8 panel (b).

That wealthier investors are investing in riskier underlying investments can also be seen in Figure 15, where the average returns on single investments in alternatives are shown. Note that while the average return is increasing with wealth, as at the asset class level, the Sharpe ratio of single investments does not increase with wealth. This indicates that wealthier

investors or their managers are constructing portfolios of alternatives positions that reduce the overall volatility of alternatives returns.

Second, we can also explore the role of allocations across sub-asset classes within alternatives. Figure 16 panel (a) shows investors' allocations within alternatives and how they change with wealth. Wealthier investors have larger investments in private equity and venture capital funds, whereas investors with less overall wealth have higher exposure to alternative funds, which include funds offered by asset managers such as AQR and Blackrock that are categorized as "Alternative" strategy funds by Morningstar. This pattern likely reflects two distinct features. First, alternatives funds and hedge funds tend to have a better liquidity profile than private equity funds. Since alternatives funds and hedge fund investments are usually traded securities, even funds with strong lock-up agreements allow for withdrawal within a few quarters. Private equity and venture capital funds generally require investors to commit capital for anywhere between 5 and 10 years or longer, reflecting the illiquidity of the underlying assets. Second, alternatives funds and hedge funds have progressed further along on the path to become an investment option for personal investing. Following strong performance, hedge funds gained popularity in the early 2000s, resulting in substantial growth in the number of managers and assets under management. Wealth managers are also offering a broader menu of alternatives funds and hedge fund investments to their clients. In contrast, private equity has gained popularity primarily due to strong returns over the last decade, and access to its options has been less democratized, reflected in higher minimum investment amounts, for example.

We can re-run regression (4) of the overall alternatives returns on wealth and the shares allocated to each sub-asset class. These results are reported in Table 20, excluding the alternative funds share, so that in column (1) the baseline is an investor who has all their alternatives wealth in alternatives funds. On average, higher hedge fund and private equity shares are associated with higher returns, but the differences are not statistically significant. A higher venture capital share is associated with a 12 percentage point higher average return.

Higher other alternatives shares is associated with a three percentage point higher return, statistically significant at the 10 percent level. However, including the shares as independent variables does not explain the return differential across wealth groups, indicating that within sub-asset classes returns differ with wealth as well.

In column (2), we instead add the logarithm of the number of investments made in alternatives. Increasing the number of alternatives on its own is not associated with a statistically significantly higher return. However, in column (3) the number of investments made in private equity and venture capital is associated with higher returns on average, and having controlled for the number of investments in each sub-asset class the size and statistical significance of the estimates of the association between alternatives returns and wealth is substantially smaller.

Risk-adjusted returns in alternatives can largely be explained by portfolio shares and diversification. In column (1) of Table 21, we add controls for the shares of alternatives wealth held in hedge funds, private equity, venture capital, and other alternatives. Increasing exposure to any of these categories beyond alternatives funds increases risk adjusted returns, and reduces both the size of the coefficients on wealth and increases the standard errors of those estimates. Column (4) shows this as well. Similarly, in columns (2) and (5), increasing the number of alternatives investments is associated with higher risk-adjusted returns. This further reduces the significance of wealth as an explanatory variable. Finally, adding the number of investments in hedge funds, private equity, venture capital, and other alts independently allows us to measure the rise in risk-adjusted returns associated with increasing diversification within each of those sub-asset classes. This is found to be positive at 0.11 and 0.13 for private equity and venture capital, respectively, and larger for other alternatives.

The average return and volatility of alternative investments by sub-asset class is shown in Figure 16 panel (b). Wealthier investors' investments in alternative funds, hedge funds, and other alternatives are more volatile, but do not necessarily earn much higher average returns.

In addition, the average returns for all groups of investors in these sub-asset classes is below five percent. By contrast, the returns on private equity investment increase with wealth, but do not become more volatile. The returns for all investors on venture capital are high, and increase significantly for the wealthiest investors in the data.

If we compare the returns within sub-assets by wealth group, by running regression (4) at the sub-asset class level, several patterns emerge. These results are reported in Table 22. Column (1) shows that the return on alternatives funds does not increase with wealth. In column (2), the returns on hedge funds increase with wealth by between 49 and 97 basis points for the highest wealth groups. Returns increase more steeply with wealth in private equity. In venture capital, returns are statistically significantly higher only for the highest wealth group. On a risk-adjusted basis, shown in Table 23, wealthier investors' risk adjusted returns appears to be higher primarily in private equity.

Because of the inherent illiquidity of their investments, reported returns on private equity and venture capital have to be considered with caution. Assets that private equity funds invest in may generate immediate cash flow that can be paid out to investors, but a large part of total returns accrue towards the end of a fund's life cycle when the underlying asset is sold. This is particularly true for venture funds that invest in early-stage companies without cash flows. The reported rate of return on these funds consists both of actual cash flows, observable separately in our data, and reported capital appreciation. Fund managers update the marking of the value of the underlying assets, based on market multiples of comparable public companies and private market transactions. While these markings are usually done at a quarterly frequency, fund managers have some discretion over the underlying assumptions, which creates the possibility that reported returns are too smooth relative to the true returns (Gupta and Nieuwerburgh, 2019).

5.4 Private businesses

Private business wealth includes both companies that individuals own and operate, and minority stakes or non-controlling investments in other companies that are privately held. By contrast, ownership of public companies is captured in the public equities category. For investors with less than 10 million in wealth, the median portfolio with private business wealth holds a stake in a single business. For those with between 10-100 million, the median increases to two businesses, and for portfolios with greater than 100 million in wealth the median number of private company investments is four. The mean is higher than the median for all groups; some individuals hold many more than one or two businesses, indicating that this wealth reflects not just the primary companies individuals own and operate.

Private companies have higher average returns, of 5.41 percent for investors with less than three million in wealth. The mean point estimate increases with wealth but is only statistically significantly different for the ultra high wealth group, whose private businesses return 7.18 percent on average. The difference is measured to be 2.52 percentage points in column (6) of Table 9. When adjusting for risk, the return on private companies is decreasing in wealth, as seen in column (6) of Table 10.

Both the data on private business wealth and that on alternatives investments can be used to compare the return on private equity to public equity, to test whether investors earn a premium on private assets on a risk-adjusted basis. In Table 26 we compare investors' risk-adjusted returns on public equities to alternatives and private businesses. On average, controlling for wealth, there is a higher risk-adjusted return to private assets. Public equities are compared to alternatives in columns (1), (3) and (5), and the estimated premium to private assets ranges between 0.13 and 0.16. Columns (1) and (3) include the log of wealth and the wealth group dummies as explanatory variables. In column (5), we include individual fixed effects to compare the returns within investors, and find even larger effects.

Since private equity is sometimes used to refer to private company wealth, we repeat the

same regressions using private company investments as the comparison group, instead of alternatives, in columns (2), (4), and (6). Although private business wealth tends to be less diversified, there is a larger difference in the risk-adjusted return to private company investments relative to private equity, on average, which is estimated to be around 0.3 when controlling for wealth, and slightly smaller when controlling for individual fixed effects. Abnormal risk-adjusted returns on private equity is in contrast to the findings of Moskowitz and Vissing-Jorgensen (2002), but consistent with Kartashova (2014).

5.5 Real estate

We account for real estate assets separately, as their returns differ from other asset classes on the platform. Most real estate holdings are through real estate funds, rather than directly held real estate, as shown in Figure 17. For real estate in particular interpreting reported returns is made difficult by the relatively limited reporting of capital gains. Nonetheless, just below half of investors' directly held real estate by value is updated quarterly by a wealth manager, on average. For real estate funds, two-thirds of asset values are updated in an average quarter, and 80 percent generate cash flows on a quarterly basis. There appears to be little relationship between real estate investment returns and wealth in Figure 8. In column (7) of Tables 9 and 10, the return to real estate is shown to decline with wealth, and also to decline on a risk-adjusted basis.

6 Conclusion

This paper documents three new facts regarding the investing behavior of ultra high net worth U.S. investors. Based on novel data on individual investment portfolios across a wide range of assets, these findings add important empirical details to a growing literature on the distribution of wealth, and how returns differ across the wealth distribution.

Portfolio allocations change substantially with total household wealth. Returns and risk-adjusted returns increase across the wealth distribution. Ultra-high net worth individual invest substantially more in alternative assets, in particular private equity and venture capital, and less in public equity markets. These investments are typically in riskier underlying assets, and diversification within alternatives improves the risk-return tradeoffs for investors, irrespective of wealth.

Within individual asset classes, wealthier households generate substantially higher risk-adjusted returns in alternative assets that are externally managed, such as hedge funds, private equity, and venture capital. We find that wealthier investors do not necessarily have preferential access to better performing investment opportunities, but achieve higher risk-adjusted returns by diversifying their alternatives across multiple funds. The strong evidence for scale dependence in private equity and venture capital investments holds relevance for public policy. Against the backdrop of high returns in recent years, investors and investment managers have proposed improving access to investing in the alternative space for less wealthy investors. Our results suggest that in contrast to public equity markets, where diversification is easily accessed through fund structures, diversification continues to makes a large difference for returns in alternatives. Easing access to alternatives would therefore require improved options for diversification for individual investors.

There are several areas in which this analysis can be applied and extended. The higher returns earned by wealthy investors are critical in estimating the dynamics of income and wealth, and their effect on macroeconomic outcomes. In this paper we have abstracted from flows. Since the investors we observe constitute a significant share of several important asset markets, it is likely that their allocations impact equilibrium asset returns (Koijen and Yogo, 2019). A related research area is to study investors' trading behavior and common mistakes in their trading decisions (Odean, 1999; Calvet et al., 2009), or how performance changes during specific market episodes (An et al., 2019). We leave these questions for future work.

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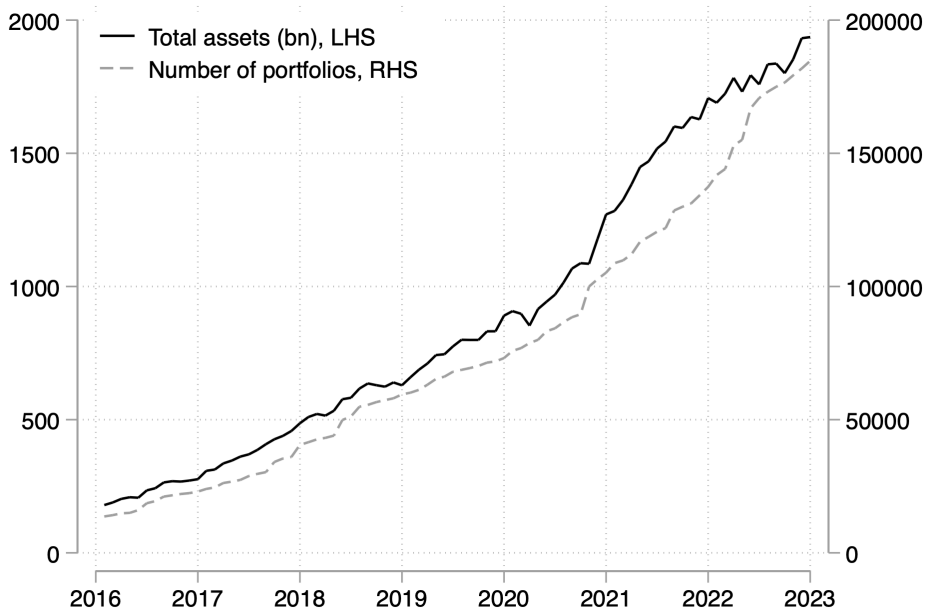
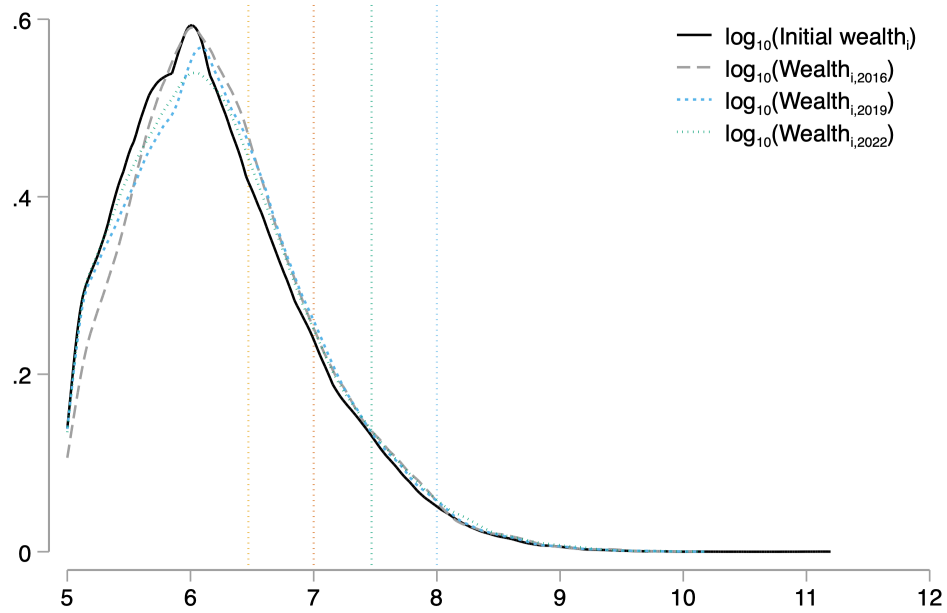
Figure 1: Data coverage

(a) Assets and portfolios over time



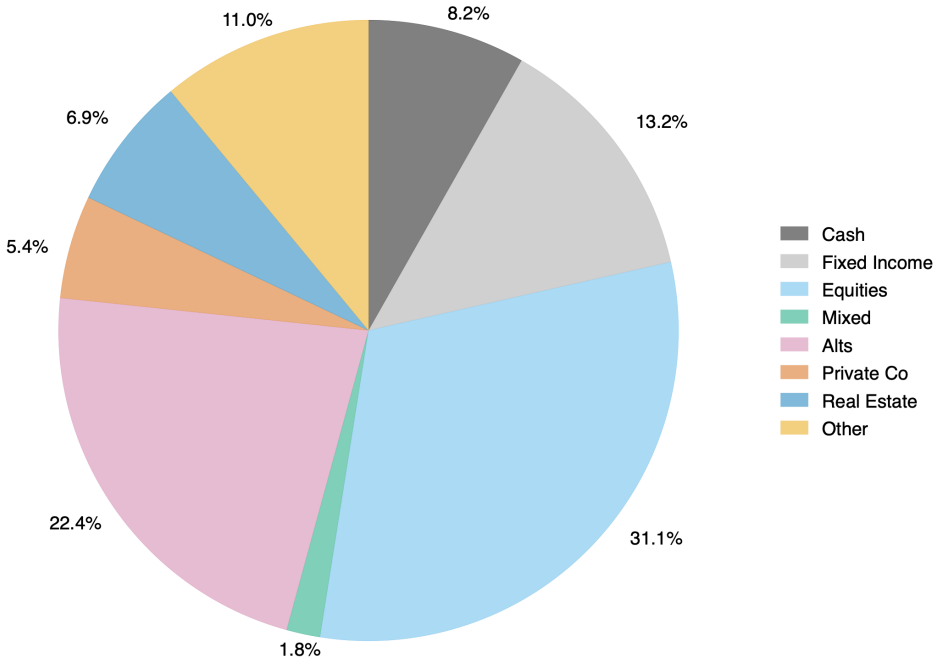
(b) Density plot of portfolios by wealth



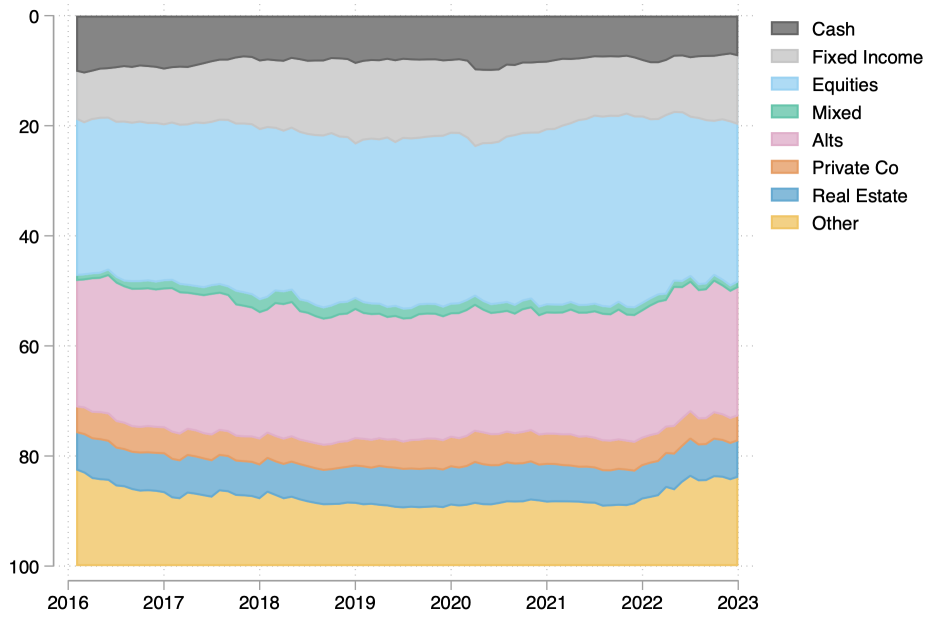
Notes: Panel (a) shows total assets and number of portfolios included in the data analyzed, over the sample period. Positions in a single asset (e.g. equities, alternatives) valued at greater than one billion are excluded, as are some portfolios of managers with many clients (i.e. no manager comprises more than ten percent of the data). Panel (b) shows density plots of the portfolios in the data, by initial wealth and by wealth at the end of 2016, 2019, and 2022. Colored lines correspond to 3, 10, 30, and 100 million.

Figure 2: Allocations by asset type, all portfolios

(a) Breakdown in 2019

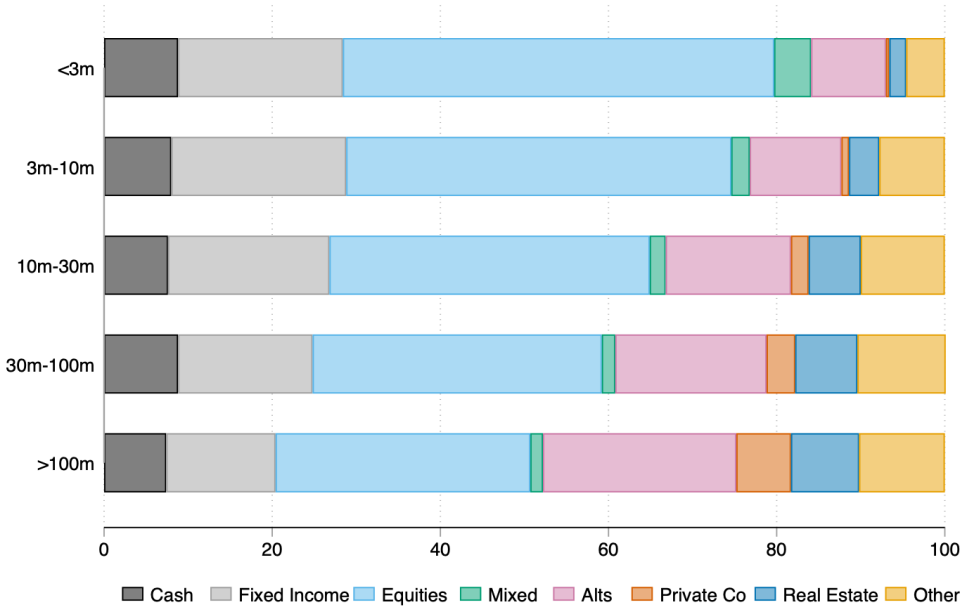


(b) Breakdown over time



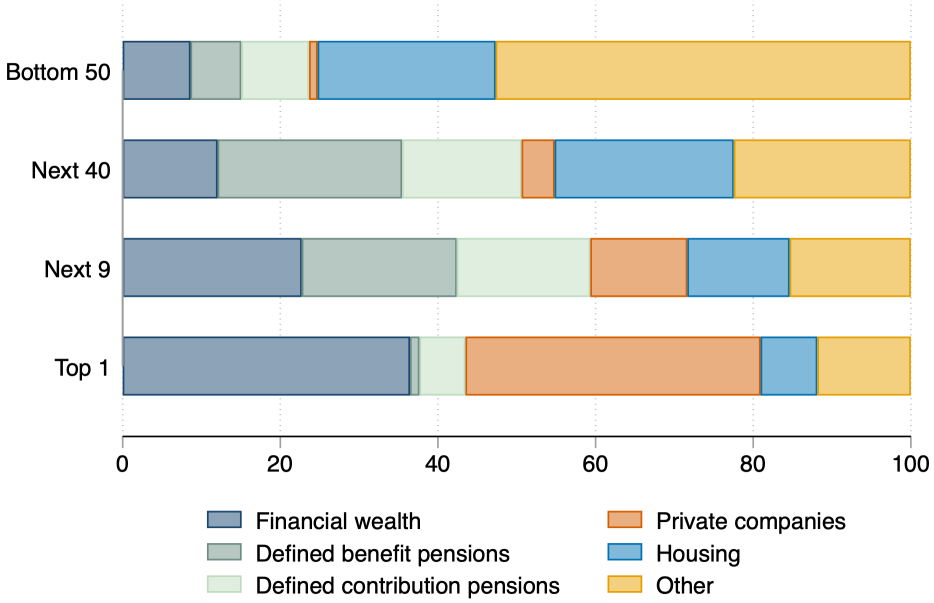
Notes: Panel (a) shows the percentage of assets on the platform allocated to major asset classes at the end of 2019. Asset classifications include sub-assets as described in Table 2. Positions in a single asset (e.g. equities, alternatives) valued at greater than one billion are excluded. This pattern does not change much over time, as shown in panel (b).

Figure 3: Portfolio allocations by asset type and wealth (%, 2019)



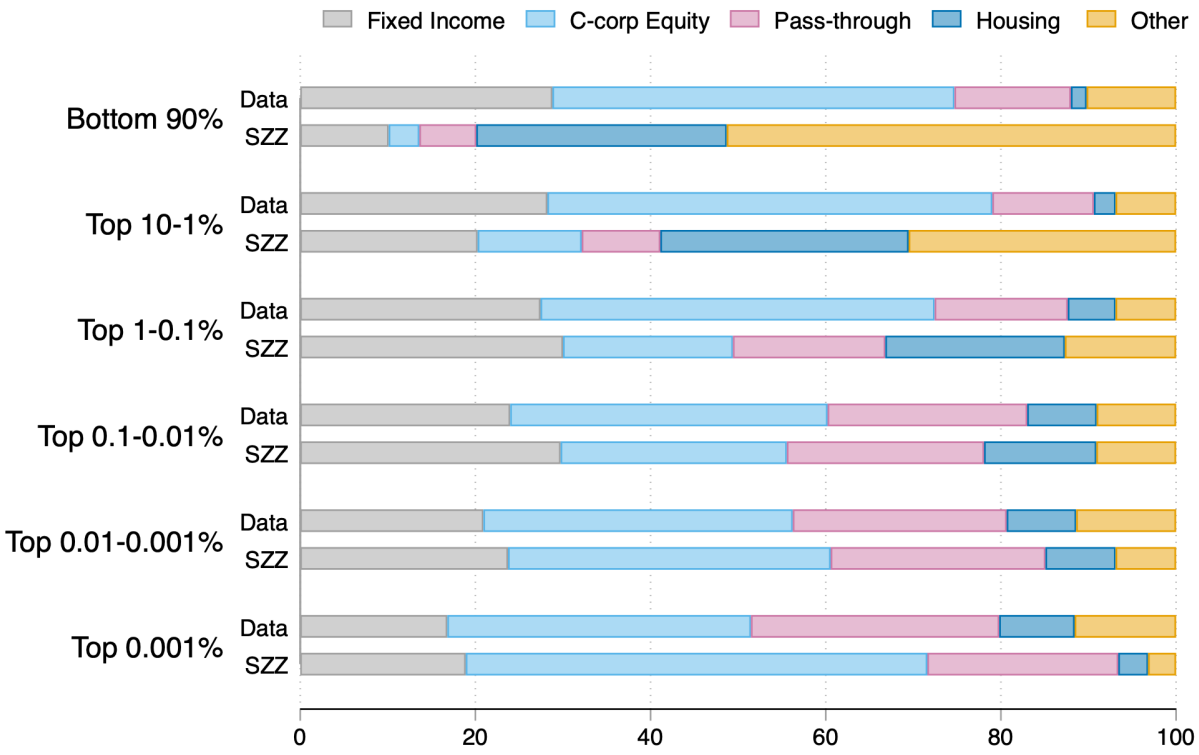
Notes: Allocations as of the end of 2019. Wealth groups assigned according to wealth at the end of the year. Portfolios with fewer than three positions and observed for less than two years are excluded, as are those with positions in a single asset (e.g. equities, alternatives) valued at greater than one billion, and those with less than 100,000 of total wealth.

Figure 4: Asset allocations in the SCF



Notes: Mean asset composition by wealth percentile groups in the 2019 Survey of Consumer Finances Business, as reported by Bricker et al. (2020). Financial wealth includes non-retirement financial assets, defined benefit pensions includes defined benefit pension wealth, defined contribution pension wealth includes retirement assets held in accounts, private companies includes privately held businesses, housing includes home equity in primary residence, and other are all other assets. Average wealth of the top 1 percent group is estimated at 29.0 million; for the next 9 it is 4.1 million, for the next 40 it is 0.7 million, and for the bottom 50 it is 94k.

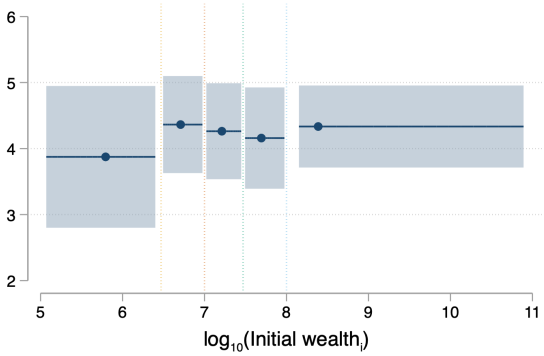
Figure 5: Comparison of Portfolio Shares to Capitalization Method (2016)



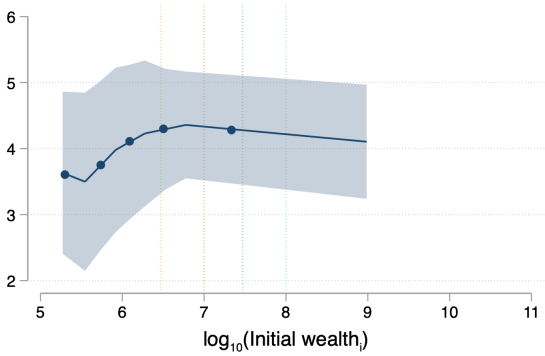
Notes: Our data, denoted "Data," compared to Smith et al. (2022), denoted "SZZ." The wealth thresholds for the cutoffs of these groups calculated by Smith et al. (2022) are at 0.6, 3.5, 17.2, 77.8, and 362.8 million. We remap our data to make it more closely comparable: (i) combining cash and cash equivalents and fixed income to compare with their fixed income category; (ii) assuming mixed allocation, equity investments, and private businesses to represent C-corp equity; and, (iii) assuming alternatives are structured as S-corps. In the Smith et al. (2022) data we add pensions and other together. On this basis, for households in the top 0.1-0.001 percent, our data on allocations comes very close to matching what has been imputed using the capitalization method. For lower wealth groups, our data appears to be missing housing and other components of wealth. For the top 0.001 percent, our data implies even more housing and other wealth than implied by the capitalization method.

Figure 6: Portfolio returns

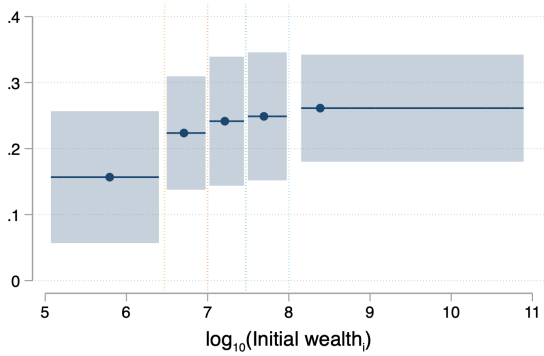
(a) Mean return (%), wealth groups



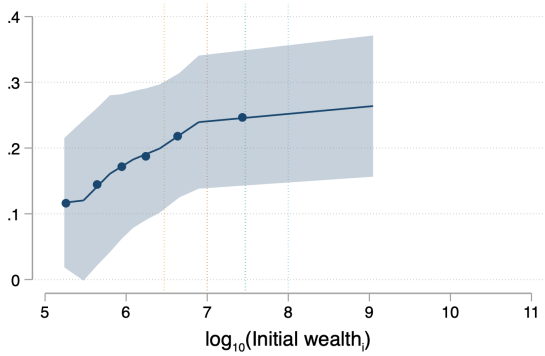
(b) Mean return (%), IMSE-optimal bins



(c) Sharpe ratio, wealth groups



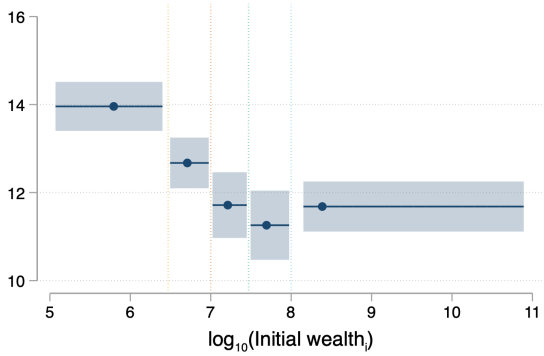
(d) Sharpe ratio, IMSE-optimal bins



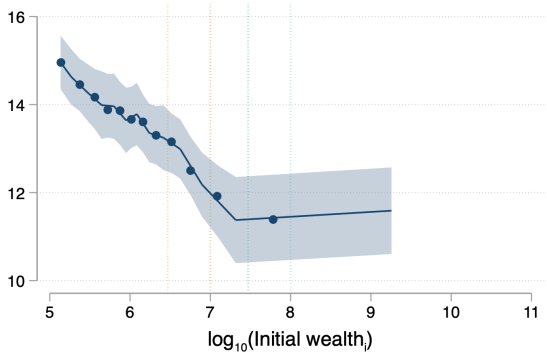
Notes: Binned scatterplots. In panels (a) and (b), the mean return is calculated for each investor, over the sample period. Initial wealth on the platform is adjusted by the larger of average annual inflows and the maximum monthly inflow observed. In panels (c) and (d), the Sharpe ratio is calculated as the ratio of average excess returns to the standard deviation of excess returns. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million. Left panels are binned by wealth groups, right panels have integrated mean-squared error (IMSE) optimal bins, lines and confidence bands based on linear polynomials. Standard errors shown are clustered by groups in the data on the same dates.

Figure 7: Portfolio risk

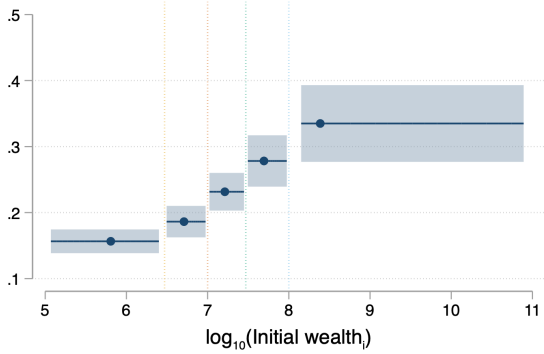
(a) Standard deviation (%), wealth groups



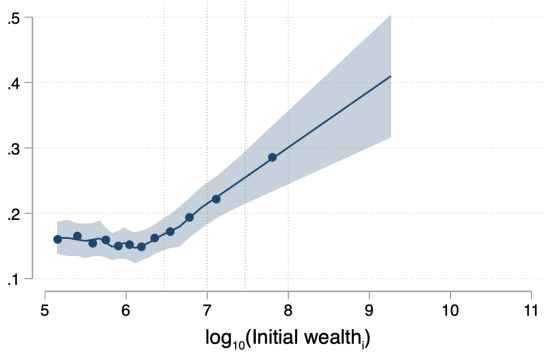
(b) Standard deviation (%), IMSE-optimal bins



(c) Idiosyncratic risk share, wealth groups



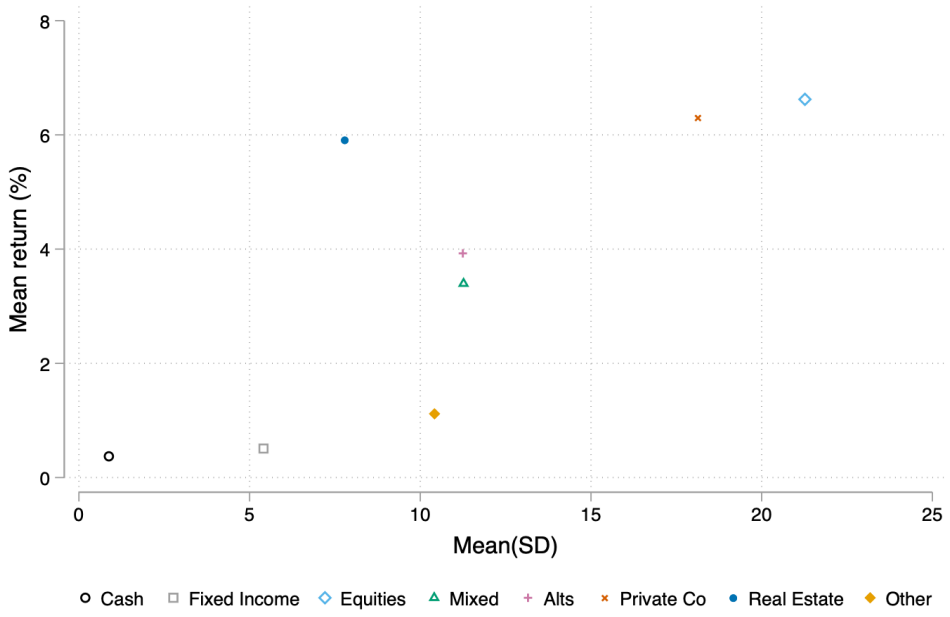
(d) Idiosyncratic risk share, IMSE-optimal bins



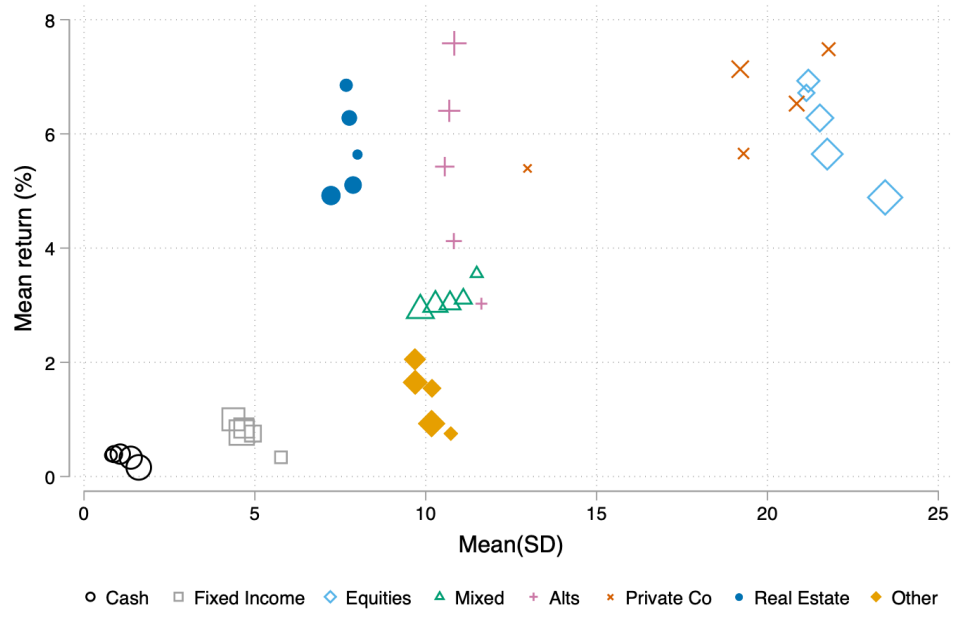
Notes: Binned scatterplots. In panels (a) and (b), the standard deviation is calculated for quarterly returns, and then annualized. In panels (c) and (d), the idiosyncratic risk share is the ratio of the variance of the residuals of regression (4) estimated with log wealth and portfolio shares interacted with year fixed effects (i.e. column (3) of Table 7), to the sum of the variances of the predicted return and the residuals. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million. Left panels are binned by wealth groups, right panels have integrated mean-squared error (IMSE) optimal bins, lines and confidence bands based on linear polynomials. Standard errors shown are clustered by groups in the data on the same dates.

Figure 8: Mean returns and risk, by asset class and wealth

(a) Overall



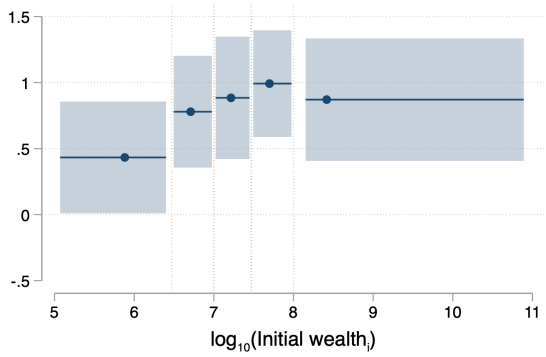
(b) By wealth group



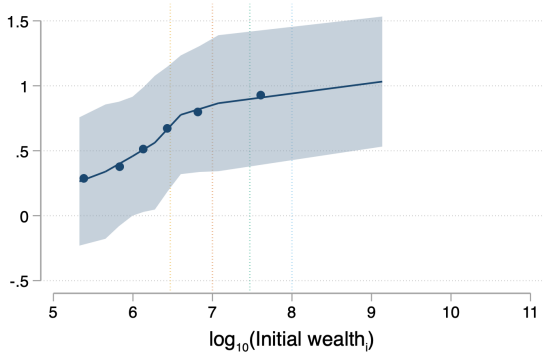
Notes: Panel (a) shows the mean return across all investors and asset classes plotted against the mean standard deviation, measured across investors, using the annualized standard deviation of quarterly returns. In panel (b), the asset class markers match the legend in panel (a), while the size of markers correspond to the wealth groups, where increasing size indicates higher initial wealth (smallest: <3m, small: 3-10m, medium: 10-30m, large: 30-100m, largest: >100m). Observations are weighted according to the months they appear in the data.

Figure 9: Fixed Income

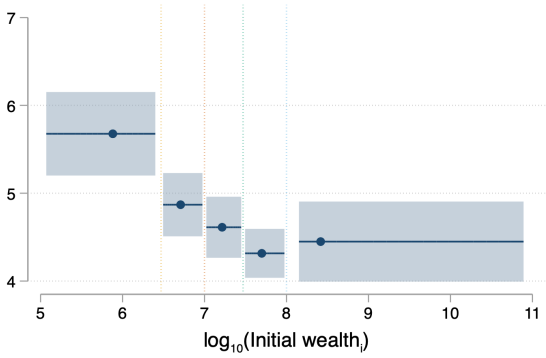
(a) Mean return (%), wealth groups



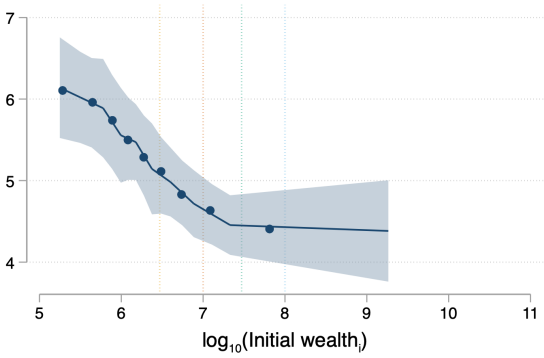
(b) Mean return (%), IMSE-optimal bins



(c) Standard deviation, wealth groups



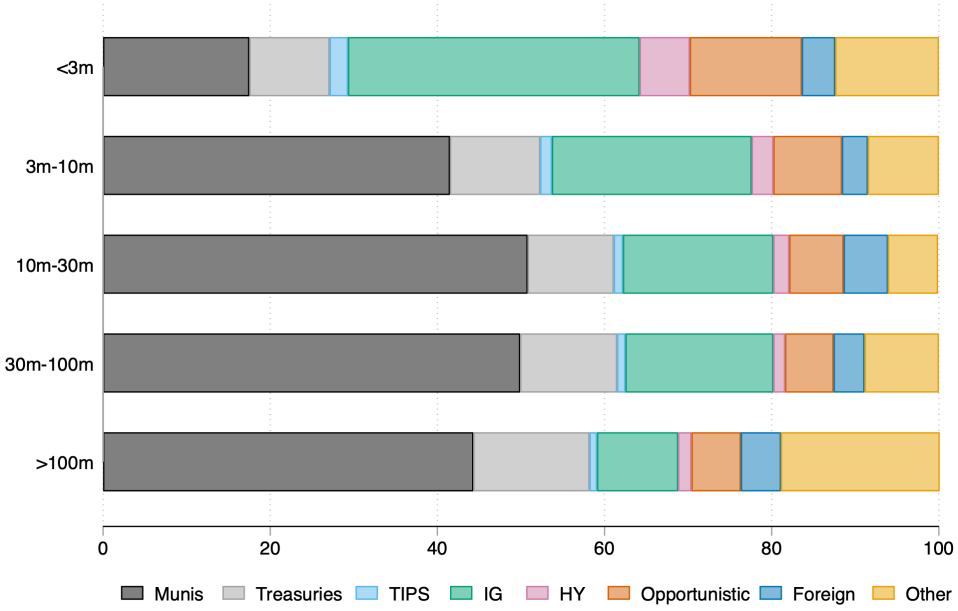
(d) Standard deviation, IMSE-optimal bins



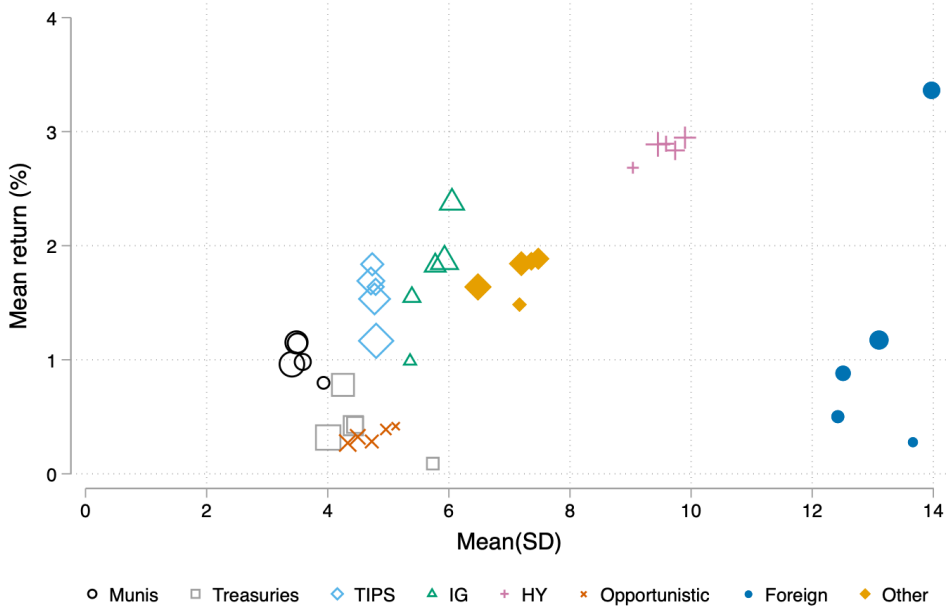
Notes: Binned scatterplots. Initial wealth is adjusted by the larger of average annual inflows and the monthly inflow observed. Panels (a) and (c) show bins according to the wealth group cutoffs. Panels (b) and (d) show IMSE-optimal bins, lines and confidence bands based on linear polynomials. Observations are weighted by the months they appear in the data. Standard errors shown are clustered by groups in the data on the same dates. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million.

Figure 10: Fixed income allocations, returns, and risk by sub-asset and wealth (%, 2019)

(a) Allocations (%)



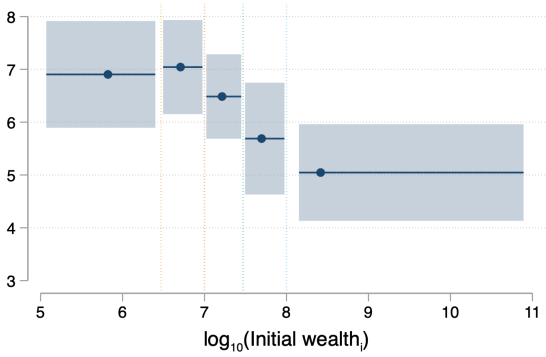
(b) Returns



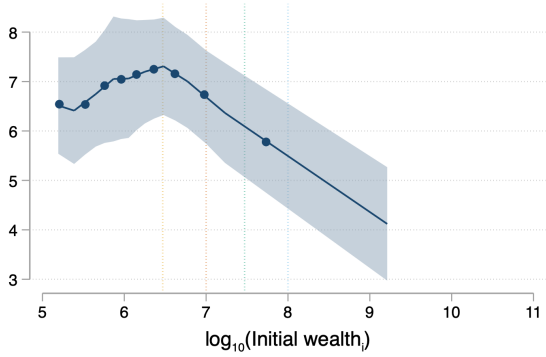
Notes: Panel (a) shows allocations within fixed income at the end of 2019. Panel (b) shows mean returns and mean standard deviation by fixed income sub-asset classes. Treasuries include agency debt (e.g. Fannie/Freddie), TIPS are Treasury Inflation-Protected Securities, IG is investment grade, HY is high yield, and Opportunitistic includes multi-strategy credit funds. The size of markers correspond to the wealth groups, where increasing size indicates higher initial wealth (smallest: <3m, small: 3-10m, medium: 10-30m, large: 30-100m, largest: >100m).

Figure 11: Equities

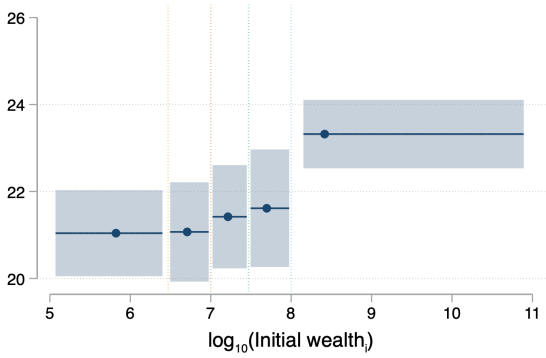
(a) Mean return (%), wealth groups



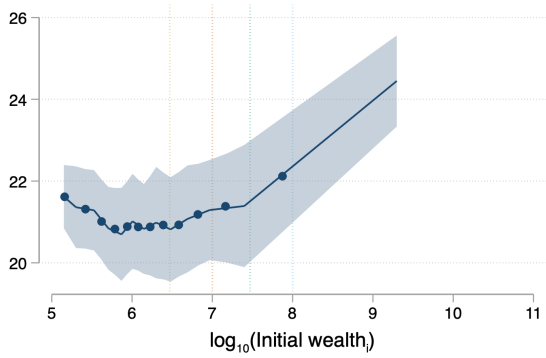
(b) Mean return (%), IMSE-optimal bins



(c) Standard deviation, wealth groups

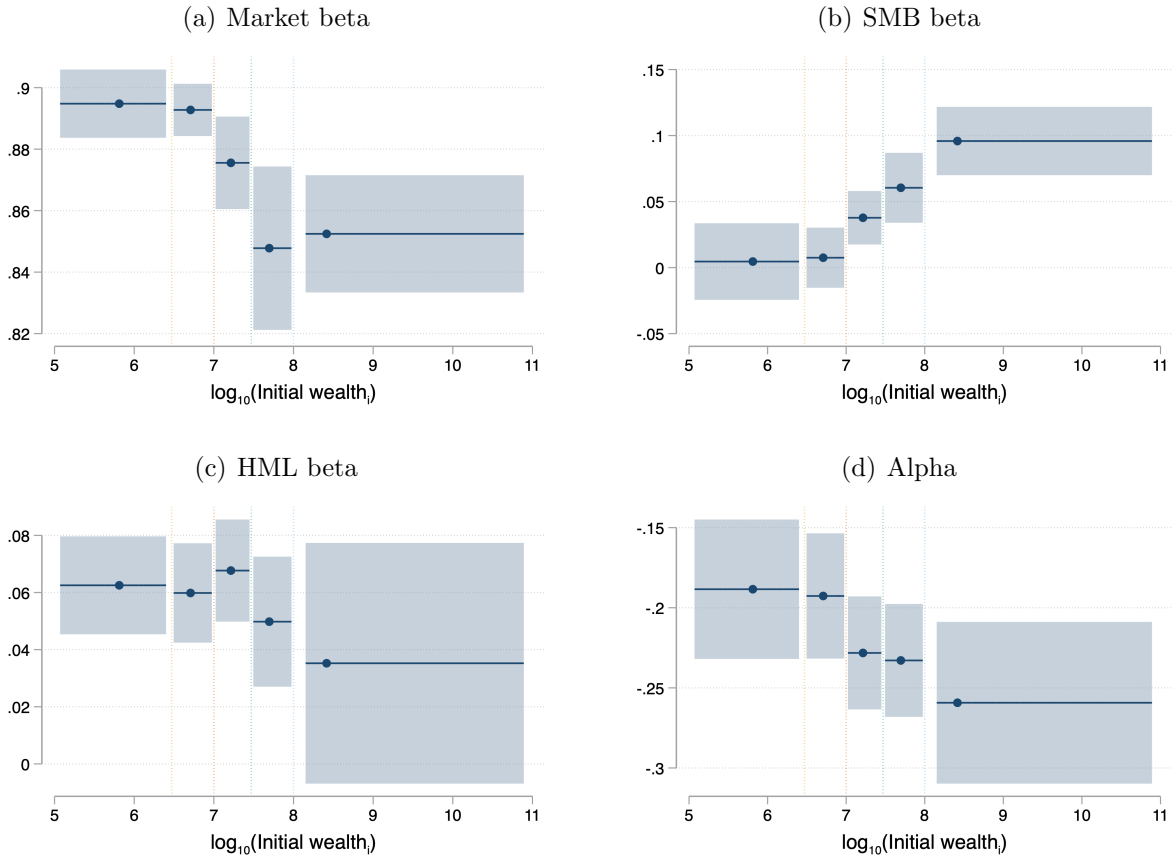


(d) Standard deviation, IMSE-optimal bins



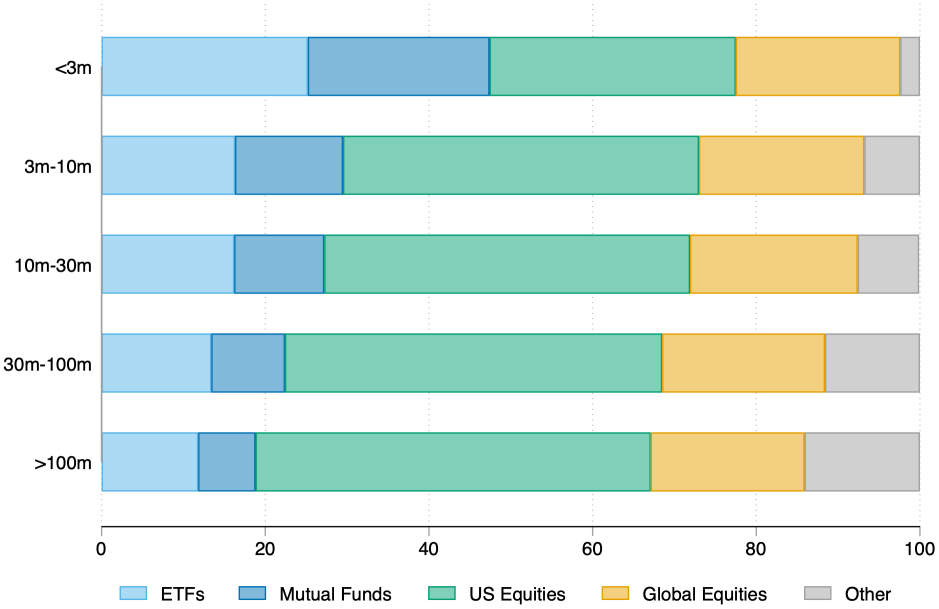
Notes: Binned scatterplots. Initial wealth is adjusted by the larger of average annual inflows and the monthly inflow observed. Panels (a) and (c) show bins according to the wealth group cutoffs. Panels (b) and (d) show IMSE-optimal bins, lines and confidence bands based on linear polynomials. Observations are weighted by the months they appear in the data. Standard errors shown are clustered by groups in the data on the same dates. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million.

Figure 12: Equity betas



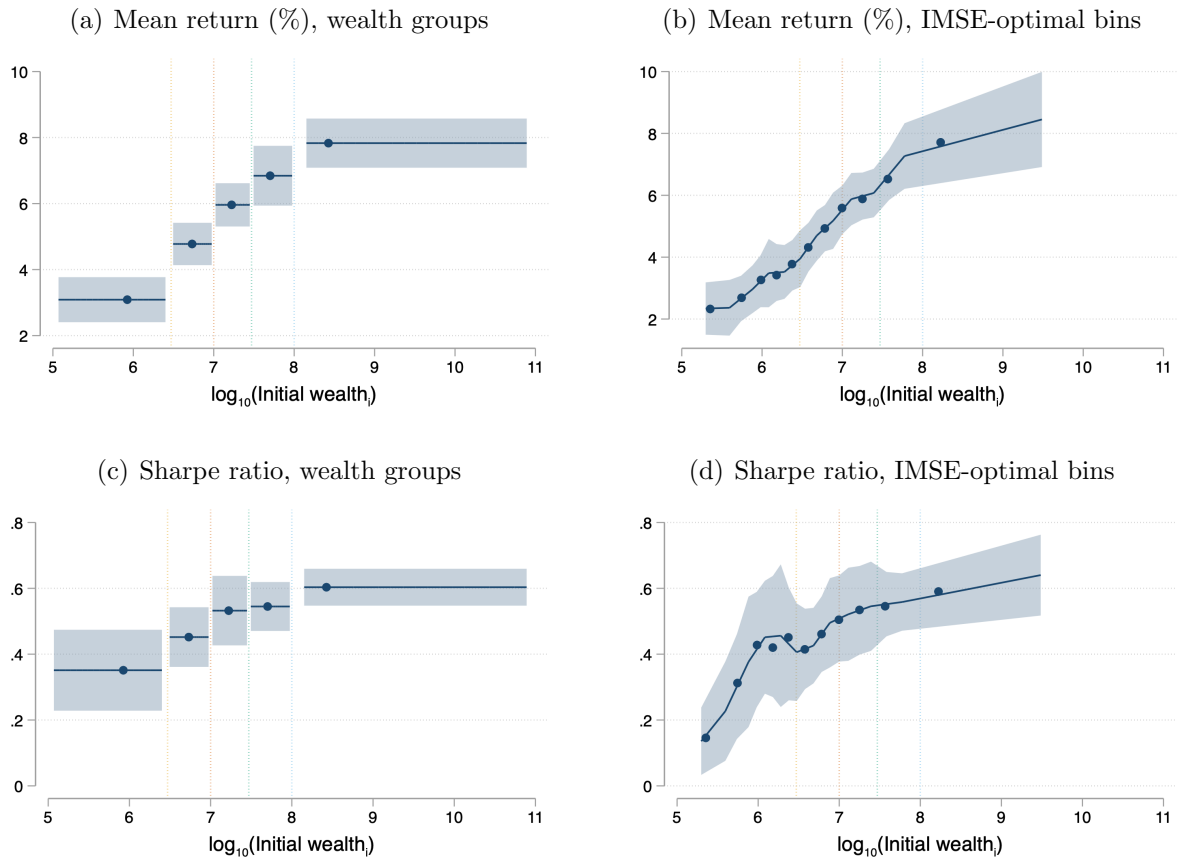
Notes: Binned scatterplots. Bins according to the wealth group cutoffs, standard errors clustered by portfolios in the data on common dates. Betas estimated using a three-factor model, at a monthly frequency. Observations are weighted by the number of months each portfolio appears in the sample. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million.

Figure 13: Equity allocations by category and wealth (2019)



Notes: Equity investments by type at the end of 2019. ETFs and Mutual Funds include US Equity funds. Global Equities includes funds that have a global or international focus. Other includes equity derivatives (e.g. options).

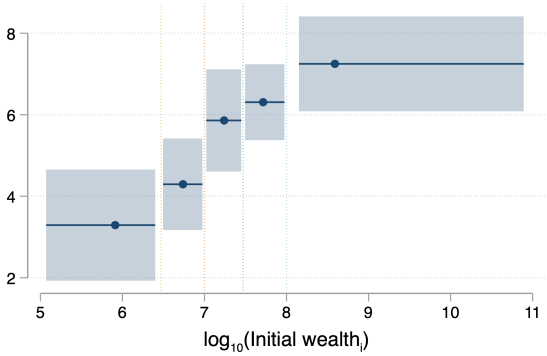
Figure 14: Alternatives returns



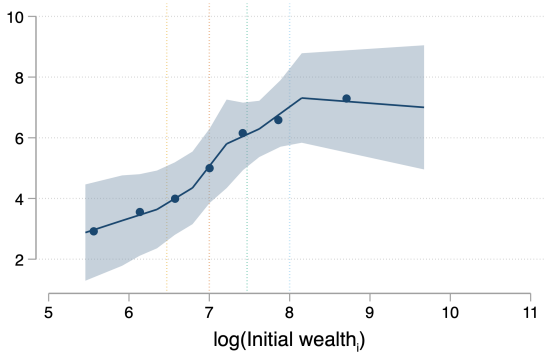
Notes: Binned scatterplots of the returns to alternatives overall, excluding portfolios with fewer than three investments, those observed for less than two years, single positions valued at greater than one billion, and those with less than 100,000 of total wealth. Sharpe ratio is calculated as the ratio of average excess returns to the standard deviation (calculated based on quarterly returns, and then annualized). Initial wealth is adjusted by the larger of average annual inflows and the monthly inflow observed. Panels (a) and (c) show bins according to the wealth group cutoffs. Panels (b) and (d) show IMSE-optimal bins, lines and confidence bands based on linear polynomials. Observations are weighted by the months they appear in the data. Standard errors shown are clustered by groups in the data on the same dates. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million.

Figure 15: Alternatives returns at the position level

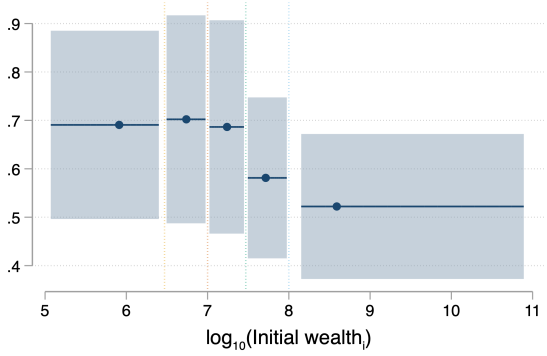
(a) Mean return (%), wealth groups



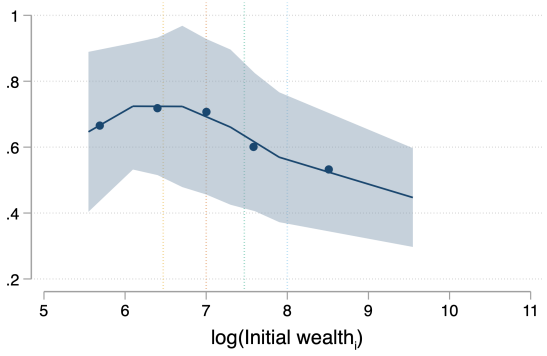
(b) Mean return (%), IMSE-optimal bins



(c) Sharpe ratio, wealth groups



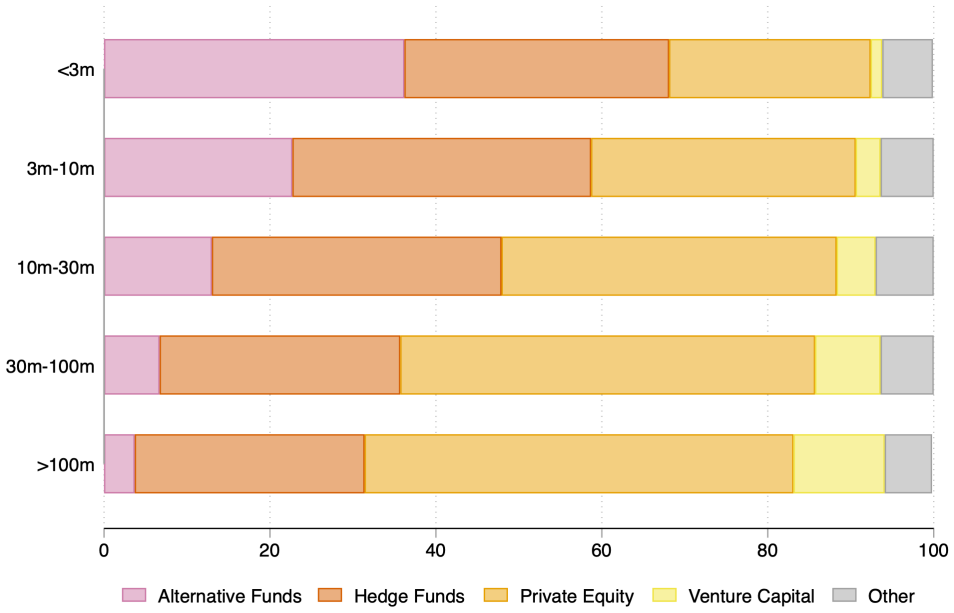
(d) Sharpe ratio, IMSE-optimal bins



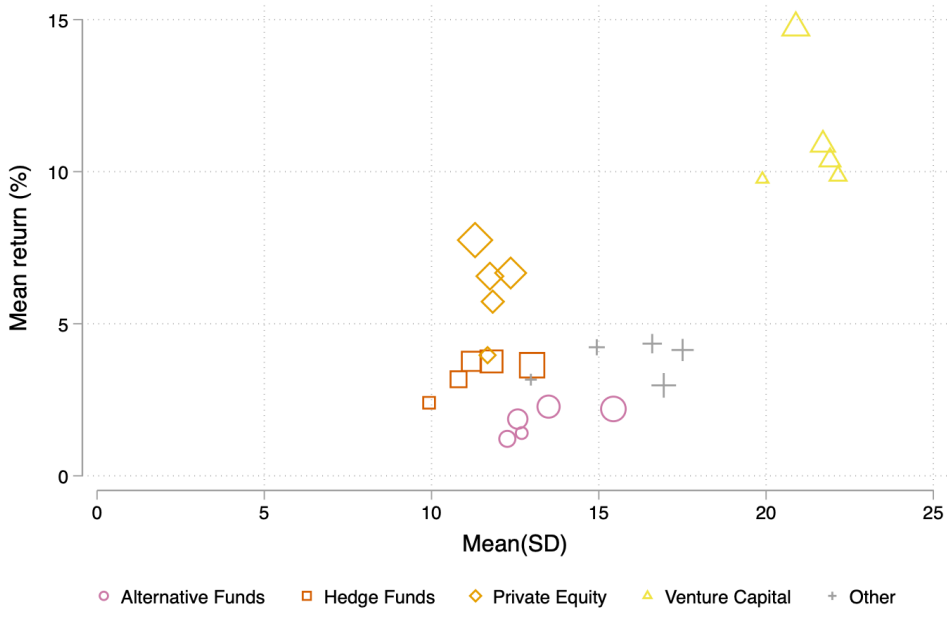
Notes: Binned scatterplots of the returns to single alternatives investments, excluding portfolios with fewer than three investments, those observed for less than two years, single positions valued at greater than one billion, and those with less than 100,000 of total wealth. Sharpe ratio is calculated as the ratio of average excess returns to the standard deviation (calculated based on quarterly returns, and then annualized). Initial wealth is adjusted by the larger of average annual inflows and the monthly inflow observed. Panels (a) and (c) show bins according to the wealth group cutoffs. Panels (b) and (d) show IMSE-optimal bins, lines and confidence bands based on linear polynomials. Observations are weighted by the months they appear in the data. Standard errors shown are clustered by groups in the data on the same dates. Colored lines show the wealth cutoffs that correspond to 3, 10, 30, and 100 million.

Figure 16: Alternatives allocations by type and wealth (%)

(a) Allocations (%)

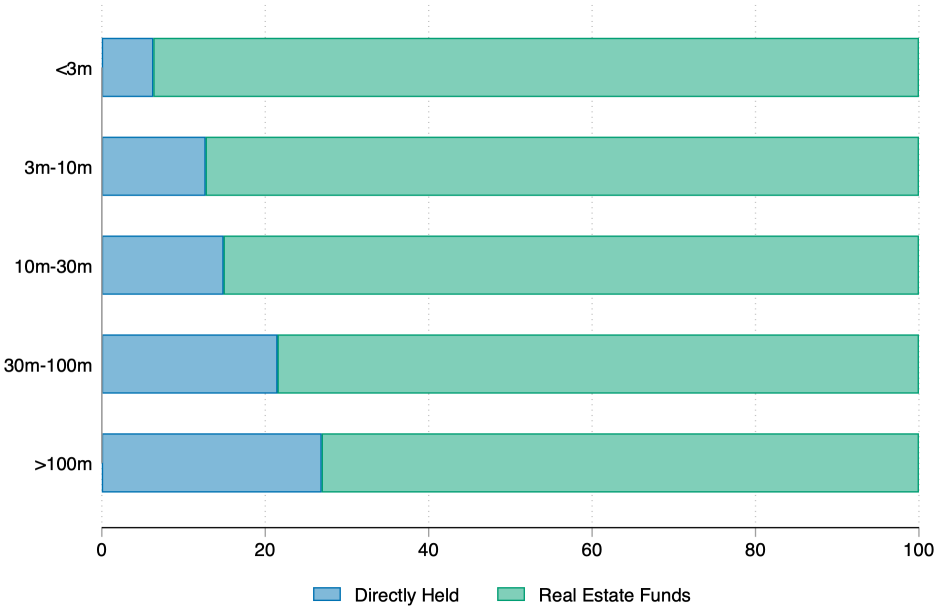


(b) Returns



Notes: Allocations in panel (a) are shown as of the end of 2019. In panel (b), the mean return and the mean standard deviation of returns is shown for each alternatives sub-asset class, for each wealth group, over the full sample (unbalanced panel). The size of markers correspond to the wealth groups, where increasing size indicates higher initial wealth (smallest: <3m, small: 3-10m, medium: 10-30m, large: 30-100m, largest: >100m).

Figure 17: Real Estate allocations by category and wealth (2019)



Notes: Real estate investments by type at the end of 2019.

Table 1: Investors' assets under management (millions)

	2016			2022		
Wealth group	Mean	Median	N	Mean	Median	N
<3m	0.7	0.4	16,980	0.6	0.3	143,497
3-10m	5.5	5.0	3,290	5.4	5.0	22,513
10-30m	17.3	16.0	1,486	17.0	15.7	10,260
30-100m	53.8	48.5	835	53.3	48.4	5,453
>100m	430.3	195.0	409	423.4	201.0	2,983
Total	12.0	0.9	23,000	10.5	0.6	184,706

Notes: Values as of year end. Wealth groups are assigned based on total assets of each investor. Positions in a single asset (e.g. equities, alternatives) valued at greater than one billion are excluded.

Table 2: Asset classification

Asset class	Sub-asset classes
Cash & cash eq	Cash (e.g. bank accounts), cash equivalents (e.g. MMFs)
Fixed income	Municipal bonds, Treasuries (e.g. U.S. Treasuries and Agencies), Treasury Inflation-Protected Securities (TIPS), Investment Grade (IG) corporate bonds, High Yield (HY) corporate bonds, opportunistic bond funds, foreign bonds, other
Equities	US ETFs, US mutual funds, US equities, global equities, other
Mixed allocation	Multi-asset allocation vehicles, held away accounts (e.g. 401k)
Alternatives	Alternative funds, hedge funds, private equity, venture capital, other (e.g. commodities)
Private businesses	Equity in private companies
Real estate	Directly held real estate, real estate funds
Other	Collectibles, crypto, other, unknown

Notes: Asset classification is based on internal inputs from managers and validated using external information drawn from Morningstar, S&P, ICE, Preqin, Pitchbook, etc. as well as manager input characteristics.

Table 3: Portfolio allocations by asset type and wealth (%, 2019)

Wealth group	Cash & cash eq.	Fixed income	Public equities	Mixed	Alts	Private companies	Real estate	Other
<3m	8.8	19.6	51.3	4.4	8.9	0.4	2.0	4.6
3m-10m	8.0	20.8	45.8	2.2	10.9	0.9	3.6	7.8
10m-30m	7.6	19.2	38.1	1.9	14.9	2.1	6.2	10.0
30m-100m	8.8	16.0	34.4	1.6	18.0	3.4	7.4	10.5
>100m	7.4	13.0	30.3	1.5	23	6.5	8.1	10.2

Notes: Data as of the end of 2019. Portfolios with fewer than three positions and observed for less than two years are excluded, as are those with as are those with positions in a single asset (e.g. equities, alternatives) valued at greater than one billion, and those with less than 100,000 of total wealth.

Table 4: Comparison to Estimates of Top Wealth in 2016 from Smith et al. (2022)

	Average wealth (millions)						
Wealth group	Data	SZZ	Equal Returns	Revised SZ	N	Population	%
Bottom 90%	0.2	0.1	0.1	0.1	10,003	214,797,000	0.005
Top 10-1%	1.6	1.2	1.2	1.3	7,522	21,479,700	0.04
Top 1-0.1%	7.7	6.4	6.6	6.3	3,588	2,147,900	0.2
Top 0.1-0.01%	35.8	30.6	34.9	32.5	1,352	214,900	0.6
Top 0.01-0.001%	151.9	139.6	194.2	184.9	388	21,500	1.8
Top 0.001%	871.6	1,025.0	1,621.8	1,309.7	147	2,400	6.1

Notes: Comparison to Smith et al. (2022), Saez and Zucman (2016), and Saez and Zucman (2020). The wealth thresholds for the cutoffs of these groups calculated by Smith et al. (2022) are at 0.6, 3.5, 17.2, 77.8, and 362.8 million. Average wealth columns refer to averages in our data, in Smith et al. (2022) ("SZZ"), Saez and Zucman (2016) ("Equal Returns"), and Saez and Zucman (2020) ("Revised SZ"). The three remaining columns show the number of portfolios in the wealth group and in our data at the end of 2016, the total population estimated by SZZ to be in the wealth group, and the percentage our data represents of the population.

Table 5: Portfolio returns (unbalanced panel), 2016 - 2022

(a) Summary statistics

Initial wealth group$_i$	Return (%) Mean (1)	Median (2)	S.D.($\overline{r}_i$) (3)	S.D.(r_{it}) Mean (4)	Median (5)	Arithmetic mean (%) (6)	N (7)
<3m	3.88	4.14	5.14	14.0	13.8	4.79	60,428
3m-10m	4.38	4.44	4.92	12.7	12.6	5.17	14,478
10m-30m	4.25	4.25	5.25	11.7	11.2	4.95	6,941
30m-100m	4.16	4.18	5.33	11.3	10.4	4.84	3,642
>100m	4.33	4.45	5.85	11.7	10.5	5.09	1,731
Total	4.01	4.20	5.14	13.4	13.2	4.87	87,220

Notes: Wealth groups are assigned according to initial wealth on the platform, plus the larger of average annual inflows and the maximum monthly inflow observed. Returns are calculated at a monthly frequency, and annualized according to the average monthly log return of each investor multiplied by 12, expressed in percentage points. The standard deviation of average returns in column (3) reflects the dispersion of annualized returns across portfolios. The mean and median standard deviation of portfolio returns in columns (4) and (5) is calculated for the quarterly returns of each investor, and annualized. Concentrated positions (> 1 bn) are excluded, as are portfolios with fewer than three investments, those observed reporting performance for less than two years, and those with less than 100,000 of total wealth.

(b) Distribution and counterfactual

Initial wealth group$_i$	Distribution p10 (1)	p25 (2)	p50 (3)	p75 (4)	p90 (5)	Counterfactual return (%) Mean (6)	S.D.($\overline{r}_i$) (7)	$\overline{\text{S.D.}(r_{it})}$ (8)
<3m	-1.98	1.43	4.14	6.55	9.26	3.92	5.05	14.3
3m-10m	-0.67	2.03	4.44	6.75	9.47	4.31	4.76	13.3
10m-30m	-0.54	1.79	4.25	6.60	9.61	4.17	5.07	12.6
30m-100m	-0.85	1.67	4.18	6.66	9.41	4.05	5.09	12.4
>100m	-1.35	1.46	4.45	7.25	10.48	4.14	5.42	13.1
Total	-1.55	1.58	4.20	6.61	9.34	4.02	5.02	13.9

Notes: Panel (b) additionally shows further moments of the distribution of portfolio returns in columns (1) to (5). Columns (6) to (8) show summary statistics for counterfactual portfolio returns in which the returns on private equity and venture capital investments have been replaced with the value-weighted equity return. Column (6) shows the mean counterfactual return, column (7) shows the dispersion of mean returns across investors, and column (8) shows the average standard deviation of returns over time.

Table 6: Persistence of wealth groups (%)

Wealth group$_{i,t-1}$	Wealth group$_{i,t}$ <3m	3m-10m	10m-30m	30m-100m	>100m
<3m	95.5	3.8	0.5	0.2	0.1
3m-10m	6.5	83.4	9.1	0.8	0.2
10m-30m	2.1	4.7	82.5	9.9	0.8
30m-100m	1.3	1.2	5.1	84.2	8.2
>100m	0.9	0.3	0.6	3.5	95.0

Notes: For portfolios with wealth in a category in the first column at the end of the year, the columns show what percentage are in each wealth group at the end of the following year. These changes can be driven by additional inflows to the platform (e.g. labor income), as well as financial returns.

Table 7: Portfolio returns (%)

	Wealth in logs			Wealth groups$_{i,t-1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
log(Wealth$_{i,t-1}$)	0.20	0.12	0.17			
	(0.12)	(0.12)	(0.13)			
3m-10m				0.18	0.10	0.21
				(0.16)	(0.14)	(0.16)
10m-30m				0.25	0.01	0.10
				(0.27)	(0.24)	(0.27)
30m-100m				0.28	0.09	0.10
				(0.32)	(0.25)	(0.26)
>100m				0.45*	0.38	0.32
				(0.24)	(0.33)	(0.37)
Fixed income share$_{i,t-1}$	-0.77	0.15		-0.76	0.16	
	(0.77)	(0.65)		(0.78)	(0.64)	
Equity share$_{i,t-1}$	6.87	9.44**		6.86	9.43**	
	(6.19)	(4.21)		(6.18)	(4.20)	
Mixed share$_{i,t-1}$	1.88	2.75		1.79	2.68	
	(2.76)	(1.87)		(2.76)	(1.88)	
Alternatives share$_{i,t-1}$	3.86*	4.78***		3.88*	4.80***	
	(2.08)	(1.15)		(2.08)	(1.15)	
Private business share$_{i,t-1}$	2.29	3.17*		2.38	3.24*	
	(2.68)	(1.64)		(2.72)	(1.66)	
Real estate share$_{i,t-1}$	2.71	1.92		2.76	1.98	
	(1.76)	(1.22)		(1.76)	(1.22)	
Other share$_{i,t-1}$	2.52	3.65**		2.52	3.66**	
	(2.80)	(1.76)		(2.81)	(1.77)	
Time fixed effects	Y	Y		Y	Y	
Weighted OLS		Y	Y		Y	Y
Year×shares fixed effects			Y			Y
Observations	352,649	352,649	352,649	352,649	352,649	352,649
Adjusted R-squared	0.66	0.62	0.69	0.66	0.62	0.69

Notes: Portfolio performance is calculated each month using the weighted average of investments' reported performance and allocations at the start of each month. Returns on specific investments are winsorized at the top and bottom 0.5 percent of each sub-asset class on each date. The annual return is calculated using the sum of log returns over the months that each investor is in the data in each year, converted to percentage points. Wealth and wealth groups are measured with a one year lag. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months of each year. To prevent the estimates from being biased by the larger number of portfolios later in the sample, in columns (2), (3), (5), and (6) the observations are weighted according to the number of months in which each portfolio appears in the sample. Portfolios with fewer than three investments, observed for less than two years, those with single positions in equities or alternatives valued at greater than one billion, and those with less than 100,000 in total wealth are excluded. Standard errors are double clustered at the portfolio and date level. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Risk-adjusted portfolio returns $\left(S_i = \frac{\overline{r_{it} - r_{ft}}}{\sigma_i}\right)$

	Wealth in logs		Initial wealth groups	
	(1)	(2)	(3)	(4)
log(Initial wealth$_i$)	0.025***	0.019***		
	(0.008)	(0.006)		
3m-10m			0.029**	0.019**
			(0.012)	(0.009)
10m-30m			0.031	0.019
			(0.020)	(0.016)
30m-100m			0.037**	0.030**
			(0.016)	(0.013)
>100m			0.046**	0.034**
			(0.018)	(0.016)
Time fixed effects	Y	Y	Y	Y
Weighted OLS		Y		Y
Observations	86,868	86,868	86,868	86,868
R-squared	0.27	0.23	0.27	0.23

Notes: Risk-adjusted returns are calculated using the average annual excess return, divided by the standard deviation of excess returns. Wealth and wealth groups are based on initial wealth, adjusted by the larger of average annual inflows and the maximum monthly inflow observed. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample in columns (2) and (4). Portfolios with fewer than three investments, observed for less than two years, those with single positions in equities or alternatives valued at greater than one billion, and those with less than 100,000 in total wealth are excluded. Standard errors are clustered by groups in the data on the same dates. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Asset-class returns (%)

	Cash	Fixed income	Equities	Mixed	Alts	Private co.	Real estate	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Wealth in logs								
$\log(\text{Wealth}_{i,t-1})$	-0.002	0.07	-0.14	-0.19	1.35***	0.91*	-0.54*	-0.40
	(0.02)	(0.20)	(0.13)	(0.19)	(0.42)	(0.50)	(0.28)	(0.43)
Time fixed effect	Y	Y	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y	Y	Y
Observations	277,253	254,000	313,822	112,979	189,782	19,789	54,121	98,995
R-squared	0.08	0.60	0.68	0.67	0.23	0.09	0.11	0.25
(b) Wealth groups								
3m-10m	0.02	0.04	0.07	-0.27	0.69*	1.15	0.27	-0.02
	(0.03)	(0.22)	(0.11)	(0.19)	(0.36)	(1.05)	(0.46)	(0.40)
10m-30m	0.02	0.06	-0.42**	-0.40*	1.73***	2.23**	-0.25	-0.71
	(0.03)	(0.34)	(0.20)	(0.23)	(0.64)	(0.98)	(0.63)	(0.85)
30m-100m	0.04	0.30	-0.64	-0.34	2.64***	1.15	-1.32**	-0.60
	(0.06)	(0.37)	(0.40)	(0.39)	(0.82)	(1.16)	(0.67)	(0.94)
>100m	-0.11	0.17	-0.80	-0.03	4.18***	2.52**	-1.38**	-1.19
	(0.12)	(0.40)	(0.84)	(0.68)	(1.39)	(1.24)	(0.57)	(1.02)
Time fixed effect	Y	Y	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y	Y	Y
Observations	277,253	254,000	313,822	112,979	189,782	19,789	54,121	98,995
R-squared	0.08	0.60	0.68	0.67	0.23	0.09	0.11	0.25

Notes: Asset-class returns are calculated using a weighted average of reported performance and allocations at the start of each year, and winsorized at the top and bottom 0.5 percent of observations for each asset class on each date. The regressions exclude portfolios with fewer than three investments on the platform, those observed for less than two years, and those with less than 100,000 in total wealth. Concentrated portfolios are included but exclude single equity or alternative investments valued at greater than one billion. Standard errors double clustered at the portfolio and date level, significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Risk-adjusted asset-class returns $\left(S_{ik} = \frac{\overline{r_{ik} - r_f}}{\sigma_{ik}}\right)$

	Cash (1)	Fixed income (2)	Equities (3)	Mixed (4)	Alts (5)	Private co. (6)	Real estate (7)	Other (8)
(a) Wealth in logs								
log(Initial Wealth$_i$)	0.21***	0.03***	-0.01***	-0.02***	0.11***	-0.12***	-0.18***	0.06***
	(0.02)	(0.01)	(0.004)	(0.01)	(0.02)	(0.03)	(0.03)	(0.02)
Time fixed effect	Y	Y	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y	Y	Y
Observations	66,571	60,762	75,866	28,122	44,322	4,089	11,029	24,883
R-squared	0.18	0.48	0.44	0.58	0.19	0.72	0.18	0.19
(b) Initial wealth groups								
3m-10m	0.16***	0.03***	-0.002	-0.02**	0.06**	-0.11	-0.06	0.06**
	(0.02)	(0.01)	(0.00)	(0.01)	(0.03)	(0.07)	(0.05)	(0.02)
10m-30m	0.30***	0.05***	-0.03***	-0.02	0.16***	-0.27***	-0.23***	0.16***
	(0.03)	(0.01)	(0.01)	(0.01)	(0.04)	(0.08)	(0.06)	(0.04)
30m-100m	0.46***	0.05***	-0.04***	-0.02	0.19***	-0.35***	-0.41***	0.10***
	(0.05)	(0.01)	(0.01)	(0.03)	(0.04)	(0.06)	(0.06)	(0.04)
>100m	0.59***	0.05***	-0.08***	-0.01	0.26***	-0.30***	-0.46***	0.13**
	(0.09)	(0.02)	(0.02)	(0.03)	(0.04)	(0.08)	(0.08)	(0.05)
Time fixed effect	Y	Y	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y	Y	Y
Observations	66,571	60,762	75,866	28,122	44,322	4,089	11,029	24,883
R-squared	0.18	0.48	0.44	0.58	0.18	0.72	0.18	0.19

Notes: Risk-adjusted returns are calculated using the average annual excess return, divided by the standard deviation of excess returns. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors are clustered by groups in the data on the same dates. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11: Equity returns (unbalanced panel), 2016 - 2022

Initial wealth$_i$	Return (%) Mean (1)	Median (2)	S.D.($\overline{r}_{ik}$) (3)	S.D.($r_{ik,t}$) Mean (4)	Median (5)	N (6)
<3m	6.85	7.30	7.76	21.1	20.5	52,925
3m-10m	7.12	7.50	10.82	21.2	20.4	12,584
10m-30m	6.36	7.05	8.43	21.5	20.6	5,988
30m-100m	5.68	6.73	8.11	21.7	20.4	3,156
>100m	4.93	6.25	8.99	23.4	21.5	1,606
Total	6.75	7.26	8.49	21.3	20.5	76,259

Notes: Wealth groups are assigned according to initial wealth on the platform, plus the larger of average annual inflows and the largest monthly inflow observed for each portfolio. Returns are calculated at a monthly frequency, and annualized according to the average monthly log return of each investor multiplied by 12, expressed in percentage points. The standard deviation of average returns in column (3) reflects the dispersion of annualized equity returns across portfolios. The mean and median standard deviation of portfolio returns over time in columns (4) and (5) is calculated for the quarterly returns of each investor, and annualized. Concentrated positions (> 1 bn) are excluded, as are portfolios with fewer than three investments, those observed reporting performance for less than two years, and those with less than 100,000 in total wealth.

Table 12: Factor loadings by wealth group (mean)

Wealth group$_i$	Market beta	SMB beta	HML beta	Alpha	R-squared
<3m	0.89	0.005	0.06	-0.19	0.88
3m-10m	0.89	0.01	0.06	-0.19	0.87
10m-30m	0.87	0.04	0.07	-0.23	0.82
30m-100m	0.85	0.06	0.05	-0.23	0.77
>100m	0.85	0.10	0.03	-0.26	0.71
Total	0.89	0.01	0.06	-0.20	0.86

Notes: Betas estimated using a three-factor model, at a monthly frequency. The log of wealth is measured at the date a portfolio is first observed on the platform, adjusted for subsequent inflows to avoid underestimating wealth.

Table 13: Number of equity positions by sub-asset class (2019)

Wealth group$_{i,t-1}$	ETF	Mutual Fund	US Equities	Global Equities	Other
<3m	3.2	2.2	19.4	5.3	0.6
3m-10m	3.9	2.5	62.1	16.2	1.9
10m-30m	3.7	2.4	107.6	32.8	3.4
30m-100m	3.8	2.4	148.3	53.6	5.2
>100m	3.4	2.4	195.7	96.4	8.5
Total	3.4	2.3	44.0	13.7	1.5

Notes: For portfolios with wealth in a category in the first column, the columns show how many positions are held in each sub-asset class, on average.

Table 14: Equity returns (%)

	Wealth in logs			Wealth groups$_{i,t-1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
log(Wealth$_{i,t-1}$)	-0.14	-0.45**	-0.23			
	(0.14)	(0.23)	(0.17)			
3m-10m				0.04	-0.23	-0.15
				(0.14)	(0.19)	(0.17)
10m-30m				-0.33*	-0.84**	-0.57**
				(0.19)	(0.34)	(0.28)
30m-100m				-0.50	-1.17**	-0.64
				(0.35)	(0.57)	(0.45)
>100m				-0.62	-1.42	-0.56
				(0.85)	(0.98)	(0.84)
Mutual fund share$_{i,t-1}$	-0.45			-0.44		
	(0.46)			(0.45)		
US equities share$_{i,t-1}$	0.58			0.58		
	(0.49)			(0.49)		
Global share$_{i,t-1}$	-4.55**			-4.53**		
	(2.20)			(2.20)		
Other share$_{i,t-1}$	-3.84*			-3.79*		
	(2.04)			(2.02)		
$\ln(N_{\text{Equity investments}})$		0.41**			0.40**	
		(0.16)			(0.16)	
$\ln(N_{\text{Mutual funds}}+1)$			0.22			0.22
			(0.16)			(0.16)
$\ln(N_{\text{US equities}}+1)$			0.54**			0.54***
			(0.21)			(0.21)
$\ln(N_{\text{Global equities}}+1)$			-0.40*			-0.39*
			(0.23)			(0.23)
$\ln(N_{\text{Other equities}}+1)$			-0.70***			-0.68***
			(0.20)			(0.19)
Time fixed effects	Y	Y	Y	Y	Y	Y
Weighted OLS		Y	Y		Y	Y
Observations	304,381	313,822	313,822	304,381	313,822	313,822
R-squared	0.69	0.68	0.68	0.69	0.68	0.68

Notes: Returns are calculated each month using the weighted average of investments' reported performance and allocations at the start of each month. The annual return is calculated using the sum of log returns over the months that each investor is in the data in each year. Returns on specific investments are winsorized at the top and bottom 0.5 percent of each sub-asset class on each date. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors are double clustered at the portfolio and date level. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Alternatives returns (unbalanced panel), 2016 - 2022

	Return (%)			S.D.($r_{ik,t}$)		
	Mean	Median	S.D.($\overline{r}_{ik}$)	Mean	Median	N
Initial wealth$_i$	(1)	(2)	(3)	(4)	(5)	(6)
<3m	2.94	3.13	9.23	11.6	10.3	26,637
3m-10m	4.12	4.02	8.62	10.8	9.6	8,973
10m-30m	5.43	5.21	7.10	10.6	9.5	4,903
30m-100m	6.38	5.64	7.38	10.7	9.8	2,757
>100m	7.58	6.97	7.28	10.8	10.3	1,511
Total	3.85	3.88	8.81	11.2	10.0	44,781

Notes: Wealth groups are assigned according to initial wealth on the platform, plus the larger of average annual inflows and the largest monthly inflow observed for each portfolio. Returns are calculated at a monthly frequency, and annualized according to the average monthly log return of each investor multiplied by 12, expressed in percentage points. The standard deviation of average returns in column (3) reflects the dispersion of annualized returns across portfolios. The mean and median standard deviation of portfolio returns over time in columns (4) and (5) is calculated for the quarterly returns of each investor, and annualized. Portfolios with fewer than three investments and those observed reporting performance for less than two years are excluded.

Table 16: Summary statistics for alternatives positions (2019)

Wealth group	Average positions	Size (m)	Frequency of updating (%)	Matched positions (% by value)
<3m	3.1	0.1	89.7	76.6
3m-10m	5.1	0.3	82.0	72.5
10m-30m	10.3	0.8	72.6	66.6
30m-100m	19.2	1.3	63.3	61.6
>100m	35.8	6.1	60.0	61.3

Notes: Mean number, size, and updating frequency of positions in alternatives, by wealth group. Frequency of updating refers to the percentage of positions which have some change in performance reported in any given quarter. Matched positions refers to the percentage of alternatives portfolio value that can be matched to external identifiers (e.g. Pitchbook, Preqin).

Table 17: Alternatives positions (unbalanced panel), 2016 - 2022

	Return (%)			S.D.($r_{ij,t}$)		
	Mean	Median	S.D.($\overline{r}_{ij}$)	Mean	Median	N
Initial wealth$_i$	(1)	(2)	(3)	(4)	(5)	(6)
<3m	3.52	2.96	12.55	14.4	11.4	81,066
3m-10m	4.59	4.06	14.24	16.3	11.9	35,969
10m-30m	6.43	5.70	16.41	18.6	13.6	32,522
30m-100m	6.99	6.26	17.82	21.0	16.4	29,630
>100m	7.88	6.81	18.69	23.5	19.1	33,007
Total	5.50	4.50	15.68	18.1	13.5	212,194

Notes: Wealth groups are assigned according to initial wealth on the platform, plus the larger of average annual inflows and the largest monthly inflow observed for each portfolio. Returns are calculated at a monthly frequency, and annualized according to the average monthly log return of each investor multiplied by 12, expressed in percentage points. The standard deviation of average returns in column (3) reflects the dispersion of annualized returns across underlying investments. The mean and median standard deviation of returns over time in columns (4) and (5) is calculated for the quarterly returns of each investment, and annualized. Excludes portfolios with fewer than three investments, observed for less than two years, and less than 100,000 in total wealth.

Table 18: Alternatives returns at the position level (%)

	All	Unmatched	Matched positions			
	(1)	(2)	(3)	(4)	(5)	(6)
(a) Wealth in logs						
$\log(\text{Wealth}_{i,t-1})$	0.81**	0.12	1.32***	1.60***	1.58***	0.31*
	(0.33)	(0.30)	(0.49)	(0.38)	(0.39)	(0.16)
Funds of funds					-1.27**	
					(0.60)	
Time fixed effect	Y	Y	Y			
Vintage-time f.e.				Y	Y	
Position-time f.e.						Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Observations	1,711,209	860,360	850,849	676,857	676,857	656,764
R-squared	0.06	0.06	0.07	0.08	0.08	0.71
(b) Wealth groups						
3m-10m	0.74**	0.10	1.29***	1.55***	1.56***	0.15
	(0.31)	(0.39)	(0.33)	(0.36)	(0.36)	(0.10)
10m-30m	1.37**	0.17	2.30***	2.71***	2.72***	0.44*
	(0.54)	(0.60)	(0.61)	(0.54)	(0.54)	(0.22)
30m-100m	1.71**	0.26	2.87***	3.45***	3.43***	0.60**
	(0.69)	(0.69)	(0.88)	(0.73)	(0.74)	(0.29)
>100m	2.31**	0.41	3.78***	4.41***	4.34***	0.81*
	(0.90)	(0.78)	(1.37)	(1.08)	(1.10)	(0.44)
Funds of funds					-1.30**	
					(0.61)	
Time fixed effect	Y	Y	Y			
Vintage-time f.e.				Y	Y	
Position-time f.e.						Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Observations	1,711,209	860,360	850,849	676,857	676,857	656,764
R-squared	0.06	0.06	0.07	0.08	0.08	0.71

Notes: Reported performance, winsorized at the top and bottom 0.5 percent of observations. Excludes portfolios with fewer than three investments, observed for less than two years, and less than 100,000 in total wealth. Standard errors double clustered at the portfolio and date level, significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 19: Risk-adjusted alternatives returns at the position level $\left(S_{ij} = \frac{\overline{r_{ijt} - r_{ft}}}{\sigma_{ik}}\right)$

	All	Unmatched	Matched positions			
	(1)	(2)	(3)	(4)	(5)	(6)
(a) Wealth in logs						
$\log(\text{Wealth}_{i,t-1})$	-0.06***	-0.06***	-0.06***	-0.01	-0.01	0.001
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Funds of funds					0.02	
					(0.06)	
Time fixed effect	Y	Y	Y			
Vintage f.e.				Y	Y	
Position f.e.						Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Observations	549,611	314,406	235,205	172,027	172,027	161,646
R-squared	0.09	0.10	0.09	0.01	0.01	0.29
(b) Wealth groups						
3m-10m	-0.04***	-0.06***	-0.01	0.05**	0.05**	0.02
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)
10m-30m	-0.08***	-0.11***	-0.04	0.07*	0.06*	0.03*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.02)
30m-100m	-0.12***	-0.14***	-0.10***	0.01	0.01	0.01
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)
>100m	-0.18***	-0.17***	-0.17***	-0.04	-0.04	0.004
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)
Funds of funds					0.01	
					(0.06)	
Time fixed effect	Y	Y	Y			
Vintage-time f.e.				Y	Y	
Position-time f.e.						Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Observations	549,611	314,406	235,205	172,027	172,027	161,698
R-squared	0.09	0.10	0.09	0.01	0.01	0.29

Notes: Reported performance, winsorized at the top and bottom 0.5 percent of observations. Excludes portfolios with fewer than three investments, observed for less than two years, and less than 100,000 in total wealth. Standard errors clustered by groups of investments observed on the same dates, significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 20: Alternatives returns (%)

	Wealth in logs			Wealth groups		
	(1)	(2)	(3)	(4)	(5)	(6)
$\log(\text{Wealth}_{i,t-1})$	0.76***	1.03***	0.38*			
	(0.21)	(0.29)	(0.22)			
3m-10m				0.32	0.50	0.35
				(0.27)	(0.34)	(0.30)
10m-30m				0.87***	1.30**	0.68
				(0.33)	(0.54)	(0.42)
30m-100m				1.32***	1.93***	0.44
				(0.35)	(0.53)	(0.36)
>100m				2.36***	3.14***	0.46
				(0.86)	(0.80)	(0.31)
Hedge fund $\text{share}_{i,t-1}$	0.63			0.70		
	(1.80)			(1.79)		
Private equity $\text{share}_{i,t-1}$	2.99			3.03		
	(1.88)			(1.87)		
Venture capital $\text{share}_{i,t-1}$	12.03***			12.04***		
	(4.16)			(4.14)		
Other $\text{share}_{i,t-1}$	2.89*			2.93*		
	(1.72)			(1.72)		
$\ln(N_{\text{Alts investments}})$		0.49			0.49	
		(0.34)			(0.32)	
$\ln(N_{\text{HF investments}}+1)$			-0.67*			-0.64*
			(0.35)			(0.35)
$\ln(N_{\text{PE investments}}+1)$			0.89**			0.92**
			(0.44)			(0.44)
$\ln(N_{\text{VC investments}}+1)$			2.44***			2.50***
			(0.89)			(0.87)
$\ln(N_{\text{Other alts}}+1)$			-0.06			-0.05
			(0.45)			(0.44)
Time fixed effects	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Observations	175,068	175,068	175,068	175,068	175,068	175,068
R-squared	0.25	0.23	0.25	0.25	0.23	0.25

Notes: Returns are calculated each month using the weighted average of investments' reported performance and allocations at the start of each month. The annual return is calculated using the sum of log returns over the months that each investor is in the data in each year. Returns on specific investments are winsorized at the top and bottom 0.5 percent of each sub-asset class on each date. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors are double clustered at the portfolio and date level. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 21: Risk-adjusted alternatives returns $\left(S_{ik} = \frac{\overline{r_{ikt} - r_{ft}}}{\sigma_{ik}}\right)$

	Wealth in logs			Wealth groups		
	(1)	(2)	(3)	(4)	(5)	(6)
log(Initial wealth$_i$)	0.04**	0.03*	0.01			
	(0.01)	(0.02)	(0.02)			
3m-10m				0.01	0.01	0.02
				(0.02)	(0.03)	(0.02)
10m-30m				0.05	0.06	0.04
				(0.03)	(0.04)	(0.03)
30m-100m				0.03	0.01	-0.05
				(0.03)	(0.04)	(0.03)
>100m				0.06*	0.01	-0.12***
				(0.03)	(0.05)	(0.04)
Hedge fund share	0.18***			0.19***		
	(0.03)			(0.03)		
Private equity share	0.56***			0.57***		
	(0.06)			(0.06)		
Venture capital share	0.98***			1.00***		
	(0.10)			(0.09)		
Other share	0.97***			0.98***		
	(0.17)			(0.17)		
$\ln(N_{\text{Alts investments}})$		0.13***			0.13***	
		(0.02)			(0.02)	
$\ln(N_{\text{HF investments}} + 1)$			-0.07**			-0.06**
			(0.03)			(0.03)
$\ln(N_{\text{PE investments}} + 1)$			0.10***			0.11***
			(0.03)			(0.03)
$\ln(N_{\text{VC investments}} + 1)$			0.11***			0.13***
			(0.03)			(0.03)
$\ln(N_{\text{Other alts}} + 1)$			0.20***			0.21***
			(0.06)			(0.06)
Time fixed effects	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Observations	44,310	44,310	44,310	44,310	44,310	44,310
R-squared	0.27	0.20	0.22	0.27	0.20	0.22

Notes: Risk-adjusted returns are calculated using the ratio of average excess returns and the standard deviation of excess returns, and reported on an annualized basis. Returns on specific investments are winsorized at the top and bottom 0.5 percent of each sub-asset class on each date. Sub-asset class shares are winsorized at the top and bottom 0.5 percent. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors are clustered by the groups in the data on the same dates. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 22: Alternatives returns by sub-asset class (%)

	Alternative Funds (1)	Hedge Funds (2)	Private Equity (3)	Venture Capital (4)	Other Alts (5)
(a) Wealth in logs					
$\log(\text{Wealth}_{i,t-1})$	0.12	0.49*	1.55***	1.63	0.48
	(0.30)	(0.29)	(0.54)	(1.01)	(0.46)
Time fixed effect	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y
Observations	102,890	111,891	81,872	20,451	47,325
R-squared	0.24	0.29	0.17	0.21	0.23
(b) Wealth groups					
3m-10m	-0.41	0.49***	1.53*	0.68	0.82
	(0.32)	(0.13)	(0.78)	(0.73)	(0.69)
10m-30m	0.04	0.93***	2.37**	0.67	1.41
	(0.42)	(0.22)	(0.94)	(0.89)	(0.95)
30m-100m	0.21	0.97**	2.81**	1.50	1.37
	(0.56)	(0.48)	(1.09)	(1.46)	(0.86)
>100m	0.76	0.96	3.59***	4.68*	0.21
	(0.79)	(1.31)	(1.29)	(2.67)	(1.24)
Time fixed effect	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y
Observations	102,890	111,891	81,872	20,451	47,325
R-squared	0.24	0.29	0.17	0.21	0.23

Notes: Sub-asset class returns are calculated using a weighted average of reported performance and investment sizes at the start of each month, and is winsorized at the top and bottom 0.5 percent of observations on each date. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors double clustered at the wealth group and date level, significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 23: Alternatives Sharpe ratio $\left(S_{ik} = \frac{\overline{r_{ikt} - r_{ft}}}{\sigma_{ik}}\right)$

	Alternative Funds (1)	Hedge Funds (2)	Private Equity (3)	Venture Capital (4)	Other Alts (5)
(a) Wealth in logs					
log(Initial wealth$_i$)	0.003	0.03	0.12**	0.001	-0.25**
	(0.01)	(0.03)	(0.04)	(0.03)	(0.08)
Time fixed effect	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y
Observations	19,848	21,373	15,996	3,669	9,215
R-squared	0.34	0.16	0.12	0.13	0.38
(b) Initial wealth groups					
3m-10m	0.002	0.06**	0.17***	-0.02	-0.40***
	(0.01)	(0.02)	(0.03)	(0.02)	(0.04)
10m-30m	0.02	0.12**	0.21***	-0.11**	-0.59**
	(0.01)	(0.03)	(0.04)	(0.04)	(0.15)
30m-100m	-0.01	0.06**	0.21***	-0.13**	-0.75***
	(0.02)	(0.02)	(0.04)	(0.04)	(0.16)
>100m	0.03	0.002	0.23***	0.02	-0.79**
	(0.03)	(0.02)	(0.04)	(0.04)	(0.17)
Time fixed effect	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y
Observations	19,848	21,373	15,996	3,669	9,215
R-squared	0.34	0.16	0.12	0.14	0.40

Notes: Sub-asset class returns are calculated using a weighted average of reported performance and investment sizes at the start of each month, and is winsorized at the top and bottom 0.5 percent of observations on each date. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors double clustered at the wealth group and date level, significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 24: Number of direct private company investments (2019)

Wealth group	Mean	Median	S.D.	N
<3m	1.7	1.0	3.2	1,867
3m-10m	2.3	1.0	3.1	1,181
10m-30m	3.5	2.0	5.4	1,140
30m-100m	4.9	2.0	8.1	1,082
>100m	10.1	4.0	20.4	830
Total	3.9	1.0	9.3	6,100

Notes: The table shows summary statistics about the number of private company investments held by investors in different wealth groups at the end of 2019.

Table 25: Private business returns (unbalanced panel), 2016 - 2022

	Return (%)			S.D.($r_{ik,t}$)		
	Mean	Median	S.D.($\overline{r}_{ik}$)	Mean	Median	N
Initial wealth group	(1)	(2)	(3)	(4)	(5)	(6)
<3m	5.41	6.81	21.20	13.0	7.3	1,448
3m-10m	6.31	6.76	29.98	19.3	12.1	746
10m-30m	7.57	6.07	18.58	21.8	15.1	748
30m-100m	6.56	4.46	18.22	20.8	16.0	716
>100m	7.18	5.89	13.43	19.2	15.2	615
Total	6.42	6.19	21.31	18.1	12.1	4,273

Notes: Wealth groups are assigned according to initial wealth on the platform, plus the larger of average annual inflows and the largest monthly inflow observed for each portfolio. Returns are calculated at a monthly frequency, and annualized according to the average monthly log return of each investor multiplied by 12, expressed in percentage points. The standard deviation of average returns in column (3) reflects the dispersion of annualized equity returns across portfolios. The mean and median standard deviation of portfolio returns over time in columns (4) and (5) is calculated for the quarterly returns of each investor, and annualized. Concentrated positions (> 1 bn) are excluded, as are portfolios with fewer than three investments, and those observed reporting performance for less than two years.

Table 26: Risk-adjusted public versus private equity returns $\left(S_{ik} = \frac{\overline{r_{ikt} - r_{ft}}}{\sigma_{ik}}\right)$

	Wealth in logs		Wealth groups		Individuals f.e.s	
	(1)	(2)	(3)	(4)	(5)	(6)
Private dummy	0.13***	0.27***	0.13***	0.28***	0.16***	0.21**
	(0.03)	(0.10)	(0.03)	(0.10)	(0.04)	(0.10)
log(Initial Wealth$_i$)	0.03***	-0.03***				
	(0.01)	(0.00)				
3m-10m			0.02	-0.002		
			(0.01)	(0.01)		
10m-30m			0.05**	-0.04***		
			(0.02)	(0.01)		
30m-100m			0.06***	-0.09***		
			(0.01)	(0.01)		
>100m			0.07***	-0.13***		
			(0.02)	(0.02)		
Time fixed effects	Y	Y	Y	Y	Y	Y
Weighted OLS	Y	Y	Y	Y	Y	Y
Individual fixed effects					Y	Y
Comparison group	Alts	Private Co	Alts	Private Co	Alts	Private Co
Observations	120,807	80,169	120,807	80,169	79,802	7,486
R-squared	0.18	0.55	0.18	0.55	0.60	0.86

Notes: Returns on public equities, alternatives, and private businesses are calculated each month using the weighted average of investments' reported performance and allocations at the start of each month. The annual return is calculated using the sum of log returns over the months that each investor is in the data in each year. Returns on specific investments are winsorized at the top and bottom 0.5 percent of each sub-asset class on each date. The time fixed effect absorbs variation that is common to investors who are in the sample for the same subset of months. To prevent the estimates from being biased by the larger number of portfolios later in the sample, the observations are weighted according to the number of months in which each portfolio appears in the sample. Standard errors are double clustered at the portfolio and date level. Significance follows * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.