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Why Are the Wealthiest So Wealthy? A Longitudinal Empirical Investigation*

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Abstract

We use 1993–2015 Norwegian administrative panel data on wealth and income to study lifecycle wealth dynamics. At age 50, the excess wealth of the top 0.1%, relative to mid-wealth households, is accounted for by higher saving rates (34%), initial wealth (32%), and higher returns (27%), while higher labor income (5%) and inheritances (1%) account for the residual. One-fourth of the wealthiest—the "New Money"—start with negative wealth but experience rapid wealth growth early in life. Relative to the "Old Money", the New Money are characterized by even higher saving rates and returns, and also by higher labor income.

Keywords: Wealth inequality, lifecycle wealth dynamics, rate of return heterogeneity, bequests, saving rate heterogeneity
JEL codes: D14, D15, E21

*The "ⓡ" symbol indicates that the authors' names are in certified random order (Ray and Robson (2018)). The views expressed herein are those of the authors and do not reflect the ones of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors. Halvorsen acknowledges support from the European Research Council under the European Union's Horizon 2020 research and innovation program (grant agreement No. 851891). Ozkan acknowledges financial support from the Canadian Social Sciences and Humanities Research Council. For helpful comments, we thank seminar participants at the 2021 NBER SI Micro Data and Macro Models Group, 2021 Barcelona GSE Summer Forum, World Inequality Conference, EEA/ESEM, HKUST-Jinan, SEA, SED, Midwest Macro, SECHI Macro Group, Australasian Macro, Stanford, Wharton, EIEF, FRB Philadelphia, PUC Chile, UBC, UC Berkeley-Haas, Queen's, Central Bank of Chile, UNAB, McGill, FRB of Richmond, PHBS Macro Workshop, and Washington University St. Louis. Special thanks to Corina Boar, Chris Carroll, Mariacristina De Nardi, Andreas Fagereng, Fatih Guvenen, Greg Kaplan, Virgiliu Midrigan, Kurt Mitman, Ben Moll, Luigi Pistaferri, and Kjetil Storesletten for comments and helpful suggestions. Click here for the latest version.

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1 Introduction

Wealth concentration is increasingly at the center of academic and public discourse (see Piketty (2014)), prompting active debate on issues such as wealth taxation (e.g., Guvenen *et al.* (2019); Boar and Midrigan (2022)). To study these questions, however, cross-sectional evidence is not enough; we also need to know how the wealthiest accumulate their fortunes over their life cycle since different mechanisms imply different policy prescriptions. For example, do they inherit their wealth from their parents (De Nardi (2004))? Or do they build it up by consistently investing in high-return assets (Cagetti and De Nardi (2006); Benhabib *et al.* (2019)), by saving a higher portion of their income due to a higher precautionary savings motive (Castañeda *et al.* (2003)) or lower discount rates (Krusell and Smith (1998)), or by saving more as a result of higher lifetime earnings (Huggett (1996))? We shed light on these questions by empirically investigating household lifecycle wealth *dynamics* using Norwegian administrative *panel* data on wealth and income between 1993 and 2015.

Because of data limitations, the earlier literature has mostly analyzed wealth accumulation using quantitative models calibrated with cross-sectional data (see De Nardi and Fella (2017) for a survey). For example, in the US, the main data source on wealth, the Survey of Consumer Finances (SCF), is a triennial cross-sectional survey. The Panel Study of Income Dynamics (PSID) also collects wealth data since 1999, but does not sample the top 1% households well (Insolera *et al.* (2021)), even though they own more than one-third of total wealth. Finally, Saez and Zucman (2016) back out household wealth from administrative tax data by capitalizing incomes from different assets, but this method requires strong assumptions on returns (Smith *et al.* (2023)).

Norwegian administrative panel data has several advantages for the study of lifecycle wealth dynamics. First, its long panel allows us to document long-term wealth accumulation patterns. Second, its administrative nature and third-party reporting mean that there is little or no measurement error or attrition. Third, its richness allows us to jointly study the dynamics of financial and non-financial wealth, labor income, capital income, taxes and transfers, as well as inheritances and inter vivos transfers. In particular, since we observe all the components of the household budget constraint, we do not need to rely on assumptions on household behavior to fill in the missing gaps in the data. Finally, its large sample size allows us to obtain precise estimates for narrowly defined groups of households, including those at the very top of the wealth distribution.

Our analysis employs a nonparametric descriptive approach. For that, we retrospectively investigate the evolution of wealth, portfolio composition, rates of return, income sources, and saving rates by following the same individuals for the *past* 22 years, conditional on the *latest* wealth quantile and age group. This backward-looking approach, of course, selects on an endogenous variable (e.g., we condition on those households that reach the top). Hence, we complement this analysis with a forward-looking investigation that documents the same salient features of the data over the *subsequent* 22 years, conditional on *initial* wealth quantile and age group. These two approaches jointly paint a fuller picture of households' lifecycle wealth dynamics.

First, we document the evolution of average net worth over the life cycle for different wealth groups. On average, the wealthiest start their lives substantially richer than other households in the same cohort. For instance, the richest 0.1% of households aged 50–54 own on average about 120 times the economy-wide average wealth ($437,000 in 2015 and hereafter referred to as "*AW*"). The same individuals already owned $20 \times$ AW in their late 20s. Moreover, those in the top 0.1% among 25-year-olds own around 10 times as much wealth as those in the next 0.9%, and, going forward, this gap between these two groups roughly stays the same over the life cycle. Overall within-cohort wealth concentration, however, declines over the life cycle, especially between ages 25 and 35, mainly because the bottom half of the wealth distribution converges to the average wealth in the economy by accumulating wealth at a fast pace.[1]

For a more granular investigation of wealth mobility, we construct long-term transition probability matrices for narrow wealth groups. For brevity, we mostly focus on the retrospective analysis of the top 0.1% group among households aged 50–54 (the results for other age and wealth groups as well as forward-looking counterparts show similar patterns). We find that 29% of them were also in the top 0.1% group in their late 20s, with 65% starting out within the top 5%. However, a significant fraction of them start their careers with little or no wealth. We denote this group as the "New Money" and compare their lifecycle wealth dynamics to those who started rich, the "Old Money."

Second, we study households' lifetime portfolio composition and returns. As has been documented in cross-sectional data, wealthy households own mostly equity (e.g., Carroll (2000)). In addition, we find that the current wealthiest have invested a substantially higher share of their portfolio in equity, in particular private businesses, starting from

[1]This pattern is also visible in the US, where the wealth share of the top 1% declines from 60% at age 25 to about 30% at age 35 and remains relatively flat thereafter.

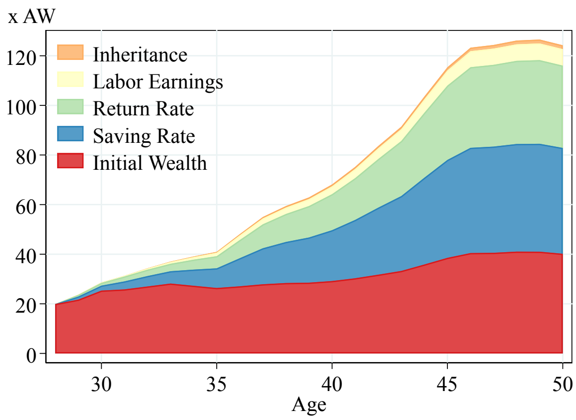
very young ages, even compared to other young households with similar wealth level. For instance, the portfolio share of equity for the wealthiest 0.1% hovers between 85% and 90% over the prior 22 years. These numbers are 4 to 12 percentage points (p.p.) higher than those of other households in the same cohort even after controlling for wealth. For below-median households, in contrast, housing is the single most important asset, constituting around 90% of their gross wealth over the lifecycle. Consistent with these large portfolio differences, richer households persistently earn significantly higher returns (see also Fagereng *et al.* (2020a); Bach *et al.* (2020)). The long-term average annual return on net wealth increases monotonically from around 1.5% for the bottom 50% of the wealth distribution to about 10% for the top 0.1% group. Interestingly, these differences are more pronounced among younger households. Furthermore, while we find mostly similar qualitative patterns within different asset types, the higher returns for top wealth owners are primarily a result of higher equity portfolio shares. Consequently, they also face more volatile but more positively skewed returns.

Third, we document the sources of income over the prior 22 years, which include initial wealth, inheritances and inter vivos transfers, labor income, capital income (from safe assets, real estate, and equity), as well as taxes and transfers (see also contemporaneous studies by Black *et al.* (2020, 2022)). The main source—83%—of lifetime income for top 0.1% wealth owners is equity income (including capital gains). In contrast, households in the bottom 90% of the distribution earn 80% to 90% of their lifetime income from labor services. Interestingly, inheritances (accrued between 1994 and 2014) constitute a negligible fraction of resources for all wealth groups. Furthermore, initial wealth and labor income are, on average, a small but still significant fraction of total resources for the wealthiest group, constituting 15.5% and 9.8% of lifetime resources, respectively. However, if we distribute capital income to four fundamental sources—(i) initial wealth, (ii) inheritances, (iii) labor income, and (iv) transfers net of taxes—initial wealth is the most important component for the wealthiest and, interestingly, much more than labor income is. This is because capital income from initial wealth compounds over more years than that accumulated from labor income, which is received gradually over the years.

Finally, we compute the past 22-year saving rate out of gross (Haig-Simons) income for each wealth and age group. Consistent with previous evidence (e.g., Fagereng *et al.* (2019)), the saving rate is strongly increasing in wealth from around 10% in the bottom half of the wealth distribution to over 70% for the top 0.1% across all age groups. Importantly, this positive correlation is not mechanical (i.e., higher saving rates moving

Figure 1 – Determinants of the Top 0.1% Wealth Accumulation

(a) Top 0.1%



(b) New Money

Notes: Figures 1a and 1b decompose the excess wealth accumulation of top 0.1% households aged 50—54 and of the New Money within the top 0.1% group relative to median-wealth households, respectively. The vertical axes show the wealth gap in multiples of the economy-wide average wealth (AW).

households up the wealth distribution); we find that the saving rate over the next 22 years also increases with initial wealth.[2]

As our primary contribution, we quantify the importance of each of the factors discussed above for top wealth accumulation. To do so, we simulate counterfactual wealth profiles by replacing each variable in the budget constraint (e.g., the return on net wealth, the saving rate, and so on) by its average value for a reference group, the middle 50% households of the same age. Since wealth accumulation is a dynamic and non-linear process, the order of replacement matters; therefore, we employ a Shapley-Owen decomposition that averages the marginal effects across all possible permutations. Our approach ignores behavioral responses and thus has to be understood as capturing the first-order effects of each dimension of heterogeneity. Yet, we view the simplicity and transparency of our method—which avoids relying on any behavioral assumptions—as an advantage that the completeness of our data allows for. Moreover, our findings provide a set of descriptive moments that can be used to benchmark structural models of wealth inequality. In ongoing work (Halvorsen *et al.* (2023)), we estimate such a structural model by targeting these moments to identify the heterogeneity in deep parameters.

We start by decomposing the excess wealth accumulation of the top 0.1% group relative to median-wealth households (Figure 1a). As individuals age, the relevance of initial wealth declines, whereas higher saving rates and rates of return increase in their

[2] A similar concern might arise about the positive correlation between past returns and wealth. Again, we find that *future* average returns are positively correlated with *initial* average wealth.

importance in explaining the wealth gap. By age 50, higher initial wealth (32.3%), higher saving rates (34.3%), and higher returns on wealth (26.7%) account for the majority of the wealth gap in similar proportions.[3] The small remainder results from higher labor income (5.3%) and higher inheritances (1.3%). From this analysis, we conclude that higher labor income and higher returns on wealth, commonly considered as the primary sources of wealth inequality, account for only a third of the wealth gap and that capturing the heterogeneity in initial conditions and saving rates is quantitatively crucial.[4]

As our second major contribution, we document significant heterogeneity among top wealth owners (both top 1% and top 0.1%). When we rank households within the top wealth group by their initial wealth, we find that the bottom quartile starts with negative average wealth of around $-0.5 \times \text{AW}$ and with little private equity. This group, the New Money, then rapidly grows their wealth early in life, as they earn even higher returns and save at higher rates compared to the top quartile, the Old Money, and increasingly shift their portfolio from housing to private equity. After 22 years, their portfolio allocation looks similar to that of the Old Money, although their net worth falls short of reaching the levels of the Old Money.

Applying the Shapley-Owen decomposition, we find that by age 50, higher saving rates (45.8%) and higher returns on net wealth (33.7%) primarily account for the wealth gap between the New Money and mid-wealth households, with higher labor income (16.1%) also contributing significantly (Figure 1b). Higher inheritances are only a minor factor (5.8%), and since they start out relatively poor, their lower initial wealth actually reduces the wealth gap slightly (-1.4%). In contrast, the fortunes of the Old Money by age 50 are mostly due to higher starting wealth (42.7%), with higher saving rates (29.5%) and higher returns (23.8%) accounting for the majority of the remaining gap with respect to the reference group, and only a small role for higher labor income (3.1%)

[3]Although we do not have data on inter vivos transfers and inheritances prior to 1994, we interpret differences in initial wealth mainly as unobserved intergenerational transfers. Using data on post-tax and transfer labor income—which we observe prior to 1993 as well—and extrapolating the observed return on wealth and the saving rate from the sample period, we find that capitalized savings from labor income can only account for 7.5% of initial wealth of the Old Money, who account for 95.2% of total top 0.1% initial wealth. Furthermore, for the wealthiest in younger cohorts whom we can follow back to age 18, we again find that initial wealth—which is most likely to represent intergenerational transfers—is the single most important source of lifetime income.

[4]Benhabib *et al.* (2019) reach a similar conclusion using a quantitative model targeted to US data. They find that idiosyncratic rates of return contribute to top wealth concentration but are not sufficient to explain it. Instead, saving and bequest behavior that increases with wealth is quantitatively more important in accounting for top wealth inequality.

and higher inheritances over the sample period (0.8%). These results highlight that the group of wealthy households is heterogeneous, composed of both successful self-made entrepreneurs that rise from the bottom and middle of the wealth distribution, and those that can be thought of as rentiers, who start their lives with significant wealth.

Related Literature. Our paper contributes to the empirical literature on the determinants of wealth accumulation. Recently, a set of studies has utilized the increased availability of rich administrative datasets to document dimensions of heterogeneity relevant for wealth accumulation in isolation. Fagereng *et al.* (2020a) and Bach *et al.* (2020) document return heterogeneity across the wealth distribution; Bach *et al.* (2017) and Fagereng *et al.* (2019) document saving rate heterogeneity across the wealth distribution. Our analysis brings together these different sources of heterogeneity to quantitatively decompose the importance of each of them for wealth accumulation. Because we observe all components of the household budget constraint in our data, we can decompose wealth dynamics over the lifecycle and across the wealth distribution empirically.

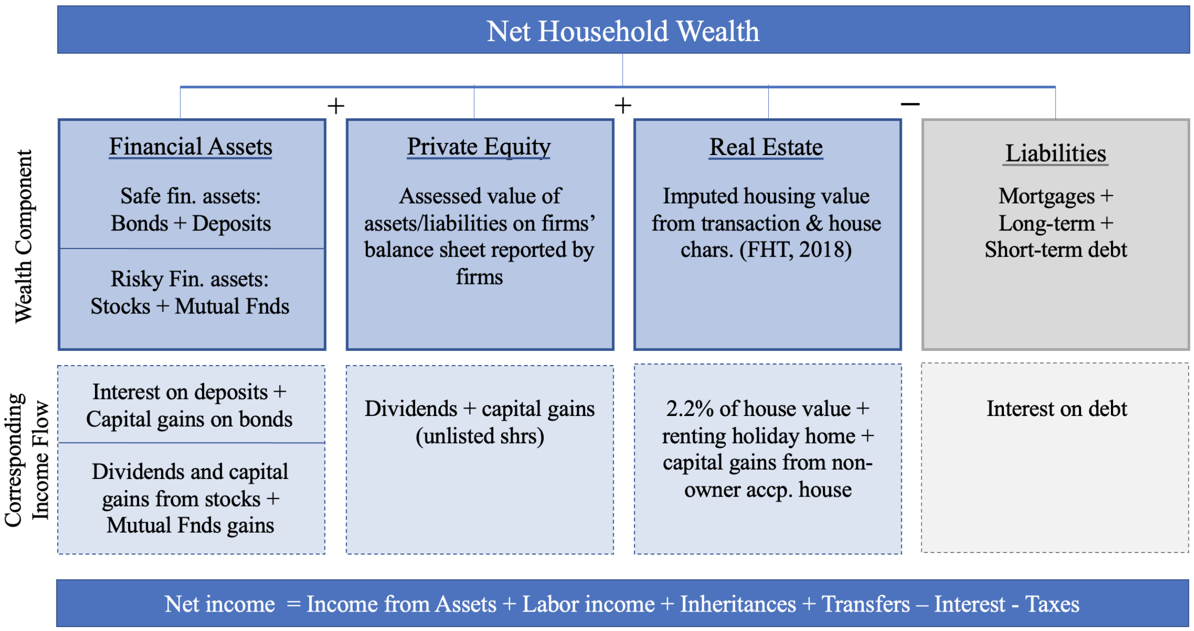
In a contemporaneous study, Black *et al.* (2020) also document that the main source of lifetime income for top wealth owners is equity income (also see Black *et al.* (2022) for the role of inheritances). However, this exercise falls short of explaining whether their large wealth is due to their high initial wealth, rates of return, or saving rates. Furthermore, Black *et al.* (2020) abstract away from heterogeneity within the top wealth owners, whereas we show large differences between New and Old Money.

We also relate to the quantitative-theoretic literature on wealth inequality going back to Imrohoroglu (1989), Huggett (1993), and Aiyagari (1994). Recent contributions to this literature have increasingly incorporated some of the empirical evidence on cross-sectional heterogeneity in returns (e.g., Benhabib *et al.* (2019), Hubmer *et al.* (2021), and Pugh (2018)), labor income (e.g., Kaymak *et al.* (2020)), and saving rates (e.g., Straub (2019)). We inform this literature by providing a new set of dynamic wealth profiles and an empirical decomposition of wealth dynamics—including the wealthiest—over the lifecycle that can be used to discipline quantitative models.

2 Data and Definitions

We use data from a combination of administrative tax and income records, which contain detailed information on assets, income sources, taxes, transfers, and demographic

Figure 2 – Summary of Variables



Notes: Figure 2 summarizes the main variables used in our analysis. See Appendix A for additional details.

information for the entire Norwegian population from 1993 to 2015. These registers include annual tax records, a shareholder registry, firm balance sheets, the inheritance tax registry, and the central population register. Most information on households is third-party reported to the tax authorities, ensuring accuracy and reliability.[5] Figure 2 summarizes the main variables used in our analysis.

Our measure of household net wealth accounts for all financial wealth (e.g., stocks, mutual funds, and bonds), non-financial wealth (e.g., real estate), and private equity, as well as the value of short- and long-term liabilities (e.g., credit card debt, student debt, and mortgages). We rely primarily on asset values and incomes reported through tax records. Similar data have been used by earlier work (e.g., Fagereng *et al.* (2020a, 2019)), so we relegate the details on the data sources and the description of all variables used in this study to Appendix A. However, a couple of remarks are in order to explain the measurement of some of the variables. Financial assets such as bank accounts, bonds, mutual funds, listed shares and other securities in the Norwegian Central Security

[5]Wealth and income are taxed in Norway (see Appendix A.4 for details). Crucially, Norwegians are asked to report all of their assets and liabilities even if they do not meet the threshold to be taxed. All assets and liabilities (as well as the incomes and the interest paid) are measured by December 31 of each year, so our data represent an end-of-year snapshot of individuals' balance sheets.

Depository (www.euronextvps.no), and liabilities (e.g., credit card debt, student debt, and mortgages) are quite accurately reported in tax records. The value of housing in each year is imputed from contemporaneous transactions data using a machine learning method developed by Fagereng *et al.* (2020b). For other real assets, such as farm land and real estate abroad, we use their tax values, which are usually based on purchase value net of depreciation.

The value of equity owned by the household is primarily derived from personal tax records and supplemented with detailed information on individuals' ownership of publicly traded stocks and tax values of private firms.[6] Tax values are set according to a detailed set of rules given by tax law (see tax form RF-1028). These rules mainly aim to measure asset values at their current sales price rather than at historical cost. Tax values of companies are highly correlated with their book values (Fagereng *et al.* (2020a)) but may differ because of different valuation rules (e.g., differences in depreciation rates, treatment of pension obligations, valuation of inventories, and so on). Neither measure includes intangible assets, and both are overall considerably lower than market values.

Most income components are precisely reported in tax records, including labor earnings (comprising salaries, bonuses, earnings from self-employment, etc.), interest income received, interest expenses paid, transfers, and taxes. Our data also contain information on dividends from equity. A tax reform in 2006 introduced a tax on dividends, which caused behavioral adjustments and incentivized holding private equity. First, incomes were shifted over time as large dividends were taken out prior to the reform and close to zero after. Second, holding companies were created so that dividends could be paid to the holding company from its subsidiaries, and the ultimate owner could thereby avoid (or delay) paying dividend taxes. In sum, there was an overall shift from dividends to retained earnings (capital gains) after the tax reform on 2006. Therefore, in line with previous papers using Norwegian data (Alstadsæter *et al.* (2016),Fagereng *et al.* (2020a, 2019)), we obtain both dividends and retained earnings using the link between individuals' equity ownership and companies' balance sheets given by the shareholder registry from 2005 onwards. Prior to 2005, we impute dividends and capital gains using post-2005 information, see Appendix A. Furthermore, because of the prevalance of holding companies at the top of the wealth distribution, we closely follow the approach in pre-

[6]Norwegian tax authorities regularly audit private firms to assess their value and compare it with the one reported in tax forms. Although not all firms are audited, firms with revenues over around $500,000 are required to have their balance sheets audited by an approved auditing entity.

vious papers that account for indirect ownership in the calculation of returns to equity. Using the rental-equivalence approach, we impute annual income from owner-occupied housing that is equal to 2.2% of the house value.

Finally, data on inheritances are available from 1995 (when the registry was first digitalized) until 2014 (when the inheritance tax was abolished). This registry contains all inter vivos transfers and inheritances—including those below the tax threshold—with information on donors, recipients, and taxes paid. It is important to note that assets in the inheritance registry are likely to be undervalued. For example, transfers of private equity were given a 70% discount on assessed values below NOK 10 million (around $1.5 million) until 2009, and a 40% discount later. When we compare the aggregate amount of total wealth in the year before death and the aggregate amount of bequests (summing up inheritances from the recipient side), we find that bequests in the inheritance tax registry account for only 40% of wealth at death on average. This discrepancy may reflect under-measurement of inheritances as well as donations, large health care expenditures in the year of death, and costs of transferring estate. We further discuss the role of mismeasurement in our results in Section 3.5.

Furthermore, the data exclude the value of private or public pensions. In Norway, more than 80% of all pensions are provided through a national insurance program, a pay-as-you-go scheme with a large degree of redistribution from the rich to the poor. Almost all the rest is covered by employer-provided pension plans, and only 0.3% of total pension wealth is held as personal pension plans. Only this small fraction is reported on the tax returns. In addition, our data exclude any wealth hidden offshore, which is not reported to the tax authorities of Norway. As shown by Alstadsæter *et al.* (2018), accounting for hidden wealth increases the share of the top 0.1% of households by 1 p.p. of total wealth. Finally, our data exclude assets whose value is difficult to measure (e.g., art or jewelry).

The main variable of interest in our analysis is net wealth, for which the natural decision-making unit is a household. Furthermore, the Norwegian government taxes the wealth of individuals in a household jointly. Therefore, for each individual we measure all variables—assets, liabilities, and income—at the household level. In our baseline sample, we consider all individuals who are 25 years old or more with non-missing net wealth. This leaves us with a sample of 51.3 million individual-year observations and an average of 2.2 million observations per year. We convert all nominal values to 2018 prices using the Norwegian Consumer Price Index.

2.1 Wealth over the Life Cycle

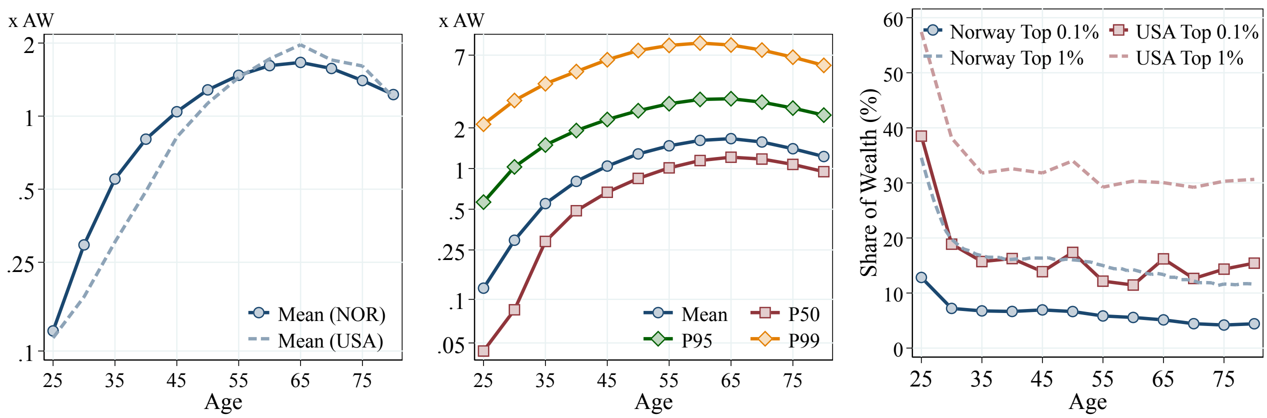
Before discussing the dynamics of wealth accumulation, we briefly describe the evolution of the cross-sectional wealth distribution over the life cycle. The average wealth displays a hump-shaped profile over the life cycle (Figure 3a), rapidly increasing from $0.15 \times$ AW to $1 \times$ AW between ages 25 and 45, after which wealth accumulation slows down before peaking at $1.6 \times$ AW at age 65. The median wealth grows faster than the average, indicating a steeper wealth profile in the bottom half of the distribution. For example, the median wealth increases by 20-fold from $0.05 \times$ AW to $1 \times$ AW between ages 25 and 55 versus the 2.5-fold growth for the 95th percentile (Figure 3b). Thus, wealth concentration declines over the life cycle with the share of total net worth held by the top 1% declining sharply from 35% at age 25 to 18% at age 35 (Figure 3c).

To draw broad comparisons with the US, we consider a similar sample of households from the SCF (see Tables C.4 and C.5 for moments of the distribution of wealth and income for this sample). The hump-shaped profile of average wealth and the decline in wealth inequality over the life cycle are not specific to Norway. For instance, the average wealth in the US increases from $0.15 \times$ AW to $2 \times$ AW between ages 25 and 65 and declines afterward (Figure 3a). Even though wealth concentration is significantly higher in the US (Figure 3c), it similarly declines over the life cycle, especially earlier in the working life.[7] These similarities suggest that similar economic forces can be in play behind the lifecycle wealth dynamics in both countries.

These cross-sectional patterns, however, present only a partial picture of the lifecycle wealth dynamics and are not sufficiently informative about the mechanisms through which wealth increases over time. For instance, although two individuals might appear at the top of the wealth distribution, one of them might have inherited a large fortune, whereas the other might have founded a successful start-up that propelled her to the top of the distribution. To disentangle these different paths, in the following sections, we exploit the panel dimension of our data and investigate the evolution of wealth by following the same individuals over their life cycle and across the wealth distribution.

[7]The decline in within-cohort wealth inequality contrasts with the increasing earnings inequality over the life cycle (Ozkan *et al.* (2022)).

Figure 3 – Wealth Distribution and Concentration over the Life Cycle



Notes: Panel A shows the within-age-group average. Panel B shows selected percentiles of the wealth distribution in Norway. In Panels A and B, we plot the age fixed effects from a Deaton-Paxson regression controlling for year effects. All values are expressed relative to the average wealth in the economy (AW) and scaled using an inverse hyperbolic sine transformation. Panel C shows the within-age-group share of wealth.

3 Life Cycle Wealth Dynamics

In this section, we document the salient features of the lifecycle wealth dynamics over the wealth distribution by employing two complementary approaches. In our main results, we retrospectively investigate the evolution of net wealth, portfolio composition, income sources, rates of return, and saving rates over the *previous* 22 years, conditional on age and wealth quantile at the end of the sample period. For example, we fix a group of households in the top of the wealth distribution in 2014 and 2015 within an age interval and follow them back to 1993 to document the key properties of their wealth dynamics. Although intuitive, this *backward-looking* approach suffers from a "survival bias"; for example, by focusing on the characteristics of the households that made it to the top, we might overlook important information about the unlucky ones that did not. For this reason, we complement our retrospective approach with a *forward-looking* investigation and document the same moments from the data over the *next* 22 years, conditional on wealth quantile and age in the beginning of the sample period. Next, we discuss the details of our methodology.

3.1 Methodology

Backward-looking Analysis. We group households by age and wealth in the latest years of our sample and then investigate their wealth accumulation history going back to 1993. In particular, for a given base year $\tau \leq 2015$, we group heads of households into

5-year age bins, $h \in \{45-49, 50-54, ..., 75-79, 80+\}$. Here, we restrict our analysis to individuals who are 45 years and older so that we can follow them back to when they were 22 years old in 1993. Then, within each age group h, we rank individuals with respect to their average net wealth between τ and $\tau-1$, $\overline{W}^h_{i,\tau} = (W_{i,\tau} + W_{i,\tau-1})/2$, where $W_{i,\tau}$ is the net worth of household i in year τ. We use the average wealth over two years to reduce the impact of transitory changes in wealth in our ranking.

We rank households into a total of nine wealth bins. First, we group households with negative average net wealth, $\overline{W}^h_{i,\tau} < 0$, into one bin and define a second group of those who end up with very small but positive wealth, $\overline{W}^h_{i,t} \in [0, W^{\min}_t)$, where $W^{\min}_t$ is about \$1,500 in 2018.[8] We then partition the remaining households into the following seven bins over the $\overline{W}_{i,\tau}$ distribution: $\{[W^{\min}_t, P50), [P50, P75), [P75, P90), [P90, P95), [P95, P99), [P99, P99.9), \geq P99.9\}$, where $P50$ denotes the 50th percentile of the $\overline{W}^h_{i,\tau}$ distribution, $P75$ denotes its 75th percentile, and so on. We denote each such backward-looking wealth group by BW^h_j.

Then, for each base year τ, for each wealth group j in each age interval h, we compute a set of moments $\mathbb{M}^\tau_{h,j}$ that are informative about the life cycle wealth dynamics (i.e., average wealth, average saving rate, and so on). As an attempt to control for year effects, we repeat this analysis for each base year $\tau \in \{2010, 2011, ..., 2015\}$ and take an average across base years.[9] Hence, in our figures we show the average of these moments across base years $\left(\overline{\mathbb{M}}_{h,j} = \frac{1}{6}\sum_{\tau=2010}^{2015} \mathbb{M}^\tau_{h,j}\right)$ by wealth and age group.

Forward-looking Analysis. In this case, we group households by their age and wealth in the initial years of our sample and investigate the wealth dynamics for these groups going forward. That is, we group heads of households 25 years and older into 5-year age bins in each base year $\tau \in \{1994, 1995, ..., 1999\}$. Then, within each age group h, we rank households with respect to their average net wealth in τ and $\tau-1$, $\overline{W}^h_{i,\tau}$, into the previously defined wealth groups. Again, as an attempt to control for year effects, we take an average of moments pertaining to wealth dynamics over all base years within an age and wealth group. We denote each such forward-looking wealth j and age h group as FW^h_j. This approach allows us to uncover the heterogeneity in the wealth accumulation paths that different households expect to experience going forward.

[8] $W^{\min}_t$ equals to the earnings derived from working 40 hours a week for a full quarter at half the minimum wage, which is around 12,000 NOK in 2018 (about \$1,500). On average, around 7% of households in our sample have net negative wealth, and less than 1% have positive but small net wealth.

[9] In practice, we could repeat this analysis for years before 2010 at a cost of a shorter panel. By choosing 2010 as the first year, we ensure that we can follow individuals for at least 16 years.

An important detail of our approach is worth discussing. Even though we measure wealth and income at the household level, in our analysis we follow *individuals* who are heads of households in conditioning year τ. It is possible that these individuals belong to different households in different years (for example, after marriages or divorces) or that they are not identified as the heads of households in some years. Recent research has shown that family formation might have important implications for wealth accumulation and inequality (e.g., Fagereng *et al.* (2022)); therefore, in a robustness analysis (Appendix E.4), we restrict our sample to stable households that remained unchanged during our sample period. We find that our results from this sample are quantitatively and qualitatively similar to our benchmark findings.

3.2 Dynamic Average Wealth Profiles

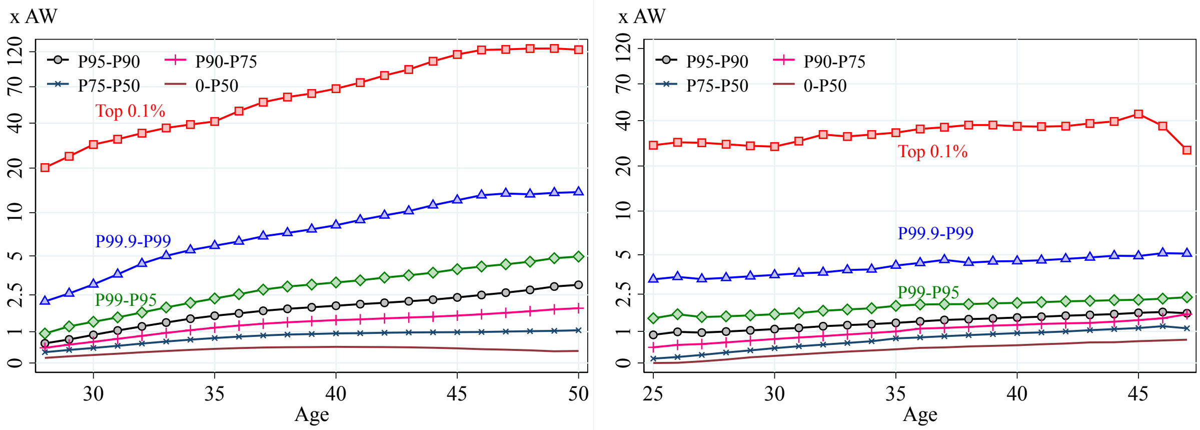
We start by documenting the evolution of households' average net worth over the life cycle for different wealth groups, both retrospectively (i.e., for BW_j^h groups) and going forward (i.e., for FW_j^h groups). To better distinguish the large differences in wealth across the distribution, we rescale wealth using the inverse hyperbolic sine transformation (IHS). Unlike logarithmic conversion, it can be applied to negative and very small values of wealth (see Pence (2006)). In particular, the IHS of wealth is given by $\ln\left(\theta W_{it} + \sqrt{\theta^2 W_{it}^2 + 1}\right)$, which is roughly equal to $\ln W_{it}$ for large values of W_{it} for $\theta = 0.5$, which we use in our analysis.

We find a substantial degree of persistence, especially at the top of the wealth distribution. On average, top wealth owners already had much higher initial wealth relative to their peers 22 years prior (Figure 4a). For instance, the households in the richest 0.1% group ($BW_{\geq P99.9}^{50-54}$) own about 120 × AW when they are 50 to 54 years old. The same households owned 20 × AW when they were in their late 20s, indicating a sevenfold increase in wealth over around 20 years. For the next 0.9% of the richest households, average wealth increased from 2.5 × AW to 15 × AW over the same period.

Similarly, the $FW_{\geq P99.9}^{25-29}$ group—those in the top 0.1% initially—owned around 30 × AW in the beginning of the sample period. Instead of seeing any mean reversion, this group increased their wealth to 40 × AW by their mid-40s (Figure 4b). In fact, the top group's wealth growth over the entire period is very similar to the wealth growth of the $BW_{\geq[P99.9-P99]}^{50-54}$ group. As a result, on average, the within-cohort wealth inequality in the right tail of the distribution remains mostly unchanged over the life cycle with relative wealth shares remaining roughly constant within the top 10% of the distribution (see

FIGURE 4 – AVERAGE WEALTH PROFILES

(A) Backward-Looking Wealth Profile (B) Forward-Looking Wealth Profile



Notes: Figure 4a shows the backward-looking average wealth profile for BW_j^{50-54}. Figure 4b shows the forward-looking average wealth profile FW_j^{25-29}. We plot the IHS of the average wealth of the group relative to AW.

Figure D.8). The patterns for other age groups show qualitatively similar results (see Figures D.9 and E.5 for backward- and forward-looking wealth profiles, respectively).

We only observe a decline in wealth inequality in the bottom half of the distribution as young households with little wealth experience a much steeper wealth growth, especially when they are between 30 and 40 years old. For instance, the youngest households below the 50th percentile of the wealth distribution ($FW^{25-29}_{[W_t^{\min},P50)}$) experience a 20-fold increase in their wealth from 0.05 × AW to 1 × AW (Figure 4b). Therefore, the decline in lifecycle wealth inequality shown in Figure 3c is mainly coming from the bottom half of the distribution converging toward the median as low-wealth households enter the working life with very little wealth and accumulate assets as they age.

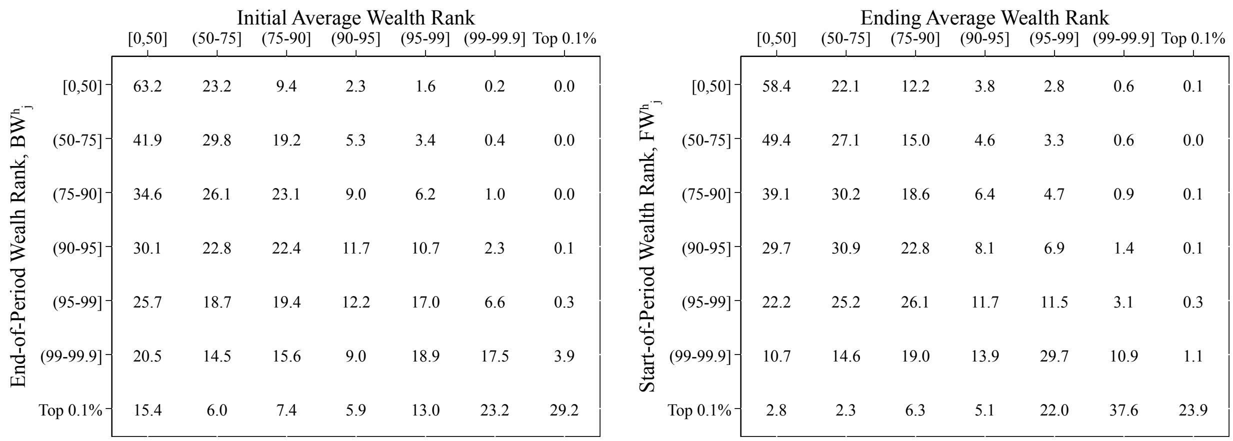
Long-term Transition Probability Matrix

To obtain a more granular picture of the intragenerational wealth mobility, we construct backward- and forward-looking long-term transition probability matrices. To this end, Figure 5a shows, among the 50- to 54-year-olds in the end of the sample period, the fraction of each wealth group j, BW_j^{50-54} (rows of the matrix), that comes from the nth initial average wealth ($\overline{W}_{i,1994}$) quantile (columns of the matrix).[10] Similarly, Figure 5b shows the transition probabilities between FW_j^{25-29} groups and 2014-2015 average

[10]We again take the average of transition probabilities over six base years $\tau \in \{2010, 2011, ..., 2015\}$, across which the length of the transition period varies between 23 years (between 2015 and 1993) and 18 years (between 2010 and 1993). The transition matrices for each base year are quantitatively very similar to each other and available upon request.

Figure 5 – Long-term Intragenerational Transition Matrix

(A) Backward-Looking Transition (B) Forward-Looking Transition



Note: Figure 5a shows the fraction of households in different percentiles of the wealth distribution in $\overline{W}_{i,1994}$ (columns), conditional on their percentile of the wealth distribution in the conditioning year, BW_j^{50-54} (rows). Each row sums to 100. Figure 5b shows similar results by initial wealth, FW_j^{25-29} (rows), and the wealth distribution in $\overline{W}_{i,2015}$ (columns).

wealth ($\overline{W}_{i,2015}$) quantiles for the households aged 25–29 in the beginning of the sample period. These two figures roughly correspond to the same cohorts.

Consistent with our previous results, more than 60% of $BW^{50-54}_{\geq P99.9}$ were already in the top 5% of their cohort initially, and 29.2% of them were already in the top 0.1% of the distribution (bottom row of Figure 5a).[11] This implies that households in the $BW^{50-54}_{\geq P99.9}$ group are 292 times as likely to come from the top 0.1% $\overline{W}_{i,1994}$ quantile relative to the population average. Similarly, more than 80% of $FW^{25-29}_{\geq P99.9}$ are still in the top 5% of the $\overline{W}_{i,2015}$ distribution, with around 24% being in the top 0.1% (bottom row of Figure 5b). We later refer to these households, who started their lives rich and have continued being rich, as the "Old Money" and investigate them in more detail in the following sections. Interestingly, the bottom row of Figure 5a also indicates that 21.4% of individuals who reach the top 0.1% of the wealth distribution started below the 75th percentile (sum of the two left columns). Later, we refer to this group of households as the "New Money" and contrast their wealth dynamics with that of the Old Money.

A second interesting aspect of Figure 5a is that a few wealthy households drop below the 75th percentile even after 20 years. For example, less than 2% of the households in the bottom 50% of the BW_j^{50-54} distribution (first row) come from the top 5% of the

[11]Because the wealth distribution is very skewed, the top 1% or the 0.1% wealth range is quite wide, which can mechanically explain the persistence at the top of the wealth distribution. Therefore, we have constructed an alternative transition matrix whose logarithmic states are equally distanced that shows similar patterns (Figure D.11).

$\bar{W}_{i,1994}$ distribution and almost none from the top 0.1%. Similarly, only around 5% of the top 0.1% of the FW_j^{25-29} distribution (bottom row of Figure 5b) fell to below the 75th percentile of the $\overline{W}_{i,2015}$ distribution. Thus, unlike the significant fraction for the New Money—who rise through the ranks of the wealth distribution—very few wealthy households fall off from the top of the wealth distribution. In this sense, rapid wealth accumulation is more common than rapid dissaving or squandering.

For brevity, in this section we have shown the transition matrices for the younger cohorts in our sample (those between ages 25 and 55). Similar figures for older cohorts show that wealth mobility is weaker for them (see Figures D.10 and D.43 for backward- and forward-looking transition matrices, respectively). For example, more than 80% of the top 0.1% group among 50- to 54-year-olds in the early years of the sample (i.e., $FW_{\geq 99.9}^{50-54}$ group) are still in the top 1% of their cohort in 2015. Thus, fewer individuals enter or exit the top wealth group among older households. Furthermore, the degree of mobility at the top end of the wealth distribution is slightly weaker compared to the labor earnings mobility in Norway, as reported by Halvorsen *et al.* (2022).

Given the similarities between the forward- and backward-looking transition matrices and our focus on those who reach the top ranks of the wealth distribution, in the rest of the paper, we concentrate on the results from the retrospective approach and discuss the differences with those from the forward-looking approach when necessary. A full set of results for the latter approach is presented in Appendix E.5.

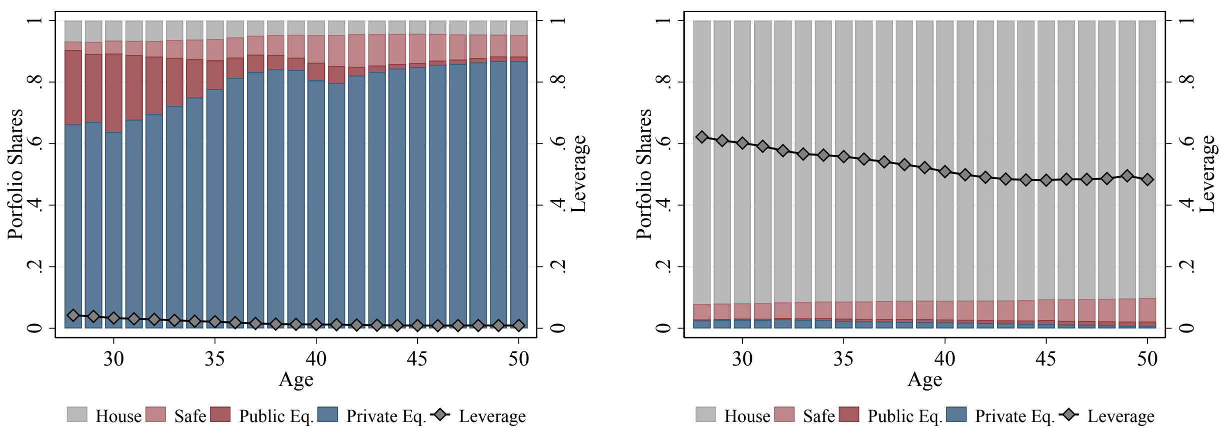
3.3 Lifecycle Portfolio Composition

Having shown how the average wealth evolves over the life cycle for different wealth groups, we now analyze differences in portfolio composition. We focus on four broad asset categories: housing (value of owner-occupied housing and other real estate), safe assets (bonds, cash, and deposits), public equity (directly held stock and mutual funds), and private equity (value of private businesses). We report their shares out of household's total assets. We also report the leverage as the ratio of all household liabilities (mortgages, credit card debt, student debt, and others) to the sum of assets. Finally, all the moments are weighted by the total value of assets of the household.

As has been extensively documented in cross-sectional data (e.g., Carroll (2000)), wealthy households on average hold most of their wealth in equity, in particular, in private businesses. We show that the wealthiest have invested a substantially higher share of

Figure 6 – Backward-Looking Portfolio Shares

(a) Households in the top 0.1% (b) Households in $[W_t^{\min}, P50)$



Notes: Figure 6 shows the evolution of the portfolio shares (left y-axis) and leverage (right y-axis) for households in BW_j^{50-54}. Portfolio shares are calculated as the ratio between the value of all assets in a particular category (e.g., total value of safe assets) over the total value of gross wealth (i.e., sum of wealth in housing, safe assets, public equity, and private equity) within a wealth rank and age group. Within-group leverage is the ratio between the sum all debt (e.g., mortgages, student debt, credit card debt) and the sum of all total assets within a wealth rank and age group.

their portfolio in private businesses starting from very young ages (Figure 6a). For the top 0.1% group of 50- to 54-year-olds ($BW_{\geq P99.9}^{50-54}$), the average share of the portfolio invested in risky assets (the sum of private and public equity) is mostly constant over the life cycle, staying above 80% across all ages and increasing up to 89% of the portfolio by age 50. For this group, private equity constituted around 60% of total assets early on in their lives and increases to 80% by their mid-40s, after which it stays roughly constant. Thus, the wealthiest alter the composition of their risky assets in favor of private businesses but keep the total share of risky assets more or less constant over their lifetime.[12] We find similar patterns for older cohorts (Figure D.12).

Have the current wealthiest invested in equity more heavily in the past compared to those with similar wealth and age, or do the aforementioned large portfolio shares for them reflect the cross-sectional correlation, as previously documented (e.g., Carroll (2000))? To investigate this question, we regress the portfolio equity share in every year

[12] Recall that our retrospective analysis may suffer from survival bias—that is, we focus on those who actually reached the top and overlook those that did not. So, it is possible that the current wealthiest are those who were lucky with their businesses and ended up in the top of the wealth distribution as well as with a large portfolio share of private equity. To investigate the possible role of endogeneity in our results, we turn to our forward-looking analysis for the same cohort. Figure D.44 shows the evolution of portfolio shares for the initially wealthiest group, $FW_{\geq P99.9}^{30-34}$. For this group, the share of the portfolio invested in risky assets is between 60% and 70%, and again, private equities constitute a majority of them. Thus, we conclude that survival bias plays a relatively small role in our retrospective analysis.

Table I – Equity Portfolio across Wealth Groups, $\overline{W}^h_{i,2015}$

	Total Equity	Public	Private
$\overline{W}^h_{i,2015} \geq P99.9$	0.124***	0.0090***	0.115***
	(0.0007)	(0.0005)	(0.0005)
$P99 \leq \overline{W}^h_{i,2015} < P99.9$	0.0882***	0.0127***	0.0756***
	(0.0002)	(0.0002)	(0.0002)
$P95 \leq \overline{W}^h_{i,2015} < P99$	0.0316***	0.0098***	0.0218***
	(0.0001)	(0.0001)	(0.0001)

Notes: Table I shows the coefficients of a panel regression of equity shares on $\overline{W}^h_{i,2015}$ dummies. The dummy for $\overline{W}^h_{i,2015} < P95$ is omitted. We control for age and year dummies, as well as dummies for current wealth for the following 28 wealth groups $\{< 0, [0, 0.5], (0.5, 1], (1, 2], (2, 3], ..., (24, 25], +25\}$. Standard errors are in parentheses (*** $p < 0.01$).

t between 1993 and 2013 on dummies for 2014–2015 average wealth groups ($\overline{W}^h_{i,2015}$). We control for the highly nonlinear contemporaneous relationship between wealth and portfolio shares by including 28 dummies of net worth in every year t ($W_{i,t}$) as well as year and age effects. Table I reports regression coefficients for the three highest wealth rank groups (the dummy for the residual group $\overline{W}^h_{i,2015} < P95$ is omitted). The coefficients increase monotonically and substantially from the lowest wealth groups to the highest. Even conditional on current wealth and age, those households that end up in the top 0.1% ($\overline{W}^h_{i,2015} \geq P99.9$) invest on average 4 p.p. more in equities compared to those that end up in the next 0.9% (($P99 \leq \overline{W}^h_{i,2015} < P99.9$), and over 12 p.p. more compared to those that end up below the 95th percentile. These differences mostly stem from a larger portfolio share of private businesses. Thus, we conclude that the current wealthiest have invested a substantially higher share of their portfolio in private businesses starting from very young ages compared to even those with similar wealth and age in the past.[13]

The (weighted) average portfolio shares mask interesting heterogeneity among top wealth owners. For example, 50% of the $BW^{50-54}_{\geq P99.9}$ group have less than 10% of their portfolio invested in private equity when they start their working lives (Figure D.13). The (unweighted) median portfolio share for private equity increases sharply from around 5% in the mid- to late 20s to around 50% by age 35 to 40. Furthermore, these households with low private equity shares in the portfolios are also relatively poorer among the top wealth group $BW^{50-54}_{\geq P99.9}$. We will revisit this group in Section 4 when we investigate the wealth dynamics of the New Money and Old Money separately.

[13]Private businesses are also very important for wealth concentration in the US (Cagetti and De Nardi (2006); Smith *et al.* (2019)). The private equity share of the richest households is higher in Norway relative to the US (Figure D.3) mainly because of several tax incentives to hold private equity in Norway.

Safe assets and housing have a much smaller share in the portfolios of the $BW^{50-54}_{\geq P99.9}$ group, and their shares also remain more or less constant over the life cycle, with a slight increase in the portfolio share of safe assets and a corresponding slight decline for housing wealth. Finally, top wealth owners maintain a very small amount of leverage over their lives, which never increases above 10% of total assets.

In contrast, for households below the 50th percentile ($BW^{50-54}_{[W^{\min}_t, P50)}$), housing is the single most important asset in their portfolios, constituting around 90% of their gross wealth throughout the sample period (Figure 6b).[14] Low-wealth households start their lives with much higher leverage (80% of total assets), mostly in the form of long-term debt (Fagereng *et al.*, 2020a). As they progress in life, leverage declines, but never below 50% of total assets.[15] These differences between high- and low-wealth households are similar across cohorts (Figure D.13). Moreover, although here we have focused on the left and right tails of the wealth distribution, Figure D.14 shows that portfolio shares are mostly monotonic in household wealth, such that the results for intermediate wealth groups are in between those of the top and bottom wealth groups.

3.4 Long-Term Returns on Portfolios

Large persistent return heterogeneity has been argued to be key for explaining the large wealth concentration at the top of the distribution (e.g., Benhabib *et al.* (2011)), and recent empirical evidence has found significant cross-sectional dispersion in returns (e.g., Fagereng *et al.* (2020a); Bach *et al.* (2020)). Intuitively, one should expect that those individuals that reach the highest wealth ranks have earned persistently higher returns relative to the rest of the population over the life cycle. Hence, having studied the differences in portfolio allocation, we now turn to returns from each asset class across

[14]The share of publicly-traded stocks, owned either directly by individuals or indirectly through mutual funds, is significantly lower in Norway relative to the US and other OECD countries, and the opposite is true for real estate wealth (Figure D.2 in the Appendix). Several reasons account for this difference between Norway and the US. First, the Norwegian government actively promotes homeownership through tax policies and housing market regulations; therefore, homeownership rates are above 80% in Norway compared to around 65% in the US. Second, the total value of public equity wealth relative to the GDP is small in Norway relative to the US. Third, the public pension system in Norway owns roughly one-third of the public equity (see Fagereng *et al.* (2019)).

[15]Notice that households with higher leverage are more likely to be in $BW^{50-54}_{[W^{\min}_t, P50)}$, which can partly explain the lack of decline in leverage after age 45 for this group. However, when we condition on initial wealth for the same cohort, we still find that those below the 50th percentile, $FW^{30-34}_{[W^{\min}_t, P50)}$, deleverage at a slow pace, as shown by Figure D.44 in Appendix E.5.

different wealth and age groups.[16]

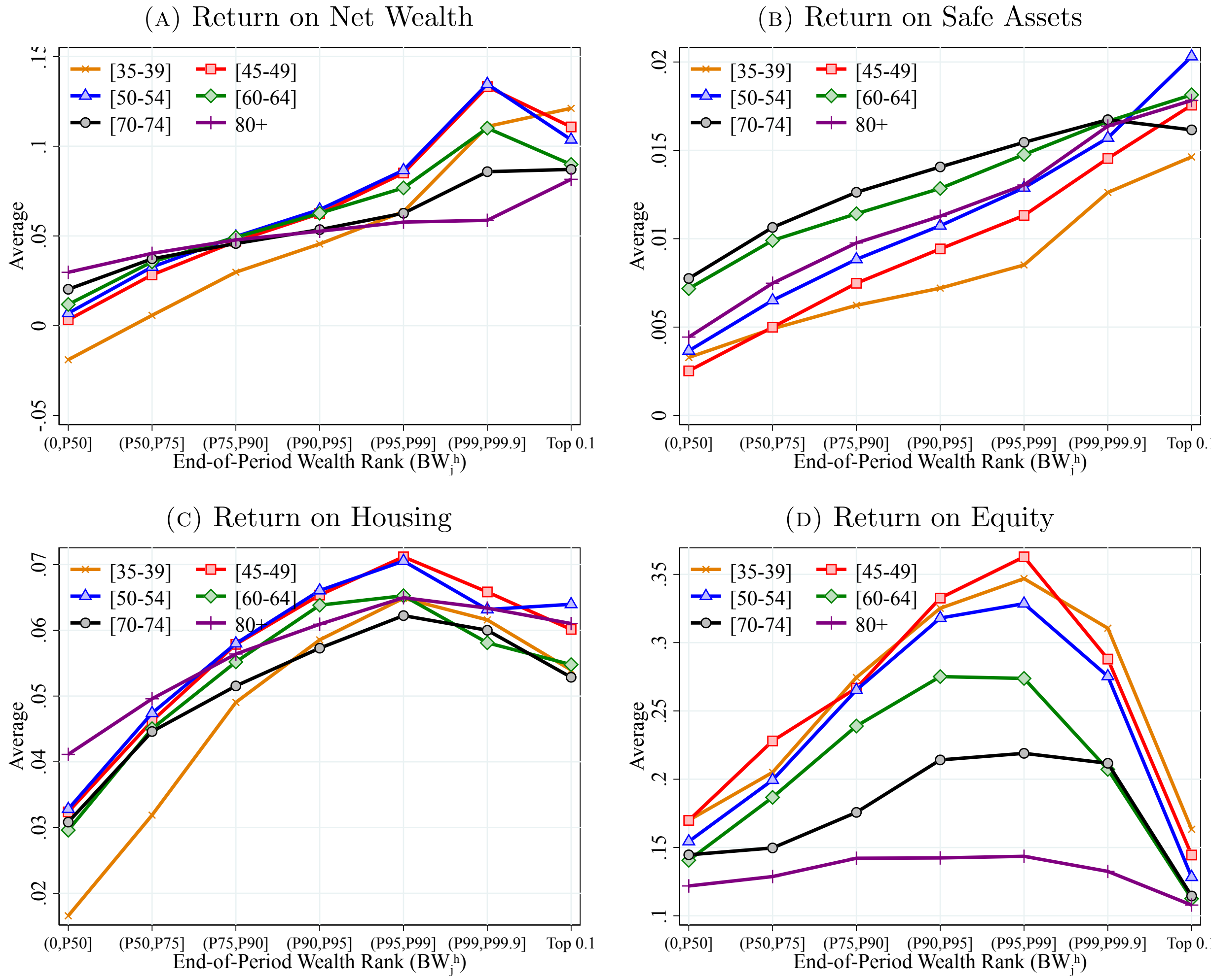
In our analysis, we follow Fagereng *et al.* (2020a), FGMP hereafter, in calculating rates of returns for households for each asset class. We measure the realized (i.e., not the expected) return as the ratio of annual income (including unrealized capital gains) generated from the asset to its value at the beginning of each year, which we adjust for intra year asset purchases and sales à la Dietz (1968). To avoid potential problems with outliers, we drop observations of returns for assets with values less than 1,500 NOK for our results in this section and we winsorize returns at the top and bottom 0.5 percent. Finally, we use data from shareholder registers on private companies to compute returns on private equity for each household. This dataset is only available from 2004 and onward. Therefore, unlike the rest of the paper, the results in this section are computed for the latter half of the sample period. We discuss the calculation of returns and compare our results to those from FGMP in Appendix A.3.

We note a few differences between our and FGMP's methodologies. First, FGMP use hedonic house price indices to determine the value of the real estate, whereas we impute house values according to their features (e.g., number of rooms) from contemporaneous transactions data using the machine learning approach developed by Fagereng *et al.* (2020b). Second, we calculate returns at the household level, rather than at the individual level, by aggregating all income from assets at the household level. Third, our sample is slightly different as we consider individuals 25 years and older with no maximum age limit. Despite these differences, we obtain a distribution of returns that is similar to that of FGMP in terms of cross-sectional moments (Table C.3), as well as their correlation with net wealth.[17]

[16]Unless noted differently, all moments of the return distribution presented in this section are gross returns and weighted by the value of the corresponding asset. For households with negative wealth holdings, we assign a weight of zero. The unweighted returns are shown in Figure D.16.

[17]Similar to FGMP, we find that the (unweighted) average annual return on net wealth increases over the wealth distribution, from an average of -5% for the first decile to 10% among the top 0.1% wealth owners (Figure D.4). Average return on safe assets is also increasing with net wealth but only above the 40th percentile. As for the return on real estate, we find a hump-shaped pattern over the wealth distribution except for a significant increase for the top 0.1% group. The patterns for weighted average returns—weighted by the corresponding asset value—for net wealth, safe assets, and real estate are roughly similar to those for the unweighted averages. The profile for returns on equity, however, differs significantly between weighted and unweighted measures. In particular, unweighted average returns increase over the wealth distribution, from around 12% for the bottom wealth decile to more than 20% in the top 1% group, and then decreases to 16% for the top 0.1% wealthiest. The weighted average, however, follows a pronounced hump-shaped pattern, increasing from 0% for the bottom decile to around 15% peak for those around the 90th percentile, and then declining to 6% for the top 0.1%

FIGURE 7 – LONG-TERM RETURNS ON ASSETS ACROSS THE WEALTH DISTRIBUTION



Notes: Figure 7 shows the value-weighted cross-sectional mean of annual returns within age and wealth groups averaged across different conditioning years.

Figure 7 presents the retrospective average annual return on different types of assets by age and wealth groups (BW_j^h) weighted by the asset value. Similar to the contemporaneous positive correlation between returns and net wealth—as documented by FGMP—Figure 7a shows large differences in the long-term average of annual returns on net wealth across the wealth distribution. For instance, for households aged 50–54 at the end of our sample period (i.e., BW_j^{50-54}), the average annual return on net wealth increases monotonically from around 0% at the bottom 50% of the wealth distribution ($BW^{50-54}_{[W_t^{\min},P50)}$) to about 10% for the top 0.1% group ($BW^{50-54}_{\geq P99.9}$). Interestingly, these differences are more pronounced among the younger cohorts. For example, there is al-

group. These results suggest strong decreasing returns to scale for equity, especially at the top of the wealth distribution, and are in line with the empirical evidence from Spain in Boar *et al.* (2022).

most a 14 p.p. difference between the highest- and lowest-return groups among 45- to 49-year-olds but only a 8 p.p. difference among households aged 75–79.

Return heterogeneity across the wealth distribution can stem from different sources. First, as we have shown in Figure 6, wealthier households invest a larger share of their portfolios in (public and private) equity. In our sample, the average annual return on equity is 12.0%, whereas the returns on housing and safe assets are 2.6% and 4.4% per year, respectively (Table C.3). Hence, portfolio composition is key for understanding why returns on assets are positively correlated with wealth.

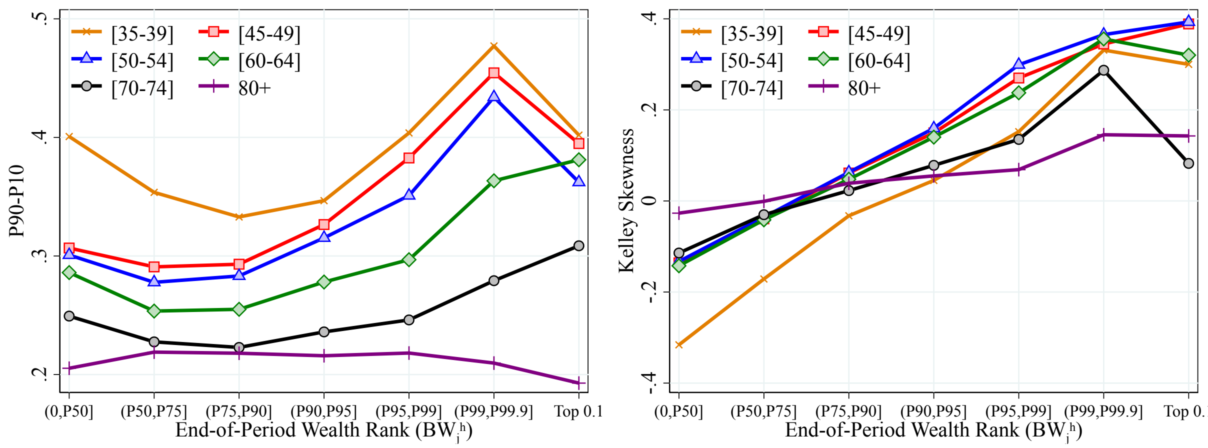
Second, wealthier households might also earn higher returns within each asset class. To see if this is the case, Figure 7 shows the retrospective average annual returns for each asset class for different wealth and age groups. The long-term average returns on safe assets increase almost monotonically in each age group, from 0.25% to 0.75% for the bottom 50% wealth group ($BW^h_{[W^{\min}_t, P50)}$) to 1.5% to 2.0% for the wealthiest households ($BW^h_{\geq P99.9}$), with older cohorts earning higher returns overall (Figure 7b). Returns on housing, instead, display a hump-shaped pattern over the wealth distribution, which is more pronounced for younger cohorts. For instance, for 50- to 54-year-olds at the end of the sample (i.e., BW^{50-54}_j), the long-term average annual return on housing increases monotonically from around 3% for the $BW^{50-54}_{[W^{\min}_t, P50)}$ group to about 7% for those in $BW^{50-54}_{[P95, P99)}$ and then declines to 5.2% for households in $BW^{50-54}_{\geq P99.9}$ (Figure 7c).

As for the average returns on equity—which constitutes most of the portfolios for wealthy households but very little for low-wealth households—we again find a hump-shaped profile over the wealth distribution (Figure 7d), which is similar to the contemporaneous relationship between wealth and returns on equity (Figure D.4b). Interestingly, the hump-shaped pattern is again much more pronounced for younger cohorts, with older ones displaying smaller differences in returns between different wealth groups. For instance, among households aged 50–54, average equity returns increase from 18% for households below the 50th percentile, $BW^{50-54}_{[W^{\min}_t, P50)}$, to 27% for those between the 99th and 99.9th percentiles, $BW^{50-54}_{[P95, P99)}$, and then decline to 10% for the top 0.1% group, $BW^{50-54}_{\geq P99.9}$. Thus, households in the top 0.1% of the distribution earned about 17% less from their equity investments relative to the next 0.9% group.[18] However, recall that the top 0.1% group $\left(BW^{50-54}_{\geq P99.9}\right)$ holds a much larger fraction of their portfolio in equity

[18]This finding might seem at odds with FGMP, who find a positive correlation between net wealth and returns. Recall that we also find that the *unweighted* average returns on equity increase over the contemporaneous wealth distribution (Figure D.4c). Yet, the *weighted* average displays a pronounced

Figure 8 – Dispersion and Skewness of Returns on Net Wealth

(a) Dispersion (b) Skewness



Notes: Figure 8 shows value-weighted cross-sectional moments of annual returns within age and wealth groups.

relative to even those in the next 0.9%. For example, those in $BW^{50-54}_{\geq P99.9}$ invest around 80% of their portfolio on risky assets starting very early in working life (Figure 6) versus 50% and 15% equity share for $BW^{50-54}_{[P99,P99.9)}$ and $BW^{50-54}_{[P95,P99)}$, respectively (Figure D.14). We conclude that top wealth owners earn higher returns mostly because they hold a larger fraction of their portfolio in equity.

The hump-shaped patterns of equity returns are qualitatively consistent with standard models of entrepreneurs operating a decreasing returns-to-scale production technology and subject to a collateral constraint (Quadrini (2000); Cagetti and De Nardi (2006); Buera *et al.* (2015)). Intuitively, more productive entrepreneurs accumulate more wealth, contributing to a positive relation between the returns to equity (or overall wealth) and wealth. However, conditional on entrepreneurial productivity, richer individuals realize a lower marginal and average return on equity since they are less financially constrained. Our findings suggest that up to the 99th percentile of wealth, the former effect is stronger, as in FGMP, whereas at the very top of the wealth distribution, the latter effect dominates, as in Boar *et al.* (2022). This interpretation is also consistent with the significantly lower leverage of the top 0.1% wealth owners relative to poorer households.[19]

Do the wealthier earn higher returns because their investments are riskier? To answer

hump-shaped pattern in the same sample. Therefore, differences between the results in this section and those in FGMP arise from using weighted as opposed to unweighted measures.

[19]Average leverage among top wealth owners is about 5% at age 35 and declines to less than 1% over the life cycle. In contrast, leverage for households between the 90th and 99.9th percentiles amounts to about 30% at age 35 and never declines below 20%.

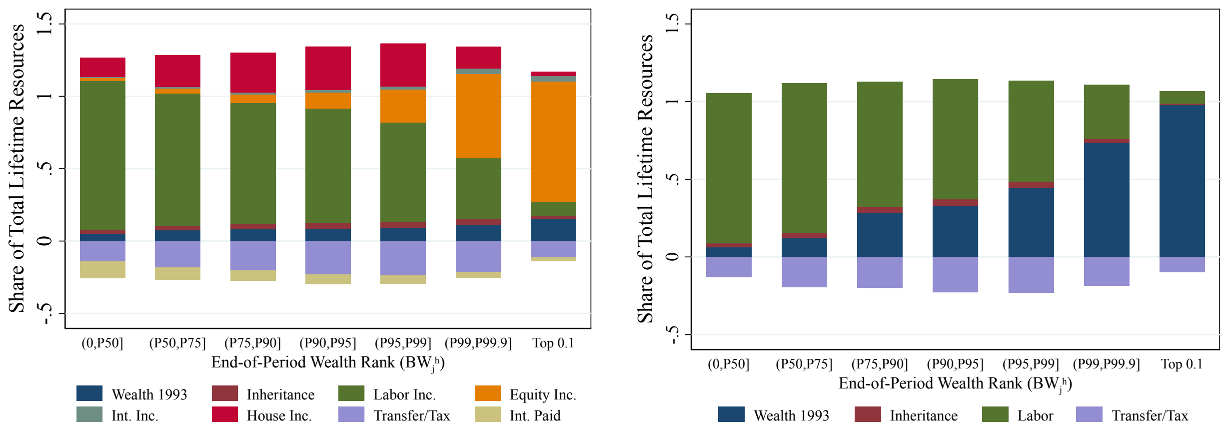
this question, we now discuss differences in the higher-order moments of the distribution of returns across wealth and age groups.[20] First, wealthier households face a somewhat more dispersed distribution of returns especially among the younger cohorts. For instance, among 45-year-olds the P90-P10 gap of the returns on assets increases from around 35% for households at the bottom 90% of the distribution to around 45% in the top 1% (Figure 8a). Returns become less volatile over the life cycle for all wealth groups but more so for the wealthiest, thereby, leading to very small differences between wealth groups in older cohorts. The higher dispersion of returns for high-wealth households is explained by the larger share of equity in their portfolios as returns for equity are more volatile with a standard deviation of 0.38 versus 0.025 and 0.19 for safe assets and housing, respectively (Table A.1). Otherwise, we find equity returns to be less volatile for the top 1% wealth groups compared to the rest of the population (Figure D.15a).

Do the wealthiest face higher disaster risk, which requires higher average returns to compensate? Figure D.15b shows the Kelley skewness (Kelley, 1947) measure, the share of total dispersion of returns on net wealth accounted for by the right tail relative to the left tail, $\mathcal{S}_{\mathcal{K}} = \frac{P90-P50}{P90-P10} - \frac{P50-P10}{P90-P10}$. The higher dispersion of returns on assets for richer households is also accompanied by a more positive skewness, indicating higher upside risk. For example, among households aged 50–54, those below the 50th percentile of the wealth distribution $(BW^{50-54}_{[W_t^{\min},P50)})$, the lower half of the return distribution constitutes 60% of the total dispersion of returns (i.e., $\mathcal{S}_{\mathcal{K}} = -0.2$). In contrast, those in the top 0.1% $\left(BW^{50-54}_{\geq P99.9}\right)$ have experienced positively skewed returns, with almost 70% of the total dispersion being accounted for by the right tail (i.e., $\mathcal{S}_{\mathcal{K}} = 0.4$). Again, these differences between wealth groups are explained more by the differences in portfolio composition—returns on equity are more strongly positively skewed relative to safe assets and housing (Table A.1)—than by within-asset class differences, as the Kelley skewness on returns on equity is relatively flat across the wealth distribution (Figure D.15b). Some of the results in this section can be explained by conditioning on an endogenous variable—that is, we select those who experienced higher and positively skewed returns on their investments, thereby becoming rich. As we show in figures D.46 and D.47, we find similar results if we condition by initial wealth.

[20]Again, for each base year $\tau \in \{2010, 2011, ..., 2015\}$ and for each wealth and age group j, h, we first calculate the value-weighted higher-order moments of the return distribution in each year t between 2004 and τ and then take an average across years t and base years τ.

Figure 9 – Decomposition of Total Lifetime Resources

(A) Lifetime Resources (B) Fundamental Income Sources



Notes: Figure 9a shows the shares of lifetime resources for BW_j^{50-54}. Figure 9b shows the shares of lifetime income accounting for capitalization for the same group.

3.5 Sources of Lifetime Income

So far we have documented that, on average, the current wealthiest started their working lives already quite rich and have invested their portfolio mostly in equity, which then allowed them to earn higher returns. In this section, we investigate the other sources of income and quantify their importance in the long-term resource constraint. To fix ideas, consider the sum of yearly budget constraints between 1993 and τ:

$$W_{i,\tau} = W_{i,1993} + \underbrace{\sum_{t=1994}^{\tau} \left[L_{i,t} + H_{i,t} + R^E_{i,t} + R^S_{i,t} + R^H_{i,t} + T_{i,t} - I^L_{i,t}\right]}_{\overline{Y}_{i,\tau}} - \sum_{t=1994}^{\tau} C_{i,t}, \tag{1}$$

In Equation (1), $W_{i,t}$ is household i's net wealth at the end of year t, and $L_{i,t}$ and $H_{i,t}$ are labor income (including self-employment income) and inheritances (including inter vivos transfers), respectively. Similarly, $R^E_{i,t}$, $R^S_{i,t}$, and, $R^H_{i,t}$ denote the income from equity (from public and private equity, including unrealized capital gains), safe assets, and real estate, respectively.[21] Finally, $T_{i,t}$ and $I^L_{i,t}$ represent public transfers net of

[21]The shareholder register on private limited companies is only available after 2004; therefore, we impute the capital income from private businesses before 2004. We have experimented with a variety of imputation methods that exploit the differences in wealth and equity portfolio shares. Our benchmark imputation relies on the insight that households that earn higher returns on equity increase their equity portfolio share. Therefore, we first divide our sample into groups based on household age and the growth rate of equity portfolio share and, using the post-2004 data, we calculate the average contemporaneous returns on equity (i.e., the ratio of equity income—including dividends and capital gains—to the value of equity) for each group. Finally, we apply these group-specific average returns prior to 2004. Our results from the post-2004 sample are very similar to the benchmark results. Other papers have used

taxes (including taxes on different sources of income, inheritances, and wealth) and total interest payments for liabilities (e.g., mortgages, student loans, credit cards, and so on), respectively. We denote the sum of these flows between 1993 and τ as the total lifetime household income of i, $\bar{Y}_{i,\tau}$. So, household i has $\bar{Y}_{i,\tau} + W_{i,1993}$ total lifetime resources at her disposal during this period, which she can split between consumption, $\sum_{t=1994}^{\tau} C_{i,t}$, and final wealth, $W_{i,\tau}$.[22]

We investigate the importance of each of these components by documenting their share out of total lifetime resources. For example, in order to quantify the importance of household labor income for individual i, we compute $\left(\sum_{t=1994}^{\tau} L_{it}\right) / \left(W_{i,1993} + \bar{Y}_{i,\tau}\right)$. As before, for each τ within each age h and wealth group j, we compute the average share of each income source weighted by the total lifetime resources of individuals, $\left(W_{i,1993} + \bar{Y}_{i,\tau}\right)$, and then take an average across base years, $\tau \in \{2010, 2011, ..., 2015\}$.

Figure 9a shows these average shares across different wealth groups among households aged 50–54. The most important source—83%—of lifetime income for the top 0.1% wealth owners is equity income (sum of dividends and capital gains). This is because, as we discussed above, top wealth owners are heavily invested in private businesses, which earn higher returns (see Figures 6a and 7a). In contrast, for households below the 90th percentile of the wealth distribution, labor income constitutes the majority of their resources with a share of 80% or more. For the top 0.1% group, initial wealth $W_{i,1993}$ (which captures the total resources available for the household at the beginning of the sample period) and labor income contribute a smaller but still significant fraction to the lifetime resources (16.7% and 9.8% of lifetime resources, respectively). Furthermore, initial wealth becomes more important as we move to older cohorts, who have had more time to accumulate wealth until 1993 (see Figure D.18). Inheritances (after 1994) on average account for a minuscule share of total resources (1.68%) even for the wealthiest group (see also Black *et al.* (2022)).[23] As discussed, inheritances might be undervalued, as measured inheritances on the recipient side account for only 40% of wealth at death at the donor side. However, even conservatively correcting this undervaluation by multiplying measured inheritances by a factor of three, the fraction of lifetime resources attributable

other methods to complete information prior to 2005. For example, Fagereng *et al.* (2019) approximate capital gains on publicly traded stock prior to 2005 using the OBXP stock price index.

[22] Our definition of total lifetime resources is similar to the measure of "Potential Wealth" in Black *et al.* (2020). However, they do not include capital gains from private equity.

[23] Although inheritances are a small fraction of total lifetime resources on average, some of the wealthiest partly owe their fortunes to large inheritances. For example, 10% of the 50–54-year-old top 0.1% group received more than 65% of their lifetime income from inheritances or initial wealth (Table C.7).

to inheritances is still small (5%). Finally, taxes net of transfers reduce the total lifetime resources for all wealth groups but much less so for the wealthiest group, indicating the favorable tax rates for equity income compared to labor income in Norway.

Fundamental Income Sources. The above analysis reveals that equity income constitutes the majority of lifetime resources for the top wealth owners. However, we do not know the initial or fundamental source of their equity investment. For example, if a household inherits some amount of wealth from which she earns most of her capital income over the life cycle, the initial amount of inheritance can be misleading for understanding its importance in total lifetime resources. To address this concern, we perform a second accounting exercise in which we distribute income from capital (including dividends and capital gains from equity, income and capital gains from housing, and income from safe assets) to four fundamental sources of income: (i) initial wealth at the end of 1993, (ii) inheritances, (iii) labor income, and (iv) net transfers from the government.

Note that in our data we do not observe how much of each one of the four components is saved versus consumed or what assets they are being invested in. Thus, we assume that households treat these sources of income equally in terms of consumption and savings as well as portfolio allocation decisions. For example, we assume that the saving rates for labor income and capital gains from housing are the same and the household invests these savings similarly in her portfolio. Following this approach, in each year we calculate cumulative incomes for the four fundamental sources, which includes the previous year's accumulated stock, the flow income, and their corresponding share of capital income. We then split the total capital income between the four sources according to their share out of the total accumulated stock.[24]

Figure 9b shows the results from this exercise. After distributing the capital income between fundamental resources, we find that the single most important component for

[24] In particular, consider a household i that starts 1994 with 1993 end-of-year wealth $W_{i,93}$ and earns labor income ($L_{i,94}$), receives inheritances ($H_{i,94}$) and public transfers, and then pays taxes ($T_{i,94}$). Then, for 1994 the accumulated stocks of these components are equal to their value in this year; that is, $\hat{W}_i^{94} = W_{i,93}$, $\hat{L}_i^{94} = L_{i,94}$, $\hat{H}_i^{94} = H_{i,94}$, $\hat{T}_i^{94} = T_{i,94}$. During the same year, household i also earns net capital income, given by $CI_{i,94} = \left(R^E_{i,94} + R^S_{i,94} + R^H_{i,94} - I^L_{i,94}\right)$. We then distribute the net capital income across household i's resources (labor, inheritances, and so on) according to their share out of total resources $CI_{i,94}\left(\hat{X}_i^{94}/\left(\hat{W}_i^{94} + \hat{L}_i^{94} + \hat{H}_i^{94} + \hat{T}_i^{94}\right)\right)$, where X denotes the resource type. Then, at the beginning of next year, 1995, the stock value of wealth is equal to $\hat{W}_i^{95} = \hat{W}_i^{94} + CI_{i,94}\left(\hat{W}_i^{94}/\left(\hat{W}_i^{94} + \hat{L}_i^{94} + \hat{H}_i^{94} + \hat{T}_i^{94}\right)\right)$. We proceed in the same way for other variables (e.g., for labor income, $\hat{L}_i^{95} = \hat{L}_i^{94} + CI_{i,94}\left(\hat{L}_i^{94}/\left(\hat{W}_i^{94} + \hat{L}_i^{94} + \hat{H}_i^{94} + \hat{T}_i^{94}\right)\right) + L_{i,95}$) and until 2015.

the wealthiest group is initial wealth in 1994. This finding is surprising considering that in the previous exercise, initial wealth and labor income constitute roughly similar shares of total resources in Figure 9a. Initial wealth plays a much bigger role in this decomposition because returns compound for more years for initial wealth relative to labor income or inheritances, which are received gradually between 1994 and 2015. As a result, even after accounting for capitalization, labor income and inheritances constitute a minuscule part of lifetime resources.[25] This is also true for other households at the top 5% of the distribution, for whom initial wealth is quite an important fundamental income resource along with labor income. Below the 95th percentile, however, most of the lifetime resources are derived from labor income.

These results suggest that the wealthiest manage to grow their substantial initial wealth by investing in private equity, which then earns very high returns. However, as discussed in Section 3.2, there is substantial heterogeneity within the top wealth group; in particular, some of these households start with very little wealth. We further investigate these differences within the top wealth group in Section 4. In Section 4.1.1, we also argue that the large initial wealth of the Old Money—which constitutes 95.2% of the initial wealth of top 0.1% households—is mainly from unobserved intergenerational transfers.

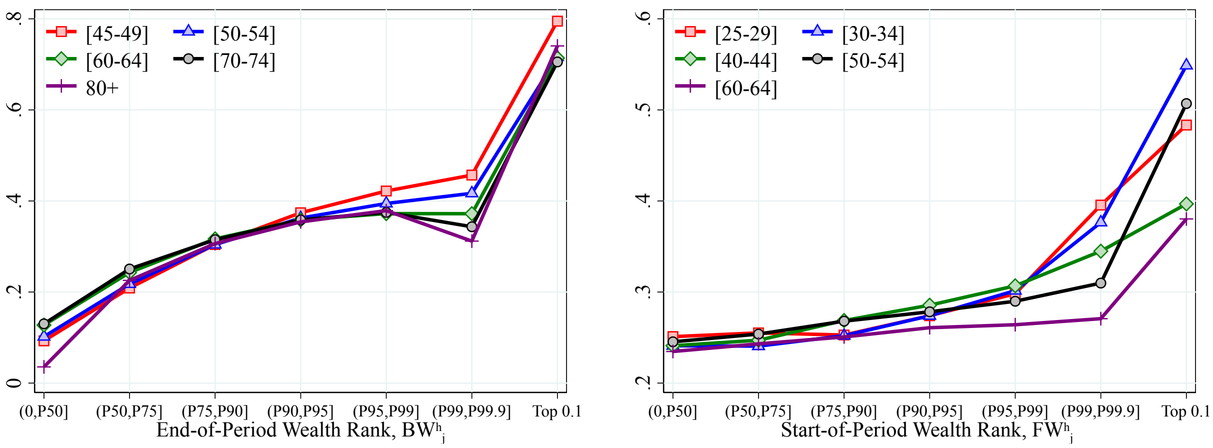
Lifecycle Saving Rate Heterogeneity Several papers have shown that richer households also save a larger fraction of their total resources relative to the rest of the population (e.g., Fagereng *et al.* (2019), Bach *et al.* (2017), Carroll (1998), and Dynan *et al.* (2004)). In this section, we show that this holds true from a lifecycle perspective as well and that the heterogeneity in lifetime saving rates is quantitatively significant. We define the lifetime saving rate for individual i as the ratio of cumulated savings over cumulated gross income (including capital gains). Using the notation of the budget constraint 1, the lifetime saving rate is given by $S_i = \left(W_{i,\tau} - W_{i,1993}\right)/\bar{Y}_i$. As before, for each τ within each age h and wealth group j, we compute the average saving rate weighted by the total lifetime income of individuals, $\bar{Y}_i$, and then take an average across base years τ.

Figure 10a shows that the saving rate is increasing conditional on the end-of-period wealth group, BW_h^j, ranging from 5% to 15% for the bottom half of the wealth distribution to 70% to 80% for the top 0.1%, with relatively little variation by age. That is, the

[25] Black *et al.* (2020) employ a similar strategy to uncover the components for what they call "Deep Potential Wealth." Relative to our approach, they use the average rate of return in each year, which varies by the net wealth decile of the individual (with the top 1% as a separate category) to capitalize the stock variables. Our results are consistent with theirs in that inheritances received between 1994 and 2015 do not represent a significant fraction of total resources.

Figure 10 – Lifetime Gross Saving Rate Across the Wealth Distribution

(a) Backward Looking — (b) Forward Looking



Notes: Figure 10 shows the lifetime saving rate by age and wealth group, defined as cumulated savings over cumulated gross income within BW_j^h and FW_j^h wealth groups.

richest households save around three-quarters of their lifetime income, while the middle class (P50-P75) saves around 20% of their lifetime income. These patterns are qualitatively and quantitatively similar to those reported in Fagereng *et al.* (2019).[26] Obviously, these large differences have strong implications for the differential wealth accumulation patterns between the wealthiest and the rest of the population, which we systematically investigate (along with other possible explanations) in Section 5.

A potential concern is that the positive correlation between wealth and saving rates is mechanical, as higher saving rates move households up the wealth distribution. However, Figure 10b confirms that lifetime saving rates across the wealth distribution are also strongly increasing in wealth when ordering households by initial wealth instead (FW_h^j). Although the relationship is quantitatively weaker—the mechanical effect discussed above is present—it is still strong: while households starting below P75 save around 25% of their lifetime income, those starting in the top 0.1% save between 40% and 55%. Although in this paper we do not provide a structural interpretation of this pattern, a few additional comments are in order. Even in standard models with homo-

[26] Fagereng *et al.* (2019) emphasize that the increase in the gross saving rate along the wealth distribution is driven by higher capital gains, and that the net saving rate (excluding capital gains) is rather flat across the wealth distribution. We confirm that a significant fraction of gross savings is coming from capital gains, at the top in particular from private businesses. We use the gross saving rate (which also includes capital gains) in this paper and do not attempt a decomposition into gross and net savings: our focus is on the wealthiest, whose portfolios consist mostly of private equity, for which capital gains represent retained earnings. Our gross saving rate approach treats business income symmetrically regardless of whether profits are retained in the firm or paid out to the firm's owners.

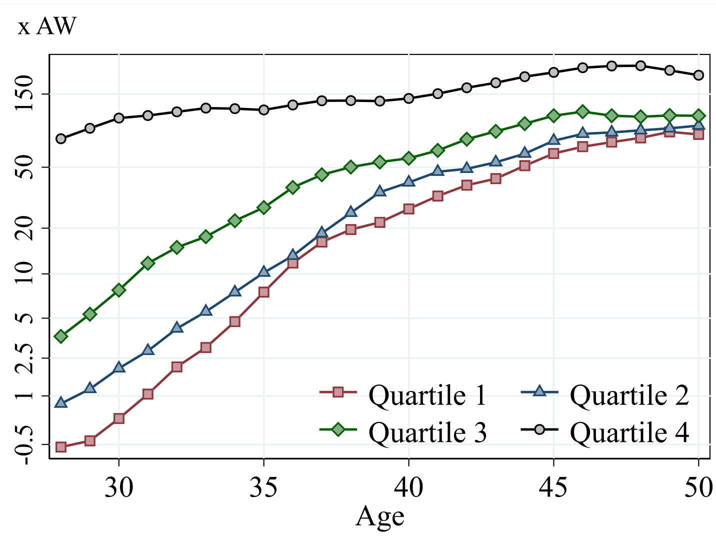
thetic intertemporal preferences, the saving rates of the rich may be higher as long as their temporarily high incomes from labor or capital are expected to mean-revert over time (see, e.g., Hubmer *et al.* (2021)). As we have seen in Section 3.4, the wealthiest face more volatile but positively-skewed capital income, which constitutes most of their lifetime resources. Furthermore, their labor income is also more volatile and slightly more positively skewed (Figure D.22). However, the magnitude of lifetime saving rate heterogeneity suggests an underlying non-homotheticity in preferences (see, among others, De Nardi (2004) and Straub (2019)).

4 New Money versus Old Money

In Figure 4 we have shown that, *on average,* the wealthiest households start their working lives dramatically richer than the rest. However, Figure 5a reveals that at least a quarter of them had very little wealth at the beginning of our sample period. In this section, we study the within-group heterogeneity among the wealthiest. For this purpose, we rank the households in the top 0.1% group aged 50–54 $\left(BW^{50-54}_{\geq P99.9}\right)$ according to their initial average wealth ($\overline{W}_{i,1994}$) into four quartiles (Figure D.24 shows similar patterns for other age groups). We call the bottom quartile households the "New Money," who start their working lives with little wealth and reach the top of the wealth distribution later. The top quartile is then called the "Old Money," who start at the top of the wealth distribution within their cohort and remain in the top wealth group.

Before comparing the wealth dynamics of these groups, we first discuss whether the New Money actually come from modest backgrounds with little resources or their initial wealth is low only because they receive intergenerational transfers later in life. We first investigate whether they have wealthy parents. We find that the Old Money are much more likely to have rich parents. For instance, 6.2% and 26.5% of the Old Money have parents in the top 0.1% and top 1% of their cohorts' wealth distribution, respectively (see Figure D.25). In contrast, only 1.1% and 6.8% of the New Money have parents in the top 0.1% and top 1% of the wealth distribution, with 75% of their parents being in the bottom 90%. Second, we compare the lifetime incomes sources of New Money and Old Money to see how important inheritances are for them. We find that inheritances constitute a slightly higher fraction of total lifetime resources for the New Money compared to the Old Money, but the shares are still small, accounting for 3.6% and 1.5% of total resources, respectively (see Figure D.23). These findings suggest that most New Money

Figure 11 – Average Wealth Profile: Old Money and New Money



Notes: Figure 11 shows the average wealth profile for households in the $BW^{50-54}_{\geq P99.9}$ wealth-age group, which are in different quartiles of the initial average wealth distribution $(\overline{W}_{i,1994})$.

households are indeed self-made and come from modest backgrounds.

4.1 Average Wealth Profiles

By construction, the Old Money start with larger initial wealth than the New Money when these households were in their late 20s, but what is surprising is the magnitude of differences (Figure 11). In particular, the Old Money (Quartile 4) have, on average, a net worth of around $75 \times$ AW in the economy in 1993 versus a negative $0.5 \times$ AW for New Money (Quartile 1). The New Money then experience significant wealth growth during this period, and their wealth grows steeply in the first 10 years of their working lives, after which the growth rate slows down, generating a concave lifecycle wealth profile. As for the Old Money, their wealth more than doubles over the first two decades of their working lives. As a result, even though the gap between the Old Money and the New Money shrinks significantly, it remains quite large even after 22 years. Notice also that, because the wealth distribution is very concentrated, especially in younger ages (Figure 3c), the two middle quartiles are closer to the New Money than to the Old Money, in terms of their initial wealth and lifecycle wealth dynamics.[27]

[27] Smith *et al.* (2019) also find that in the US, more than 75% of top earners are self-made and unlikely to receive large financial inheritances or inter vivos gifts.

4.1.1 Where does initial wealth (of the Old Money) come from?

Although we do not have data on inter vivos transfers and inheritances prior to 1994, some of our data sources are available pre-1994. We now provide three complementary sources of evidence that all imply that the vast majority of the initial wealth of the Old Money should be thought of as intergenerational transfers. Since the Old Money account for 95.2% of the total wealth holdings of the top 0.1% group in 1993, our calculations here likewise imply that the majority of initial wealth of the top 0.1% group as a whole should be interpreted as intergenerational transfers.

First, we extend our sample period and use information on post-tax and transfer labor earnings since 1967, which allows us to bound the role of labor income in accumulating initial wealth in 1993. Focusing on the 50–54-year-old Old Money households, the sum of labor earnings prior to 1993, after age 18—the age at which individuals enter the tax records—amounts to $5.4 \times$ AW, or 7.1% of initial Old Money wealth. Thus, labor income earned before our sample period cannot explain their large initial wealth.

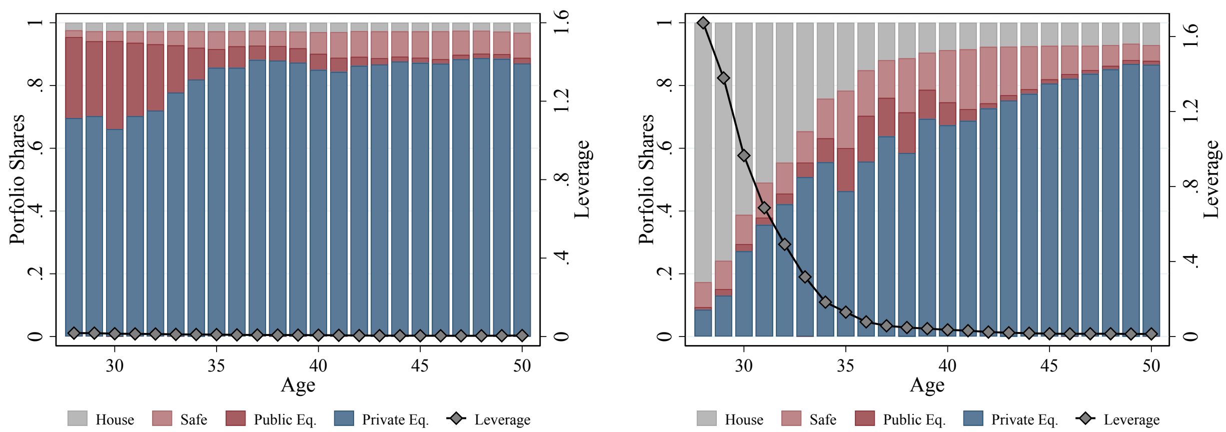
Second, instead of simply summing up all labor income, we capitalize it after age 18 until 1993 using the average saving rate and return on wealth observed between 1993 and 2015 for this group. The Old Money would have accumulated $5.7 \times$ AW from their labor income prior 1993, which accounts for only 7.5% of their initial wealth holdings. Table C.9 shows similar analysis for other cohorts: estimated savings from labor income account for 3.3% of the initial wealth of the 40–44 year old cohort, and at most 9.2% of the initial wealth of the 55-59 year old cohort.

Third, we extend our analysis on sources of lifetime income to 25-to-40-year olds in 2014, whom we can follow back to age 18 . We find that initial wealth (at age 18) is at least as important for these younger households as it is for older individuals. For example, top 0.1% households aged 30–34 own roughly $38 \times$ AW in 2014; they already owned $25 \times$ AW at age 18. For them, initial wealth accounts for 95% of fundamental income sources (Figure D.20). Initial wealth at age 18 is most likely to represent transfers from parents early in life. In summary, we interpret initial wealth mainly as unobserved intergenerational transfers.[28]

[28] Boserup *et al.* (2018) also find that initial wealth at age 18 is important for wealth inequality later in life in Denmark. Similar to us, Charles and Hurst (2003) use PSID data to show that (observed) inter vivos transfers and bequests explain little of the intergenerational wealth persistence. However, our results show that unobserved intergenerational transfers (in the form of initial wealth) are crucial for the wealth accumulation of the Old Money.

Figure 12 – Portfolio Shares: Old Money and New Money

(A) Old Money (B) New Money



Notes: Figure 12 shows the portfolio composition and leverage for households in the $BW^{50-54}_{\geq P99.9}$ wealth-age group. Old Money in Panel A (New Money in Panel B) are households in the fourth quartile (first quartile) of the initial average wealth distribution $(\overline{W}_{i,1994})$.

4.1.2 A Brief Digression: Forward-looking Profiles

As not all the wealthiest started wealthy, not all of them stay wealthy going forward either. In Figure D.51, we split the initially wealthy households $(FW^{25-29}_{\geq P99.9})$ into four quartiles according to their end-of-sample-period wealth, $\overline{W}_{i,2015}$, and then document the average net worth for each group separately. We find substantial heterogeneity in the outcomes of these households, even though they all started in the top 0.1% of the distribution. In particular, those who end up in the bottom quartile in 2015 started with more than $10 \times$ AW and squandered this wealth to around average wealth in 2015. Although these patterns are interesting on their own, in what follows we center our attention on the New Money and Old Money households. Additional results from this approach are presented in Appendix E.5.

4.2 Portfolio Composition

How do the New Money achieve the accumulation of wealth at such a rapid pace? To investigate this question, we now turn to analyze the differences in portfolio composition for the Old Money and New Money (Figure 12). The New Money start their working lives with less than 10% of their portfolios being invested in equity before the age of 30. As they grow their portfolio, its composition shifts from housing to private equity, whose share reaches to around 90% of the portfolio by their 50s, similar to the private equity share of the Old Money. Interestingly, the New Money start highly indebted—with a

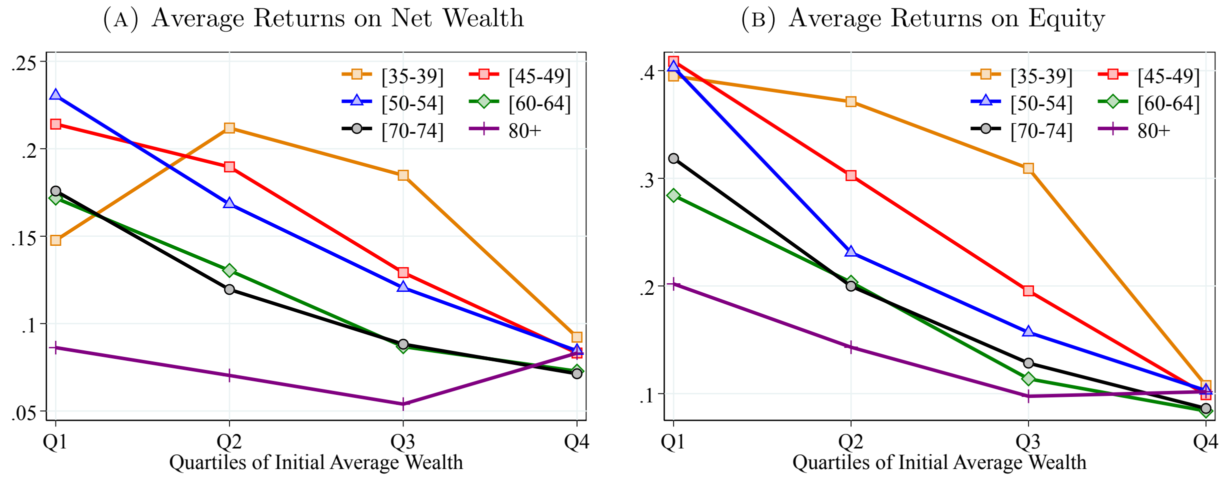
1.6 debt-to-asset ratio (thereby starting with negative average net wealth)—but quickly reduce their leverage over the first 10 years. These facts are consistent with standard entrepreneurship models with borrowing constraints (as in Cagetti and De Nardi (2006); Quadrini (2000)) in which highly productive but poor entrepreneurs leverage to invest in their firms.[29] Similar to our results for top wealth owners, we find that the Old Money have always been heavily invested in equity and, in particular, in private business. And they further alter the composition of their risky assets in favor of private businesses as they get older, but keep the total share of risky assets more or less constant over their lifetime. They are not levered at all; the debt-to-asset ratio is very small for them as well. Figures D.28 and D.29 show similar patterns for other age groups and the top 1% $\left(BW^h_{\geq P99}\right)$, respectively.

Rates of Return on Investment. Having shown the differences in portfolio allocation between the New Money and Old Money, we now turn to rates of return on their investment. Starting with the return on net wealth, we find that the New Money have earned substantially higher returns across all age groups, though the differences are more pronounced for younger cohorts (Figure 13a). For example, for those between 35 and 39 years old, the average return on net wealth is around 15% for the New Money versus around 10% for the Old Money. This is surprising because, as we discussed above, the New Money initially have less equity in their portfolios, which earns much higher returns compared with other types of assets. Hence, we also investigate average returns for each asset class individually.

Earlier in life, the New Money is mostly invested in housing, from which they do not earn higher returns compared to the Old Money (Figure D.30b). Moreover, we do not find significant differences for returns from safe assets between these groups either (Figure D.30b). Instead, the differences in net wealth returns are mainly accounted for by the higher equity returns for the New Money relative to the Old Money (Figure 13b).

[29] Do the New Money typically own single-establishment firms in professional services (e.g., lawyers, consultants) or health services (e.g., medical doctors, dentists)? To investigate this question, we compare the educational backgrounds of the New Money and Old Money and find very little differences (Figure D.26). Most have a high school education or less (38% of New Money and 48% of Old Money), 10% of both groups have law or medical degrees, and a larger proportion have finance degrees among the Old Money. Furthermore, wealth accumulation dynamics for the New Money and Old Money are similar among medical doctors and lawyers (Figure D.27). This evidence indicates that highly educated entrepreneurs neither drive the differences between the New Money and Old Money nor are heavily represented in the top wealth groups (unlike Smith *et al.* (2019) have shown for the US). This is, in part, because health care is provided by the public sector in Norway and Norway is a civil law country, whereas the US follows the common law legal system (where lawyers play a more significant role).

Figure 13 – Long-Term Returns: Old Money and New Money

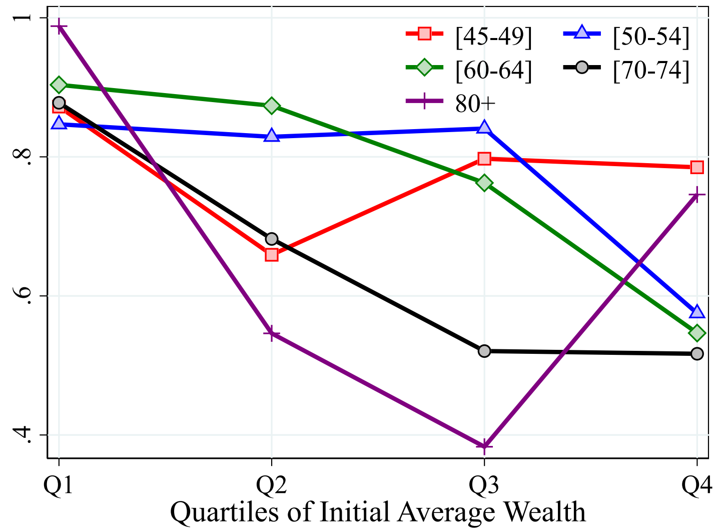


Notes: Figure 13 shows the 11-year mean of the value-weighted average returns for households in the $BW^h_{\geq P99.9}$ wealth group, which are in different quartiles of the initial average wealth distribution $(\overline{W}_{i,1994})$.

For example, again for the youngest cohort, the New Money have earned a staggering 40% annual average return on their equity investment versus around 10% for the Old Money. Thus, even though the New Money have a smaller share of their wealth invested in equity, the much higher returns from these investments allow them to earn higher long-term returns on net wealth relative to the Old Money.

The higher returns on equity for the New Money, however, are associated with higher risk compared with the Old Money (Figure D.32). For instance, among 35- to 39-year-olds, the P90-P10 gap of the returns on net wealth is around 60% for the New Money versus slightly below 40% for the Old Money. Again, these differences are more pronounced for the youngest age groups. Furthermore, they are mainly driven by equity investment being riskier for the New Money relative to the Old Money. For the same age group, the P90-P10 gap for returns to equity is almost 110% for the New Money but around 40% for the Old Money. Though the New Money face more volatile returns, the higher dispersion of returns on equity for them is also accompanied by a more positive skewness, indicating higher upside risk (Figure D.33). For example, in the same age group, the upper half of the return distribution accounts for 72.5% of the total dispersion of returns ($\mathcal{S}_{\mathcal{K}} = 0.45$) for the New Money versus 60% ($\mathcal{S}_{\mathcal{K}} = 0.2$) for the Old Money.

FIGURE 14 – SAVING RATE: OLD MONEY AND NEW MONEY



Notes: Figure 14 shows the lifetime saving rate for four quartiles in the $BW^h_{\geq P99.9}$ group according to their initial average wealth distribution $(\overline{W}_{i,1994})$. For the definition of the lifetime saving rate, see Section 3.5.

4.3 Lifetime Saving Rate

The large differences in rates of return, and the corresponding increase in the portfolio share of private equity among the New Money, explain some of the convergence of wealth accumulation displayed in Figure 11. However, we find that the New Money also save at higher rates than the Old Money. Figure 14 shows that within the top 0.1% wealth owners, the saving rate—defined in Section 3.5—is generally declining from the first quartile of initial wealth $(\overline{W}_{i,1994})$ to the top quartile, ranging from around 90% for the New Money to around 70% for the Old Money. That is, the New Money's saving rate is 20 p.p. higher than that of the Old Money. In the next section, we quantify the importance of these channels (e.g., saving rate, rate of returns, and so on) for wealth accumulation differences between the New Money and Old Money.

5 Why Are the Wealthiest So Wealthy?

So far, we have shown that rich households differ from the rest of the population in their initial wealth, portfolio composition, rates of return, sources of income, and savings rates. In this section, we combine these results to provide a set of counterfactuals to better disentangle the quantitative importance of these factors. We focus on five main sources of heterogeneity: rates of return, saving rates, initial wealth, labor income, and inheritances (including inter vivos transfers). The starting point of this decomposition is the year-by-year household budget constraint of household i in year t:

$$W_{i,t} = W_{i,t-1} + \left(\tilde{L}_{i,t} + \tilde{H}_{i,t} + \tilde{R}_{i,t} W_{i,t-1}\right) \times S_{i,t}, \tag{2}$$

where $\tilde{L}_{i,t}$ denotes the value of labor earnings (including self-employment income) after taxes and government transfers (such as unemployment and disability benefits and so on), whereas $\tilde{H}_{i,t}$ is the after-tax value of inheritances.[30] The after-tax return on net wealth, $\tilde{R}_{i,t}$, is given by,

$$\tilde{R}_{i,t} = \left(R^E_{i,t} + R^S_{i,t} + R^H_{i,t} - I^L_{i,t} - T^W_{i,t}\right) / W_{i,t-1},$$

where $R^E_{i,t}$, $R^S_{i,t}$, and $R^H_{i,t}$ denote household income (including unrealized capital gains) from public and private equity, safe assets, and real estate, respectively. Here, $I^L_{i,t}$ and $T^W_{i,t}$ denote the total interest payments and total taxes paid for wealth and capital income, respectively. Finally, we define the gross saving rate as

$$S_{i,t} = \left(W_{i,t} - W_{i,t-1}\right) / \left(\tilde{L}_{i,t} + \tilde{H}_{i,t} + \tilde{R}_{i,t} W_{i,t-1}\right),$$

which is the per-period equivalent of the gross saving rate discussed in Section 3.5.[31] Using the budget constraint defined in Equation (2), we define the path of net worth between 1994 and τ as a function of five sets of contributing factors (i.e., labor income, inheritance, rates of return, saving rate, or initial wealth):

$$\{W_{i,t}\}^{\tau}_{t=1994} = f\left(W_{i,1993}, \left\{\tilde{L}_{i,t}, \tilde{H}_{i,t}, \tilde{R}_{i,t} S_{i,t}\right\}^{\tau}_{t=1994}\right).$$

We then use this function to reconstruct the evolution of wealth when counterfactually replacing these factors by the values of a reference group.[32] We use the middle 50% of

[30] Notice that in Equation (1), one variable, T_{it}, denotes all taxes and transfers. Instead, here we split the total taxes into taxes paid for labor income, inheritances, wealth, and capital income.

[31] Of course, one can write the above budget constraint using alternative definitions of saving rate. For example, we have considered the budget constraint with a saving rate out of cash-on-hand (i.e., $\tilde{S}_{it} = W_{i,t} / \left(W_{i,t-1} + \tilde{L}_{i,t} + \tilde{H}_{i,t} + \tilde{R}_{i,t} W_{i,t-1}\right)$) and we have come to similar conclusions (see Figures D.38 and D.39).

[32] To be precise, we implement this exercise at the age-wealth group level by aggregating the budget constraint in equation 2 within each BW^h_j: $\bar{W}^{h,j}_t = \bar{W}^{h,j}_{t-1} + \left(\bar{L}^{h,j}_t + \bar{H}^{h,j}_t + \bar{R}^{h,j}_t \bar{W}^{h,j}_{t-1}\right) \times \bar{S}^{h,j}_t$, where $\overline{W}^{h,j}_t$, $\overline{L}^{h,j}_t$, and $\overline{H}^{h,j}_t$ are the average wealth, after-tax labor income, and after-tax inheritances of BW^h_j

the population (households between the 25th and 75th percentiles of wealth) in the same age group, $BW^h_{[P25,P75)}$, as the reference group. So, for a group BW^h_j, we start from the budget constraint in the initial year and simulate the counterfactual evolution of wealth consecutively for the following years by simply setting some or all factors to their value for the $BW^h_{[P25,P75)}$ group. For example, to investigate how the wealth profile would look for the top 0.1% wealth owners if they had earned the same rates of return as the middle 50% of the population, we construct the counterfactual average wealth profile for $BW^{50-54}_{\geq P99.9}$ by assigning them the after-tax return of $BW^{50-54}_{\geq[P25,P75)}$ while keeping all other factors fixed at their actual values—that is, $f\left(W_{i,1993}, \left\{\tilde{L}_{i,t}, \tilde{H}_{i,t}, \tilde{R}_{BW^{50-54}_{[P25,P75)}}, S_{i,t}\right\}^{\tau}_{t=1994}\right)$.[33]

We employ two counterfactual exercises that complement each other. First, we construct the wealth profiles when we change only one factor at a time and keep the rest of the variables intact. This exercise uncovers the importance of one particular factor in isolation from changes in other contributing factors. Second, in order to provide a cumulative decomposition of the wealth gap relative to the reference group, we employ a Shapley-Owen decomposition. In this exercise, we account for the entire wealth gap between the reference group by setting all factors to their counterfactual values in all possible different sequences (i.e., $5! = 120$ combinations for five sets of variables). The effect of each contributing factor is then measured as the average of its marginal contribution across all possible permutations (Shorrocks *et al.* (2013)).

None of these exercises, however, take into account potential behavioral responses. Arguably, replacing, for instance, the labor income of a group with average labor income, could also change households' choices, their saving rate, portfolio composition, rates of return, and so on. While we agree that these interactions could affect the overall quantitative importance of each component, we see our approach as a simple and transparent empirical decomposition to inform structural models on the importance of possible economic forces for wealth inequality. In an ongoing work (Halvorsen *et al.* (2023)), we estimate a structural lifecycle model by targeting these data moments.

in year t, respectively. We then take a weighted average of after tax returns (weighted by $W_{i,t-1}$) to construct $\bar{R}^{h,j}_t$ and of $S_{i,t}$ (weighted by total income $(\tilde{L}_{i,t} + \tilde{H}_{i,t} + \tilde{R}_{i,t}W_{i,t-1})$) to construct $\bar{S}^{h,j}_t$.

[33] As in the rest of our analysis, we construct the counterfactual for each base year $\tau \in \{2010, 2011, ..., 2015\}$ used to calculate BW^h_j and then take the average over τ. Table C.8 shows the average values of each component for each wealth group among 50- to-54-year olds, BW^{50-54}_j.

5.1 Decomposing Top Wealth Inequality

We start with the first counterfactual exercise in which we change only one factor at a time and keep the rest of the variables intact. Figure 15 displays our results for the top 0.1% group among households aged 50–54, $BW^{50-54}_{\geq P99.9}$. To fix ideas, the red line with squares shows the (retrospective) average wealth profile for them, as shown in Section 3.2. Replacing the labor income of this group by the average labor income of mid-wealth households does not have a significant impact on the wealth profile of the rich. This result is not surprising considering the small fraction of lifetime income that the top 0.1% obtains from labor (Figure 9a). In contrast, replacing their higher-than-average returns on wealth with that of the median-wealth households reduces their end-of-period wealth from 120 × AW to 30 × AW.

Next, we find that inheritances received between 1994 and 2014 do not significantly affect the wealth of those that reach the top 0.1% of the wealth distribution. This does not, however, imply that the transmission of wealth between generations is unimportant, but rather that the vast majority of the initial wealth held by households in 1993 (when these households were in their mid- to late 20s) is likely received from parents, and this has a major impact on lifetime resources.[34] To see this, we analyze the importance of initial wealth for rich households. Starting from a lower level of wealth—about 0.25 the average wealth of the economy—has a major impact for end-of-period wealth even if we allow rich households to obtain the same (high) returns and keep the same (high) saving rate as they do in the data. These results resonate with those presented in Figure 9b, which show that after capitalization of equity income, initial wealth accounts for a significant fraction of the total resources available to rich households.

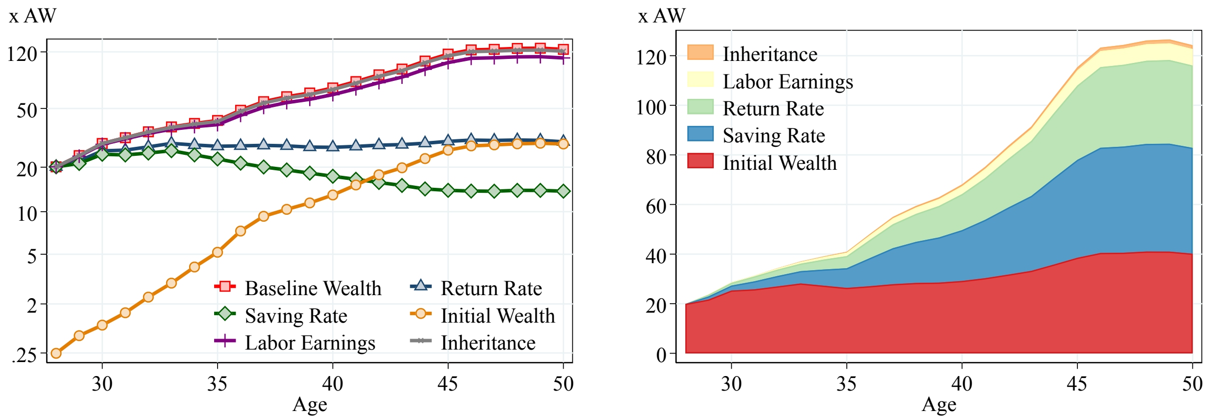
Finally, we find that the high saving rate of rich households—which combines savings from different sources of income and capital gains—plays a major role in the lifecycle wealth dynamics of the wealthiest. In particular, we find that if rich households had the saving rate of mid-wealth households instead, their end-of-period wealth would drop from 120 × AW to less than 15 × AW in the economy. Thus, for the wealthiest households, all else equal, higher saving rates have a significantly larger effect on net worth at age 50 compared with higher rates of return or initial wealth. These patterns are quite similar for other age groups (Figure D.34): initial wealth and saving rates are the two

[34] As discussed in Section 4.1.1, using various methods we conclude that initial wealth in 1993 should be thought of mainly as unobserved intergenerational transfer.

Figure 15 – Determinants of the Top 0.1% Wealth Accumulation

(a) Counterfactual Average Wealth Profiles

(b) Excess Wealth Relative to P25–P75



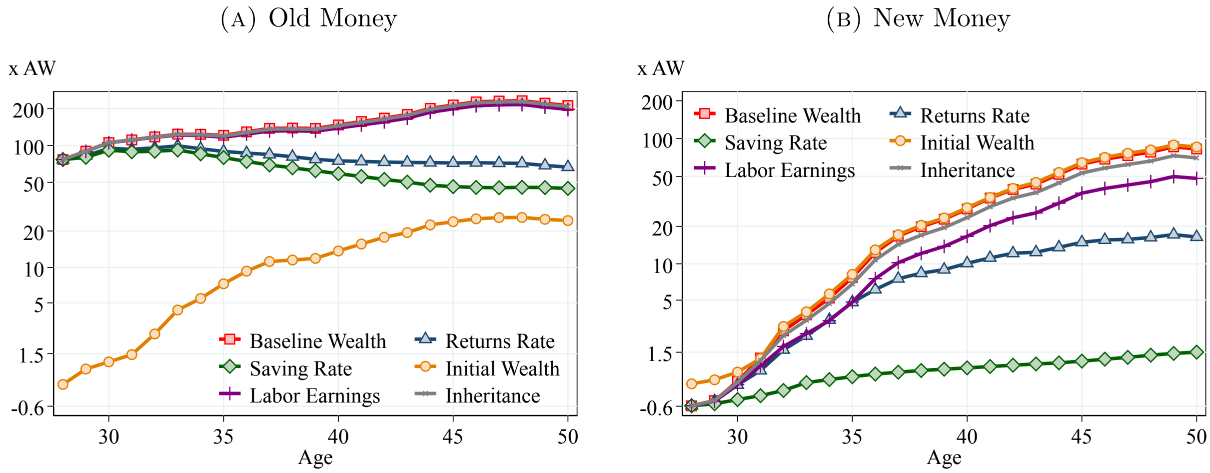
Notes: Figure 15a shows the counterfactual wealth profiles for households in the $BW^{[50-54]}_{\geq P99.9}$ age-wealth group. Counterfactuals are calculated by replacing the value of a particular variable with the average value of the same variable observed for the reference group ($BW^{[50-54]}_{[P25-P75]}$). Average wealth profiles are displayed using an IHS transformation. Figure 15b shows the average marginal contribution from a Shapley-Owen decomposition.

most important drivers of the lifecycle wealth dynamics of the wealthiest, whereas the importance of returns declines as the cohorts age.

Shapley-Owen Decomposition. The results summarized in Figure 15 quantify the importance of each factor when holding all other components fixed at their actual values. For instance, we find that high returns are very important for the high net worth of the wealthiest by simulating a counterfactual wealth path with the rate of return of mid-wealth households but keeping their actual high initial wealth. Clearly, the importance of a high rate of return would be diminished if the wealthiest started out with the (lower) initial wealth of mid-wealth households. More generally, because the budget constraint is jointly non-linear in the respective components, summing the marginal effects in the previous section does not add up to explain exactly 100% of the wealth gap between top and mid-wealth households. Relatedly, the order in which the respective components of the budget constraint are replaced matters. Therefore, we perform a Shapley-Owen decomposition, which cycles through all possible permutations of the order in which different components of the budget constraint are replaced (see Appendix C for details). The resulting average marginal effects exactly add up to explain the gap between the wealth of any given group and the reference group of mid-wealth households.

Resonating with the results presented before, Figure 15b shows that initial wealth accounts for a significant fraction of the wealth gap, declining from 100% of the gap in the

Figure 16 – Decomposing the Wealth of New Money and Old Money



Notes: Figure 16 shows the counterfactual wealth profiles for households in the $BW^{[50-54]}_{\geq P99.9}$ age-wealth group. Old Money in Panel A (New Money in Panel B) are households in the fourth quartile (first quartile) of the initial average wealth distribution $(\overline{W}_{i,1994})$. Counterfactuals are calculated by replacing the value of a particular variable with the average value of the same variable observed for the control group. Average wealth profiles are displayed using a IHS transformation.

beginning by construction to 32.3% of the gap by age 50. As individuals age, the relevance of initial wealth declines and higher saving rates and rates of return rise in importance to over 34.3% and 26.7% of the gap, respectively (or about $35 \times$AW in the economy). Taken together, for households in their early 50s, these three components account for about 95% of the total wealth accumulation gap and do so in more or less equal proportion.[35] Finally, labor income, and to an even lesser degree inheritance heterogeneity, have little importance in explaining the fortunes of the wealthiest households. As shown in Figure D.35, we draw similar qualitative conclusions if we consider other age groups, although naturally the importance of initial wealth increases for older groups (see Figures D.36 and D.37 for other wealth groups).

5.2 Decomposing New Money—Old Money Wealth Gap

The importance of heterogeneity in labor income, rates of return, saving rates, and initial conditions is quite different depending on whether the household is Old Money, with vast initial wealth holdings, or New Money, starting with very little wealth. Figure 16 compares the counterfactual wealth profiles for these groups conditional on reaching the top 0.1% of the distribution. The results for the Old Money are quite similar to

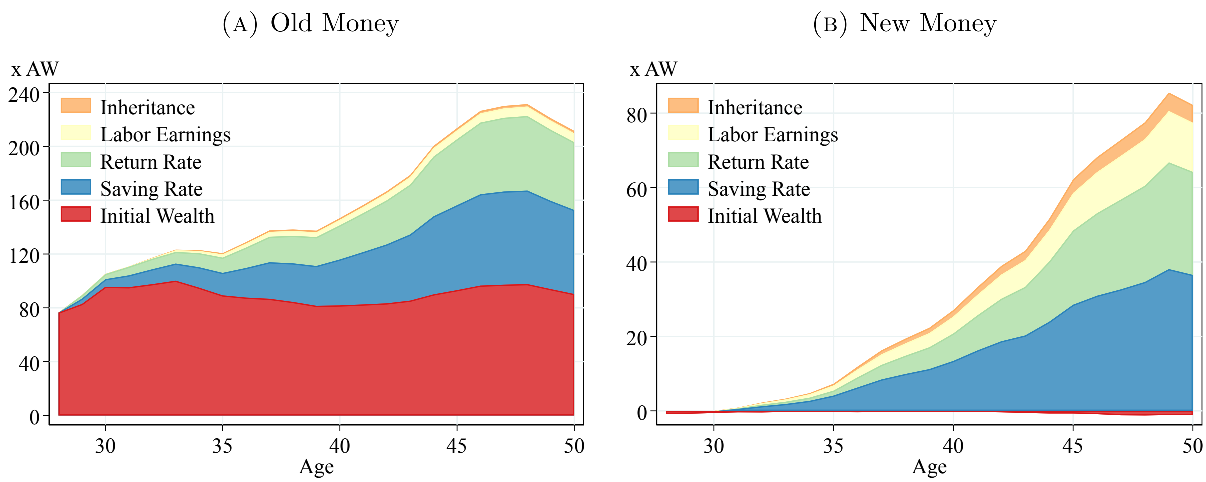
[35]Thus, after jointly accounting for all factors, we have come to a conclusion different from the saving rate being the most important factor explaining the wealth gap at age 50. This is because in the Shapley-Owen decomposition, we assign lower rates of return and initial wealth, which then lead to lower income and therefore a less important role for the saving rate out of income.

those presented in Figure 15 for the top 0.1% combined: labor income and (post-1994) inheritances play a relatively small role in accounting for overall wealth, whereas initial resources have a significant effect, reducing end-of-period wealth from 200 $\times$ AW to 30 $\times$ AW in the economy. The impact of return heterogeneity is also significant for this group as replacing the return on net wealth of the Old Money with that of mid-wealth households reduces the Old Money's wealth to 75 $\times$ AW in the economy by the end of the sample period. Finally, the saving rate has an even larger impact, reducing average wealth of the Old Money to 50 $\times$ AW in the economy.

The results for New Money households—displayed in Figure 16b—differ in two important aspects. First, (by construction) initial wealth plays almost no role in accounting for these households' high end-of-period wealth—if anything, replacing the initial wealth of this group with the one of mid-wealth households would slightly increase their starting wealth. This is consistent with the results presented in Figure 5a, which show that the New Money tend to start their working lives below median wealth. Second, labor income plays a more significant role in wealth accumulation for the New Money relative to the Old Money. In fact, if the labor income of the New Money was replaced by that of mid-wealth households, they would accumulate, on average, only 50 $\times$ AW rather than 75 $\times$ AW. As for rates of return, replacing them with those of the median wealth group reduces the end-of-period wealth for the New Money by more than a half, reaching only 20 $\times$ AW. Finally, for this group, high saving rates account for the vast majority of their end-of-period wealth: replacing the high saving rate of the New Money with the one of mid-wealth households while fixing all other variables (green line with diamonds in Figure 16b), their overall wealth would only grow to 1.5 the average wealth by the end of the sample period.

Shapley-Owen Decomposition. We now use the Shapley-Owen decomposition to study wealth accumulation of subgroups of the top 0.1%. Figure 17a breaks down the lifetime wealth gap of the Old Money (relative to the P25-P75 group) into the contribution of each component. For this group, initial wealth represents the vast majority of their wealth over their entire lifetime, seconded by an increasing importance of their relatively higher saving rate. By the end of the sample, 42.7% and 29.5% of the wealth gap of the Old Money are explained by higher initial wealth and higher saving rate, respectively. A higher return on wealth represents 23.8%, whereas the rest is accounted for by relatively higher income from labor (3.1%), with a very small fraction explained by inheritances (0.8%).

Figure 17 – Excess Wealth Relative to P25–P75: New Money versus Old Money



Notes: Figure 17 decomposes the excess wealth of the New Money and Old Money relative to the $BW^{[50-54]}_{[P25-P75]}$ group using a Shapley-Owen decomposition.

The results are very different for the New Money, as depicted in Figure 17b. For this group, the three most important components are (i) a high saving rate that accounts for 45.8% of their excess wealth relative to the control group at the end of the sample period, (ii) a high return on wealth that accounts for another 33.7%, and (iii) a higher labor income accounting for another 16.1% of the gap. For this group, above-average inheritances account for close to 5.8% of the wealth gap. Finally, initial wealth makes a small *negative* contribution (-1.4%) in explaining the gap between the New Money and the control group since, on average, the starting wealth of the New Money is below that of middle-wealth households.

5.3 Taking Stock: Implications for Structural Models

Our findings inform the literature on structural models of wealth inequality. We further provide empirical evidence on the quantitative importance of heterogeneous returns for lifetime wealth accumulation (as in, for example, in Benhabib *et al.* (2019) or Hubmer *et al.* (2021)), as well as the significant role of intergenerational linkages and associated initial wealth heterogeneity (as in De Nardi (2004)). Models that do not feature either of these channels are clearly at odds with the data. Two striking novel results arising from our analysis are relevant for quantitative models. First, heterogeneity in saving rates is a major driver of wealth inequality over the life cycle. This finding has to be interpreted with some caution: presumably, these high saving rates are enabled by high returns on wealth, high initial wealth, and high labor income. As such, in principle, heterogeneous saving rates can be a proximate, rather than a fundamental (differences in preferences), source of inequality. Nevertheless, the fact that, in an accounting sense, saving rate heterogeneity is more important than heterogeneity in rates of return and labor income for the wealth accumulation of the rich, especially for the New Money, is an important finding that structural models of wealth inequality have to account for to replicate the dynamics observed in the data. Second, and relatedly, the rapid wealth growth of New Money households is a strong feature of the data that existing models have difficulties to replicate (Hubmer *et al.*, 2021; Guvenen *et al.*, 2023) partly because these models do not account for the observed saving rate heterogeneity.

6 Conclusions

The earlier literature has offered several explanations for the observed high concentration of wealth, such as the intergenerational transmission of bequests and human capital (De Nardi (2004)) and the heterogeneity in rates of return (Cagetti and De Nardi (2006); Benhabib *et al.* (2019)), saving rates (Krusell and Smith (1998); Castañeda *et al.* (2003)), and labor earnings (Huggett (1996)). In this paper, we used a rich administrative dataset from Norway between 1993 and 2015 to quantify the importance of each of these channels for the wealth accumulation of the richest households. We find that, at age 50, the excess wealth of the top 0.1% relative to mid-wealth households is accounted for in about equal terms by higher initial wealth (32%), higher returns (27%), and higher saving rates (34%), while higher labor income (5%) and inheritances (1%) over the sample period account for the small residual. Furthermore, we find significant heterogeneity among the wealthiest: around one-fourth of these households, the New Money, start below the median wealth but experience rapid wealth growth early in life. Their fast ascent to the top is accounted for by a higher saving rate (45.8%) and by higher returns on net wealth (33.7%), with higher labor income (16.1%) also contributing significantly.

Our findings shed light on the underlying mechanisms behind wealth accumulation, in particular at the top end where wealth is concentrated. Yet, our empirical approach ignores behavioral responses and thus has to be understood as capturing the first-order effects of each dimension of heterogeneity. Future work may use our findings to discipline structural models of wealth inequality and to contribute to policy analysis.

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Supplemental Online Appendix

NOT FOR PUBLICATION

A Data Sources and Variable Definitions

A.1 Data Sources

A.1.1 Tax returns (TAX)

The main data source is tax returns for all persons in Norway 1993-2015. The tax system is residence based so Norwegians living abroad are not included. The basic income tax unit is an individual, but wealth is jointly taxed for married couples. Cohabitant couples (with or without children) are taxed separately even though they may own assets jointly. The division of assets jointly owned follows the formal ownership shares in the case of housing but can be chosen freely for mortgages. For most households, the division of assets on the tax returns has little consequence as only a small fraction of households actually pay wealth taxes (due to an exception level). All values are measured at December 31st of each year. Some items in the tax records are reported with discounted values used to calculate a household's wealth tax. We revert these items to their initial value.

Most of the information in personal tax records is third-party reported by employers or financial intermediaries such as banks, brokers, insurance companies, or the Norwegian Central Securities Depository (VPS). Components of income and wealth not provided by third parties (e.g., foreign income or dividends not registered in the VPS) are added by the individual and checked by the tax authority. In addition, tax authorities have control routines that flag tax returns with extreme movements in either income or wealth, and these are checked in more detail.

A.1.2 Shareholder register (SHR)

All private limited companies in Norway must submit information about shareholders and the number of shares each person owns to the Norwegian Tax Administration's Shareholder Register. The register is complete from 2004, and is also searchable online from 2014 (https://www.aksjeeiere.no/). The shareholder registry contains information on individuals' and firms' ownership of stocks in all companies in Norway. By combining the number of shares owned individually with the total number of shares, we get the ownership fraction of a particular individual. Some companies are held directly. In this case, the ownership share is the fraction of total shares owned by the individual. However, many companies are owned by other firms which we trace back to the owner. In particular, if an individual owns shares in company A and company A owns shares in company B, the individuals ownership share in company B is equal to that individual's ownership share in company A multiplied with A's ownership share in company B. We compute indirect ownership up to 7 layers. We can also sum up and obtain the number of companies an individual owns shares in through direct and indirect ownership.

A.1.3 Firm balance sheet and tax return

For the equity value in unlisted firms, we must rely on the assessed value that private businesses report to the tax authorities. This assessed value is derived from firm balance sheets and book values. Balance sheets contain information about total equity (total assets minus total debt), accumulated retained earnings, total revenue, and profits before and after tax. Tax authorities have routines to identify underreporting of assessed values of private businesses. In addition, medium- and lager-sized firms (with turnover above about USD 500,000) are required to have their balance sheet audited by an approved auditing entity.

A.1.4 Housing wealth database

Housing wealth is imputed using an ensemble machine learning method on housing transaction data for the period 1993-2015. The imputation includes owner-occupied housing, secondary housing, and cabins (holiday homes). Housing wealth is allocated to individuals according to ownership shares, i.e., the fraction of the house owned by an individual. Construction of housing wealth is described in detail in Fagereng, Holm and Torstensen (2020b).

A.1.5 Central population registry and Norwegian educational database

Annual national register since 1964. Contains individual identification numbers, residence, marital status, and highest completed education.

A.1.6 Inheritance tax records

Information about inheritances and inter-vivos gifts as derived from Inheritance tax records 1995-2013. The inheritance tax in Norway was abolished in 2014.

A.2 Variable Definitions

A.2.1 Personal and household id, marital status and head of household

Source: *The Central Population Registry [annual, 1964-].* Every individual has a unique personal ID number. The marital status is either single, married/cohabitant, widow/widower, divorced or separated. Based on a combination of spousal ID and marital status, a household ID number is created. A change in marital status (marriage/divorce) will generate a new household ID. The household ID is used to aggregate up from individual level data to household level data. The head of household is defined as the eldest person.

A.2.2 Year of death

Source: *The Central Population Registry [annual, 1964-].* Wealth is only measured until the year before year of death. A living person will have year of death equal to missing. A household's year of death is defined as the maximum year of death by household ID. If the remaining spouse is still alive, the maximum value will be equal to missing.

A.2.3 Educational level

Source: *Norwegian educational database [annual, 1964-].* Educational level is grouped with the following mapping to the Norwegian Standard Classification of Education (NUS), see https://www.ssb.no/en/klass/klassifikasjoner/36.

A.2.4 Labor income, self-employment income and transfers

Source: *Tax records and Social Security Administration records [annual, 1993-].*

Labor income: Measures of labor income is comprehensive and includes wages and salaries, bonuses and other irregular payments. All third party reported by employers. Corresponding code in the tax return is TAX 2.1.

Labor income from self-employment: Norway has a dual-income tax system where tax on capital is proportional and tax on labor is progressive. To avoid income shifting and

Our classification	NUS-code	Description
1 - Vocational or less	1, 2, 3, 4, 5, 9	Primary, lower secondary, upper secondary
2 - Bachelor	60-63, 69	Humanities, social sciences and other
3 - Bachelor health & STEM	65-68	Health and STEM
4 - Master	70-73, 79, 80-83, 89	Humanities, social sciences and other
5 - Master health & STEM	75, 77-78, 85, 87-88	Health and STEM
6 - Finance	64, 74, 84	Business and administration (all levels)
7 - Law	737101	Law
8 - Medical doctor, dentist	76, 86	Medical doctor, dentist

achieve neutrality in the tax treatment of wage earners and entrepreneurs, the Norwegian dual-income tax splits the income from self-employment and from small companies into an imputed return to capital, taxable as capital income, and a residual income subject to labor income tax. Corresponding codes in the tax return for the labor part are TAX 1.6, TAX 1.7 and TAX 2.7.

Transfers: Transfers include unemployment benefits, sickness benefits, paid parental leave, remuneration for participation in various government activity programs, disability benefits, public pensions, and other social welfare payments. Corresponding codes in the tax return are TAX 2.1.7, TAX 2.2 and *sykepenger, foreldrepenger, dagpenger, arbeidsavklaringspenger, tidbegrenset uførestønad, bostøtte* og *sosialhjelp* from the Social Security Administration (NAV).

A.2.5 Interest

Source: *Tax records [annual, 1993-].* Interest income on bank deposits in Norway (TAX 3.1.1), other interest income (TAX 3.1.2), interest on loans to companies (TAX 3.1.3), yields and disbursements from endowment insurance (TAX 3.1.4), interest income on bank deposits abroad (TAX 3.1.11). In addition, we do as in Fagereng *et al.* (2020a) and impute interest on outstanding claims and private loans using the average rate charged by Norwegian banks on corporate loans and capital gains on bond funds. Interest payments on debt home and abroad (TAX 3.3.1 + TAX 3.3.2).

A.2.6 Dividends

Source: *Tax records [annual, 1993-] , Shareholder registry [annual, 2004-], Firm balance sheet and tax return [annual, 1995-].* Tax records contain taxable dividends received from stocks and shares registered in the Norwegian Central Securities Depository VPS (TAX 3.1.5), from mutual funds (TAX 3.1.6), and from private equity/Norwegian and foreign shares or unit trusts not registered with the VPS (TAX 3.1.7). From 2004, an alternative value for dividends received from non-listed companies can be obtained by combining a persons share in a company with the company's dividend payout. Using the fraction of an unlisted company (k) that an individual (i) owns (as measured in the Shareholder registry, and including indirect ownership), s_{it}^k, and multiplying with dividends from an unlisted company (D_t^k), gives us an alternative measure of dividend income as $\sum_k s_{it}^k D_t^k$.

Since we have two sources of information about dividends after 2004 - tax returns (TAX), and the combination of shareholder registry (SHR) and firm accounts - there may be conflicting information. 92% of observations are equal in the two datasets, 7% have a positive value in tax records (TAX) and zero in the shareholder registry (SHR) - we assign these dividends to public equity. I.e. we use tax values (TAX) up to and including 2003, and shareholder registry (SHR) from 2004.

Dividends were not a part of the capital income tax base until 2006, when a tax on dividends were introduced as part of a major tax reform. There were two major consequences of this reform. First, there were clear adjustments prior to the reform as seen in the figure below, where large dividends were taken out prior to the reform. Second, a large number of holding companies were created so that dividends could be paid to the holding company from its subsidiaries, and the ultimate owner could thereby avoid paying dividend tax on the personal income side. In sum, there was an overall shift from dividends to retained earnings after the tax reform on 2006.

A.2.7 Taxes

Source: *Tax records [annual, 1993-], Inheritance registry [annual, 1995-2013].*

Total taxes: Total taxes paid on labor income, capital income and wealth. It is possible to observe the wealth tax separately (see more about the wealth tax below), but not it is not so straightforward to separate tax on labor income from tax on capital income.

Labor income tax: In order to calculate labor income after tax we therefore make the simplifying assumption that tax on labor (T^l) can approximated as follows:

$$T_t^l = \left[1 - \tau_t^c \left(\frac{Y_t^c}{Y_t^c + Y_t^l}\right)\right] \times (T_t - T_t^w)$$

where T^l and Y^c are labor and capital income (as defined in tax records), respectively, T is total taxes, T^w is wealth tax, and τ^c the flat tax rate on capital income, which was 28 percent until 2014.

Capital income tax: Capital tax is approximated as $T_t^c = \tau_t^c *$(interest income + dividends), where τ^c is the flat tax rate on capital income, which was 28 percent until 2014. From 2014 to 2019 the tax rate on capital was gradually reduced downwards to 22 percent.

Wealth tax: In 2021, wealth above NOK 1.5 million is taxed at a rate of 0.85 percent, with some important valuation discounts, for example for primary housing. During our sample period, wealth taxation has become more lenient, both through reduced rates and through specific valuation concessions, see A.4.

Inheritance tax: Norway had an inheritance tax during most of the studied period. The inheritance registry was digitalized in 1995 and the tax was abolished in 2014, which explains the limited observation period. We observe the exact amount of inheritance taxes paid by each heir.

A.2.8 Safe assets

Source: *Tax records [annual, 1993-].* Bank deposits in Norwegian banks (TAX 4.1.1) + cash (TAX 4.1.3) + deposits in foreign banks (TAX 4.1.9), bond funds and money market funds (TAX 4.1.5) + bonds (TAX 4.1.7.2), and other financial assets such as out standing claims/loans to friends and family (TAX 4.1.6).

A.2.9 Public equity

Source: *Tax records [annual, 1993-].* Mutual funds/stock market funds (TAX 4.1.4) and shares/stocks and shares listed in the Norwegian Central Securities Depository (VPS), (TAX 4.1.7).

A.2.10 Private equity

Source: *Tax records [annual, 1993-], Shareholder registry [annual, 2004-], Firm balance sheet and tax return [annual, 1995-]*

Private equity in tax returns is measured as firm assessed tax value of shares in non-listed Norwegian firms plus non-listed bonds and options (TAX 4.1.8). A private business is a company that is not listed on a stock exchange and owned by a small number of shareholders. Control of the firm is therefore limited to a few persons. These firms are typically small to medium sized businesses or holding companies. In 2006, Norway introduced a dividend tax at the personal level as part of a major tax reform. One response to this reform was that the number of holding companies increased, as owners would retain their earnings in firms to avoid paying dividend tax. These holding companies are therefore common, especially at the top of the wealth distribution. It is important to account for indirect ownership so that we are able to allocate capital gains onto the ultimate owner. The approach is similar to other papers using Norwegian data (Alstadsæter *et al.* (2018), Fagereng *et al.* (2020a, 2019)).

Using the fraction of an unlisted company (k) that an individual (i) owns (as measured in the Shareholder registry, and including indirect ownership), s^k_{it}, and multiplying with assessed value of an unlisted company (V^k_t), gives us an alternative measure of the overall value of unlisted shares owned as s $\sum_k s^k_{it} V^k_t$. Correlation between equity values in TAX and SHR is 0.86 for non-zero values in both registers. We use private equity from tax records as our main variable in net wealth to get a consistent measure over time, but make corrections when equity is zero in TAX and positive in SHR.

A.2.11 Housing

Source: *Dataset from Fagereng, Holm and Torstensen (2020b).* Tax records contain values for owner-occupied and secondary housing at tax value (TAX 4.3.2). Between 1993 and 2009 these tax values were related to construction value and adjusted irregularly. Since 2010 this value has been imputed using hedonic price regressions. As a consequence there is no measure of housing in tax records that is consistent over time. Instead we use imputed values of housing based on ensemble machine learning methods on housing transaction data as described in detail in Fagereng, Holm and Torstensen (2020b). The imputation includes not only owner-occupied housing, but also secondary housing and cabins (holiday homes). Housing wealth is allocated to individuals according to their ownership shares, i.e., if a married couple has reported that the wife owns 30% and the husband 70%, these ownership shares are used when allocating household values to individuals.

A.2.12 Other real assets

Source: *Tax records [annual, 1993-].* Cars and other motor vehicles at tax value (TAX 4.2.5 and TAX 4.2.6), boats at tax value (TAX 4.2.4), and other real estate apart from housing and holiday homes.

A.2.13 Foreign wealth/offshore tax havens

Source: *Tax records [annual, 1993-].* Inclusion of foreign wealth varies from country to country, depending on tax treaties.[36] The corresponding tax codes for foreign wealth is deposits in foreign banks (TAX 4.1.9) and foreign real estate (TAX 4.6.11) and debt in foreign banks (TAX 4.8.3.1). These are allocated to deposits, other real estate and liabilities, respectively.

According to Alstadsæter *et al.* (2019), the richest Scandinavians keep a substantial part of their wealth in offshore tax havens. The wealth of the top 0.01 of Norwegian households increases by about 25 percent if offshore wealth is included. On the other hand, Norwegian tax authorities offer tax amnesty for voluntary disclosure of foreign wealth.[37] Since 2007, an extra NOK 1.5 billion of taxable wealth and income has been disclosed because of this program. The number of amnesty participants picked up significantly in 2009, when G20 countries compelled tax havens to exchange bank information upon request with foreign authorities (Johannesen and Zucman, 2014) it was negligible before. According to Alstadsæter *et al.* (2019), the effect of tax amnesty has been quantitatively small; if anything, wealthier tax evaders seem to be slightly less likely to participate in an amnesty.

A.2.14 Pension wealth & life insurance

More than 80 percent of all pension wealth in Norway is provided through a National Insurance scheme, a pay-as-you go (PAYG) scheme, with a large degree of redistribution from rich to poor. Another 18 percent are covered by employer provided pension plans, and finally 0.3 percent of total pension wealth is held as personal pension plans. Only this tiny fraction of 0.3 percent is reported on the tax return (TAX 4.5.1). The majority of Norwegians have life insurance through their employer. Personal life insurance is reported on tax returns with its repurchase value (TAX 4.5.2).

A.2.15 Liabilities

Source: *Tax records [annual, 1993-].* Total debt, i.e. the sum of mortgages, student loans and consumer debt (TAX 4.8).

A.2.16 Inheritances

Prior to 2014, both inheritances and gifts were subject to taxation and were reported to tax authorities. In 2013, the inheritance and gift tax had a zero rate for taxable amounts up to NOK 470,000 from each donor (around 52,000 USD dollars in 2022). From this level, the rates ranged from 6% to 15% depending on the status of the beneficiary and the size of the taxable amount. The Norwegian inheritance taxation was recipient based, meaning that the total gift and inheritance received by one individual from one donor constituted the tax base (a child inheriting his or her last surviving parent would therefore usually inherit from both parents and thus face an exception level of NOK 940,000). The tax rates and exemption levels have varied over the sample period, see A.4.

[36] https://www.skatteetaten.no/en/person/taxes/get-the-taxes-right/property-and-belongings/houses-property-and-plots-of-land/countries-with-which-norway-has-established-a-tax-treaty/

[37] https://www.skatteetaten.no/en/person/taxes/get-the-taxes-right/abroad/income-and-wealth-abroad/undeclared-income-andor-wealth-abroad/

Norway has fairly strict rules on heirship. Under Norwegian laws, the deceased's children and spouse are legally entitled to inheritance from the deceased. The law states the deceased's children are entitled to two thirds of the deceased's total estate, split equally among them.

A.3 Calculation of Returns

In this section, we describe the main features of the construction of returns, which follows the construction of described in Fagereng *et al.* (2020a) (FGMP thereafter). We calculate returns for total net worth, safe assets, equity, and housing. For consistency with the rest of our empirical results, we compute household-level returns—rather than individual-level returns as in FGMP. In particular, we aggregate all wealth variables and income flows at the household-level. In our measure we consider public equity and private equity as one category. We calculate returns on assets as

$$r_{it}^n = \frac{y_{it}^s + y_{it}^e + y_{it}^h - y_{it}^b}{w_{it}^g + F_{it}^g/2}, \text{ where}$$

- y_{it}^s, y_{it}^e, and y_{it}^h are income from financial assets (e.g. bonds), equity (e.g. stock and private equity), and housing
- y_{it}^b is the sum of interest paid in all forms of debt
- w_{it}^g is the stock of wealth at the beginning of the period
- F_{it}^g is net flows of gross wealth during period (assets yields happen during year and households add/subtract from assets).

We calculate similar returns for safe assets, equity, and housing, which income flows are calculated as follows

- y_{it}^s: interest income
- y_{it}^e: dividend income + capital gains from stock + capital gains from private equity
- y_{it}^h: income from housing + capital gains from housing

To avoid our results to be severely influenced by outliers, we drop returns observations of households with assets below $500 USD in a given year for a given asset class (i.e., we do this separately for each return type, all assets, safe assets, equity, and housing) and we winsorize top and bottom 0.5% of the distribution of returns in a given year.

Although we follow FGMP quite closely in constructing our measure of returns, we deviate from their construction in three aspects, which we describe below.

1. Capital gains from housing. Capital gains from housing are calculated as the annual change in imputed house value (see A.2.11) in years with no transactions. In years with market transactions, capital gains from housing are set to zero. This is because net transactions are measured directly from housing transaction data (i.e. net saving in housing is calculated based on net transactions at market value in a given year), while capital gains are imputed and it would not add up if we tried to decompose the two parts. Capital gains from housing is also set to zero if housing value is zero in year $t-1$ and non-zero in t, and vice versa if housing value is zero in year t and non-zero in $t-1$. While FGMP used an hedonic price imputation of housing values, we use the new machine learning method from Fagereng, Holm and Torstensen (2020b).

Imputed income form housing is defined as imputed rent from housing using the rental equivalence approach, and calculated as the aggregate value of owner-occupied housing services from the National Accounts relative to the aggregate value of housing wealth in our sample, which implies a rent-to-value ratio of 2.23 percent (over the period of observation). Total income from housing is thus imputed income plus income from ownership of real asset as measured in the tax returns; taxable income from renting out holiday home (TAX 2.8.3) or property abroad (TAX 2.8.5).

2. Capital gains and dividends from private equity. Capital gains on equity is obtained by linking individual and firm data using the shareholder registry (SHR). Balance sheets contain information about total equity (total assets minus total debt), earned capital, dividends, total revenue, profits before, and after tax. We measure unrealized capital gains as the individual's share of their company's retained earnings. Retained earnings in year t is the part of earned capital that is not paid out as dividends. Using the fraction of a company (k) that an individual (i) owns (as measured in the SHR), s^k_{it}, we allocate these earnings to ultimate owners.

Capital gains from mutual funds is obtained by assuming as Fagereng *et al.* (2019) that mutual funds investors own a composite index fund representative of the Oslo Stock Exchange (OSE) market (80%) and the MSCI World (20%) with price q^{mf}_{t-1} as measured December 31st of year $t-1$, which we take from the OSE price database. We estimate the shares of mutual fund owned at the end of $t-1$ as $s^{mf}_{it-1} = w^{mf}_{it-1}/q^{mf}_{t-1}$. Subsequently, yields on mutual funds is calculated as $y^{mf}_{it} = (q^{mf}_t - q^{mf}_{t-1})s^{mf}_{it-1} + ((q^{mf}_t - \bar{q}^{mf}_t)(s^{mf}_{it} - s^{mf}_{it-1}))$ if $s^{mf}_{it-1} \neq s^{mf}_{it}$, where $\bar{q}^{mf}_t$ is the geometric average of the composite index fund price in year t. For dividends, see subsection A.2.6.

3. Sample selection. A last crucial difference between our estimates and those from FGMP is the underlying sample. In our baseline results, we consider a sample of individuals who are 25 years old or more whereas FGMP restrict their sample to those who are between 25 and 75 years old. Second, in our return calculation, we drop returns observations if the asset value is below 750 NOK. Instead, FGMP drop returns observations with financial wealth below USD 500 (about NOK 3,000), or individuals with non-zero private business wealth holdings of less than USD 500.

Comparing returns across specifications. As described above, our measure of returns differs from FGMP is several aspects. Despite these differences, however, our estimates are relative close to those presented by FGMP and confirm several of their findings. To see this, we start by reproducing their sample selection of FGMP in our data and calculate value-weighted cross sectional moments pooling together all available from 2005 to 2015. The results—reported in Panel A of Table A.1—are quite similar to those presented in Table 3 of FGMP. For instance, FGMP report an mean return on assets of 3.8% and a standard deviation of 8.5%. We obtain a mean return of 3.3% and a standard deviation of 20.3%, mostly coming from the larger dispersion on the returns on housing: FGMP mean return on housing is 4.9% with a standard deviation of 6.5% whereas our average is 4.5% with a standard deviation 20.1%. The rest of the estimates are in line with FGMP. We then apply our sample selection. As shown in Panel B of Table A.1, the results do not change much, with the exception of an increase in the returns on equity. Intuitively, our sample selection is somewhat less restrictive, leaving in the sample a larger number households with more volatile returns. The results do not change much if we consider household-level returns and we restrict our attention to a sample of heads of households, independent of sample selection used (Panel C and D).

Table A.1 – Wealth Returns

	N 000s	Mean	SD.	Skew.	Kurt.	P1	P5	P10	P50	P90	P95	P99
Panel A: Individual-level returns: FGMP (2005/2015)												
All	27,318	0.034	0.203	0.296	23.974	-0.622	-0.236	-0.103	0.022	0.185	0.292	0.735
Equity	10,072	0.083	0.363	2.463	24.412	-0.793	-0.350	-0.157	0.035	0.374	0.605	1.476
Housing	21,333	0.045	0.201	2.668	30.762	-0.534	-0.229	-0.088	0.025	0.183	0.281	0.811
Safe	27,374	-0.012	0.034	4.787	50.634	-0.061	-0.043	-0.042	-0.017	0.020	0.030	0.104
Panel B: Individual-level returns: This paper (2005/2015)												
All	29,482	0.033	0.202	0.702	19.911	-0.628	-0.241	-0.106	0.022	0.186	0.293	0.740
Equity	8,538	0.119	0.376	2.516	25.905	-0.920	-0.302	-0.119	0.069	0.414	0.643	1.545
Housing	23,558	0.045	0.201	2.619	30.030	-0.533	-0.229	-0.089	0.025	0.184	0.282	0.809
Safe	26,907	0.026	0.026	4.459	41.027	0.000	0.000	0.000	0.024	0.049	0.061	0.127
Panel C: Household-level returns: FGMP (2005/2015)												
All	19,356	0.032	0.183	0.506	16.993	-0.576	-0.228	-0.100	0.022	0.177	0.276	0.655
Equity	7,977	0.084	0.381	3.018	30.796	-0.837	-0.352	-0.157	0.034	0.374	0.608	1.537
Housing	14,550	0.044	0.187	2.246	26.583	-0.504	-0.215	-0.084	0.028	0.179	0.275	0.738
Safe	19,431	-0.013	0.030	3.387	31.369	-0.057	-0.042	-0.042	-0.017	0.020	0.029	0.083
Panel D: Household-level returns: This paper (2005/2015)												
All	20,902	0.030	0.186	0.468	16.887	-0.587	-0.234	-0.103	0.022	0.177	0.276	0.658
Equity	6,968	0.120	0.383	2.872	30.027	-0.905	-0.301	-0.117	0.068	0.413	0.643	1.569
Housing	16,070	0.044	0.187	2.207	26.019	-0.505	-0.216	-0.085	0.028	0.180	0.276	0.738
Safe	19,823	0.026	0.025	4.216	40.075	0.000	0.000	0.000	0.025	0.049	0.060	0.116

Notes: Table A.1 shows cross sectional statistics of the returns distribution for different asset classes based on a pooled sample of households between 2004 and 2015 (Panel A to D) and 1994 and 2015 (Panel E). We calculate returns following Fagereng *et al.* (2020a). Equity corresponds to the sum of equity on private and publicly traded firms.

A.4 Norwegian Tax System

Norway is one of few countries who still levy an annual tax on net wealth. In addition, capital income is taxed both at the personal level and at the corporate level. Finally, an inheritance tax was in place until 2014. In the following we provide a short description of the tax system with emphasis on the aspects and changes relevant for our study.

A.4.1 Capital income tax

Since 1992 Norway has had a "dual income tax" system, which consists of a combination of a low proportional tax rate on capital income and progressive tax rates on labor income. Initially, dividends capital gains attributable to retained earnings were only taxed at the corporate level.

As the wedge between the top marginal tax rate on labor and the capital tax increased over time, taxpayers faced stronger incentives to convert shareholder wages into dividends for tax purposes. Thus, a tax reform in 2006 introduced taxation of dividends and capital gains at the individual level, the so-called Shareholder model ("aksjonærmodellen").

Since coexistence of the corporate and the personal income tax can drive the total effective tax rate on corporate equity above the tax rate imposed on other forms of capital income (return to equity accrued in corporations and are taxed as corporate profits and distributed after-tax profits (dividends) are again taxed as personal income), the Shareholder model is designed so that dividends exceeding a risk-free return are taxed as "ordinary income" at a proportional rate when distributed to personal shareholders. The part of the dividend that is not exceeding a risk-free return on the investment, is not taxed on the hand of the shareholder, and is thus subject to the corporate taxation only. Furthermore, the tax is designed so that the combination of corporate profit tax and personal tax on equity premium yields a marginal tax rate on equity income in line with top marginal tax rate on labor (currently 46.7 percent).

Consequences of the 2006 tax reform and its introduction of the Shareholder model were a) an income shifting through large dividends payouts in the two years prior to reform, b) very little dividends distributed in the years after reform and a general shift towards keeping profits as retained earnings instead, and c) an increase in the number of holding companies.

Dividends are for all practical purposes exempt from taxation if the shares in the company are owned by a holding company. The holding company is only taxable at the rate of 0.72 percent on dividends. There will be no taxation at all if the holding company owns more than 90 percent of the shares in the startup company. Capital gain upon the sale of the shares in the startup company is exempt from taxation. Taxation occurs first at the shareholder level when the entrepreneur receives dividends from the holding company.

A.4.2 Wealth tax

In the Norwegian personal tax scheme, wealth is taxed jointly for married couples although all asset components are reported at the individual level. Over time, wealth taxation has become more lenient, both through reduced rates and through specific valuation concessions. The highest rate was 1.5 percent under the two-tier wealth tax in the beginning of our sample period, it went down to 1.1 percent in 2009, and has been 0.85 percent since 2015. At the same time the exemption level has been increased, from NOK 120,000 in 1993 to NOK 1.5 million in 2021.

Table A.2 – The wealth tax 1993-2015

	Rates	Allowances (in 1000 NOK)	Tax values in % of market value: Primary home*	Public stock**	Private equity
1993	1/1.3	120/235	appx. 20-25	100(75)	30
1994-1997	1.1/1.4/1.5	120/235/530	appx. 20-25	100(75)	30
1998-2004	0.9/1.3	120/540	appx. 20-25	100(65)	65
2005	0.9/1.3	151/540	appx. 20-25	65	65
2006	0.9/1.3	200/540	appx. 20-25	80	80
2007	0.9/1.3	220/540	appx. 20-25	85	85
2008	0.9/1.3	350/540	appx. 20-25	100	100
2009	1.1	470	appx. 20-25	100	100
2010-2011	1.1	700	25	100	100
2012	1.1	750	25	100	100
2013	1.1	870	25	100	100
2014	1.0	1000	25	100	100
2015	0.85	1200	25	100	100

* The horizontal bar refers to a change in the system moving from set tax values to percent of market value. Prior to 2010, tax values were based on construction value and adjusted irregularly, but on average kept at level corresponding to 20-25% of market value. Not shown in the table is the values of other real estate, such as secondary housing, holiday homes and business property. These were also reported by their set tax values until 2010, when they were replaced by 40% of market value. This discount has been reduced in recent years.
** In 1994-2004 there was no tax discount on shared traded on the stock exchange, except for small to medium sized businesses (SMB).

As illustrated by Table A.2, the wealth tax system includes a substantial tax discount on owner-occupied housing, but also on equity until 2008. In particular, the wealth tax valuation discounts were higher for private equity than for public equity (on the stock exchange) in the first 12 years of our sample period.

A.4.3 Inheritance tax

Prior to 2014, inheritances and gifts were subject to taxation in Norway. Taxes were paid by the recipient on amounts received at inheritance and on gifts received by living donors, and tax rates varied depending on the relationship to the donor. Table A.3 shows the changes in rates and exemption levels by recipient status over time. Spouses were exempt from taxation, but for others inheritance taxation was recipient based, meaning that the total gift and inheritance received by one individual from one donor constituted the tax base (a child inheriting his or her last surviving parent would therefore usually inherit from both parents and thus face an allowance twice the amount of the level in in Table A.3).

Before the abolishment of the inheritance tax in 2014, there were different ways to reduce the tax burden. One possibility was to convert assets into private equity. While the basis for taxation of listed stocks and equity was market value at the time of transfer, private equity was based on assessed valuation. Furthermore, until 2009, transfers of private equity were given a 70 percent discount on assessed values below NOK 10 million. Private equity with values exceeding NOK 10 mill got no discount. From 2009, the discount was reduced to 40 percent

Table A.3 – The inheritance tax 1993-2013

	Children and parents		Other heirs	
		Allowances		Allowances
	Rates	(in 1000 NOK)	Rates	(in 1000 NOK)
1993-1998	8/20	100/300	10/30	100/300
1999-2002	8/20	200/500	10/30	200/500
2003-2008	8/20	250/550	10/30	250/550
2009-2013	6/10	470/800	8/15	470/800

of assessed valuation up to NOK 10 million. Transferring wealth as private equity therefore substantially reduced the tax liability, both due to assessed valuation and the tax discount, in particular before 2009.

B Imputing Income From Capital Prior 2005

As mentioned in Appendix A, capital gains are calculated using a combination of firm-level balance sheet data and the share holder registry, which allows us to link capital gains to the owner of the firm. The share holder registry, however, is only available from 2005 on, restricting the measures of capital gains from private equity between that year and 2015. To perform our analysis, and extend our data as much as possible, we append the information available on capital gains by imputing capital income prior 2005 for all households in our sample. Importantly, although we have information on other measures of capital income (e.g., safe assets or mutual funds), we preferred to impute the entire capital income flow prior 2005 to reduce the noise in our imputation. To calculate income prior 2005, we proceed as follows.

- Step 1: For each year starting in 2005,
  - Rank household within a year by their total equity holdings in year t and $t-1$ as the sum of their holdings in private and public equity. We calculate the relative equity holdings as the ratio of these holdings relative to the average total equity in the economy within a year.
  - We then sort households in period t and $t-1$ by their *relative* equity holdings (two different rank) and calculate the return within pair of t and $t-1$ ranks as the ratio of capital income (sum of dividends and capital gains for public and private equity) and the average equity holdings between periods $t-1$ and t across all individuals within an age group.
  - Finally, take an average across all years between 2005 and 2015 of these returns within a pair of ranks and age groups. These returns are saved and be used for the imputation.
- Step 2: For each year prior 2005, calculate the total amount of equity holdings for each household in years t and $t-1$. Then, within each year t, calculate the ratio between the individual ownership of equity over the average equity holding within that year.

- Step 3: Classify individuals within different groups according to relative equity holdings in years t and $t-1$ and merge (by age group) the information on returns calculated *after* 2005 in step 1 for each of these groups.

- Step 4: calculate the income from capital as the product of the imputed return times the average of the equity holdings in periods t and $t-1$. Notice that this implies that we impute data starting in 1994.

We use this measure of imputed income from equity (public plus private) as our measure of capital income from equity prior 2005.

C Shapley-Owen Decomposition

In a regression contest, the Shapley-Owen decomposition is an statistical method to identify the contribution of each regressor to the overall R^2 of an OLS regressor. The basic idea—derived from the Shapley number from game theory—is to distribute the marginal contribution of each regressor taking into account all the possible combinations of regressors that can be use to account for the variation of the dependent variable. Here, we apply this simple idea to account for the difference between the wealth of a particular wealth group—top 1% wealth owners—relative to the wealth of a control group—those household between the 25th and 75th percentiles of the wealth distribution.

We start with the definition of the budget constraint for each group. The budget constraint of a household of type (a,g) where a is age and g is a wealth group given by

$$c_t(a,g) + w_t(a,g) = \tilde{l}_t(a,g) + \tilde{h}_t(a,g) + \tilde{i}_t(a,g) + k_t^e(a,g) + k_t^h(a,g) + w_{t-1}(a,g),$$

where $\tilde{l}_t(a,g) \equiv \left[l_t(a,g) + e_t(a,g) + tr_t(a,g) - \tau_t^l(a,g)\right]$ is income from labor and self employment, government transfers, minus labor taxes; $\tilde{h}_t(a,g) \equiv \left[h_t(a,g) - \tau_t^h(a,g)\right]$ is post taxes inheritances and intervivos transfers; $\tilde{i}_t(a,g) \equiv d_t(a,g) + i_t^i(a,g) + i_t^h(a,g) - i_t^p(a,g) - \tau_t^e(a,g) - \tau_t^w(a,g)$, is the sum of income from dividends, risky and safe assets (e.g. mutual funds and bonds), minus interest payments, and minus capital income tax and taxes on wealth. Define the income from capital as $R_t^{INC} w_{t-1} \equiv \tilde{i}_t(a,g) + k_t^e(a,g) + k_t^h(a,g)$ to obtain the gross saving rate as

$$s_t(a,g) = \frac{\tilde{l}_t(a,g) + \tilde{h}_t(a,g) + R_t^{INC}(a,g)\,w_{t-1} - c_t(a,g)}{\tilde{l}_t(a,g) + \tilde{h}_t(a,g) + R_t^{INC} w_{t-1}},$$

Given these definitions, the budget constraint can be written as

$$w_t(a,g) = \left[\tilde{l}_t(a,g) + \tilde{h}_t(a,g) + R_t^{INC}(a,g)\,w_{t-1}(a,g)\right] s_t(a,g) + w_{t-1}(a,g).$$

We consider $p = 5$ possible variables to permute, $x(a,g) = \left\{\tilde{l}_t, \tilde{h}_t, R_t^{INC}, s_t, w_{93}\right\}$, for their respective value in the control group, $\overline{x}_i(a)$ for a give age group. For instance, if we want to understand the importance of the saving rate *and* the income from capital, we re calculate the evolution of wealth as

$$\overline{w}_t\left(a, g; \overline{R^{INC}}, \overline{s}\right) = \left[\tilde{l}_t(a,g) + \tilde{h}_t(a,g) + \overline{R^{INC}}(a)\, w_{t-1}(a,g)\right]\overline{s}(a) + \overline{w}_{t-1}\left(a, g; \overline{R^{INC}}, \overline{s}\right),$$

conditional on a starting value of wealth equal to $w_{93}(a,g)$.

In this context the Shapley value adds the marginal contribution to the gap between the groups under analysis from replacing component x_j (e.g. the saving rate) in the budget constraint after we have already replaced a different component (e.g. income from capital) or group of components (e.g. income from capital and initial wealth), weighted by the number of permutations possible *after* adding x_j. Hence, the contribution of $x_j(a,g)$ for the wealth gap between group (a,g) and the control group can be formally written as

$$C_j(a,g) = \sum_{T \subseteq Z \setminus \{x_j(a,g)\}} \frac{k! \times (p-k-1)!}{p!}\left[\overline{w}_t(a,g;T \cup \{x_j(a,g)\}) - \overline{w}_t(a,g;T)\right],$$

where $\overline{w}_t(a,g;T)$ is the wealth gap accounted for the case in which we have replaced k of the components but without the component x_j, and $T \cup \{x_j(a,g)\}$ is the same case but with the k components plus $x_j(a,g)$. Notice that, for the case in which one replace only of the components (e.g. only the saving rate), $\overline{w}_t$ is equal to the actual wealth of the group in a particular year (the case in which we do not replace any component). The set Z all potential permutations. Then, the difference between the wealth of a particular group and the control group, $\overline{C}(a,g)$ is equal to $\overline{C}(a,g) = \sum_j C_j(a,g)$,and the corresponding share as $C_j^S(a,g) = C_j(a,g)/\overline{C}(a,g)$. We plot these in our main analysis.

D Additional Tables

Table C.1 – Basic Sample Statistics

Panel A: Population Shares					
	1995	2000	2005	2010	2015
Age 25/44	43.80%	43.00%	40.90%	39.20%	36.30%
Age 45/64	30.10%	32.90%	35.60%	36.30%	36.40%
Age 65+	26.00%	24.10%	23.50%	24.50%	27.30%
Male	63.20%	62.60%	62.50%	62.60%	62.10%

Panel B: Descriptive Statistics (US$ of 2018)							
	Mean	Std. Dev.	P10	P50	P90	P99	P99.9
Safe Assets	42,869	204,242	345	12,001	102,886	408,838	1,474,710
Public Equity	7,899	303,496	0	0	11,036	118,260	642,274
Private Equity	35,205	2,312,932	0	0	490	409,833	4,425,962
Housing	285,608	300,826	0	222,809	638,730	1,384,161	2,192,636
Gross Wealth	371,581	2,551,564	2,778	259,693	749,967	1,922,639	6,978,503
Debt	92,417	114,888	0	45,135	250,202	464,635	678,678
Net wealth	279,164	2,546,067	-24,242	16,0147	637,285	1,731,470	6,750,314
Household Observations: 51.3 Million							

Notes: Table C.1 show cross-sectional statistics of the population of households in Norway. Panel A shows, population shares for head of household. Panel B shows household-level wealth statistics in real US$ of 2018 (1 USD=8.14 NOK). To obtain these statistics, we first calculate cross sectional moments at the annual level and then we average the statistics across all years in the sample (1993 to 2015).

Table C.2 – Income and Wealth Concentration

	Bottom 50	Top 10%	Top 5%	Top 1%	Top 0.1%	Top 0.01%
Labor Earnings	8.15	32.72	19.44	5.77	1.13	0.25
Safe Assets	4.14	59.32	44.01	21.12	7.73	2.69
Public Equity	0	99.89	99.19	86.64	53.71	27.87
Private Equity	0	91.03	80.85	55.55	29.49	15.91
Housing	12.52	35.95	23.47	8.53	2.11	0.60
Gross Wealth	13.22	38.43	26.56	11.81	4.44	1.87
Debt	5.09	39.26	23.64	7.01	0.87	0.16
Net wealth	7.31	43.81	30.73	14.10	5.46	2.33

Notes: Table C.2 show cross sectional concentration statistics at the household level. To calculate these statistics, we first calculate cross sectional moments at the annual level and then we average across all years in the sample (1993 to 2015). The concentration of net wealth deviates slightly from official statistics due to our use of alternative housing values.

Table C.3 – Wealth Returns

	Obs. (000s)	Mean	Std. Dev.	Skew.	Kurt.	P90-P10	$S_{\mathcal{K}}$
All	20,902	0.030	0.186	0.468	16.887	0.280	0.107
Equity	6,968	0.120	0.383	2.872	30.027	0.530	0.302
Housing	16,070	0.044	0.187	2.207	26.019	0.265	0.147
Safe	19,823	0.026	0.025	4.216	40.075	0.049	-0.02
	P1	P5	P10	P50	P90	P95	P99
All	-0.587	-0.234	-0.103	0.022	0.177	0.276	0.658
Equity	-0.905	-0.301	-0.117	0.068	0.413	0.643	1.569
Housing	-0.505	-0.216	-0.085	0.028	0.180	0.276	0.738
Safe	0.000	0.000	0.000	0.025	0.049	0.060	0.116

Notes: Table C.3 shows cross sectional statistics of the returns distribution for different asset classes based on a pooled sample of households between 2005 and 2015. We calculate returns following Fagereng *et al.* (2020a). Equity corresponds to the returns on private and publicly traded firms. See Appendix A.3 for additional details on the calculation of returns. The Kelley skewness is defined as $\mathcal{S}_{\mathcal{K}} = \frac{P90-P50}{P90-P10} - \frac{P50-P10}{P90-P10}$.

Table C.4 – Sample Statistics: US SCF Data

Descriptive Statistics (US$ of 2018)							
	Mean	SD	P10	P50	P90	P99	P99.9
Safe Assets	125,615	602,358	85	16,521	281,479	1,620,551	5,924,482
Public Equity	84,644	1,109,028	0	0	76,413	1,569,328	9,102,842
Private Equity	91,180	1,825,445	0	0	7,301	1,574,025	12,985,575
Housing	237,051	1,477,831	0	98,010	457,038	2,389,650	10,598,920
Gross Wealth	538,491	3,293,036	382	143,885	938,809	7,116,825	31,126,536
Debt	78,513	532,779	-2	12,596	194,056	694,872	2,637,272
Net wealth	459,978	3,113,103	-1,741	78,847	801,826	6,685,830	27,845,214

Notes: Table C.4 show cross sectional statistics of the population of households in the United States using data from SCF in real US$ of 2018. To obtain these statistics, we first calculate cross sectional moments at the annual level and then we average the statistics across all years in the sample after 1989.

Table C.5 – Income and Wealth Concentration: US SCF Data

	Bottom 50	Top 10%	Top 5%	Top 1%	Top 0.1%	Top 0.01%
Income	9.41	49.92	38.58	21.42	8.32	3.03
Safe Assets	1.60	70.35	55.24	28.46	9.16	2.89
Public Equity	-0.04	95.77	87.27	59.96	25.47	8.90
Private Equity	-0.01	99.95	97.48	77.97	36.47	13.67
Housing	4.77	59.39	47.08	26.87	11.17	4.87
Gross Wealth	3.86	68.31	56.79	33.12	12.06	3.88
Debt	-0.08	58.84	43.93	23.31	10.95	5.59
Net wealth	1.78	73.37	61.55	36.24	13.28	4.33

Notes: Table C.5 show cross sectional statistics of the population of households in the United States using data from SCF in real US$ of 2018. To obtain these statistics, we first calculate cross sectional moments at the annual level and then we average the statistics across all years in the sample after 1989.

Table C.6 – Returns on Assets

	N 000s	Mean	SD.	Skew.	Kurt.	P1	P5	P10	P50	P90	P95	P99
Panel A: Individual-level returns												
All	29,482	0.033	0.202	0.702	19.911	-0.628	-0.241	-0.106	0.022	0.186	0.293	0.740
Equity	8,538	0.119	0.376	2.516	25.905	-0.920	-0.302	-0.119	0.069	0.414	0.643	1.545
Housing	23,558	0.045	0.201	2.619	30.030	-0.533	-0.229	-0.089	0.025	0.184	0.282	0.809
Safe	26,907	0.026	0.026	4.459	41.027	0.000	0.000	0.000	0.024	0.049	0.061	0.127
Panel B: Household-level returns												
All	20,902	0.030	0.186	0.468	16.887	-0.587	-0.234	-0.103	0.022	0.177	0.276	0.658
Equity	6,968	0.120	0.383	2.872	30.027	-0.905	-0.301	-0.117	0.068	0.413	0.643	1.569
Housing	16,070	0.044	0.187	2.207	26.019	-0.505	-0.216	-0.085	0.028	0.180	0.276	0.738
Safe	19,823	0.026	0.025	4.216	40.075	0.000	0.000	0.000	0.025	0.049	0.060	0.116

Notes: Table C.6 shows cross-sectional statistics of the returns distribution for different asset classes based on a pooled sample of households between 2004 and 2015. We calculate returns following Fagereng *et al.* (2020a). Equity corresponds to the sum of equity on private and publicly traded firms.

Table C.7 – Share of Lifetime Resources in the Cross Section

	Share out of lifetime resources, $\sum Y_{it}$ for 50 years old							
	Top 0.1% Wealth Group				Top 1% Wealth Group			
	P50	P90	P95	P99	P50	P90	P95	P99
Labor Income	6%	19%	26%	42%	19%	51%	64%	91%
Self-Emp. Income	0%	3%	10%	36%	0%	12%	28%	60%
Inheritance	0%	5%	10%	38%	0%	5%	9%	31%
Initial Wealth	8%	63%	81%	98%	14%	58%	70%	87%
Inheritance+Init Wealth	12%	68%	81%	98%	16%	60%	72%	88%

Notes: Table C.7 shows cross-sectional moments of the distribution of lifetime income shares.

Table C.8 – Average Values and Counterfactual for 50-to-54 year old households

Wealth Rank	Labor Income, $\tilde{l}$	Inheritances $\tilde{h}$	Saving Rate,s	Capital Income,R^{INC}	Initial Wealth*
<0	407,266	9,615	-0.81	-0.15	0.00
$[0, W_{min}]$	265,827	5,460	-0.02	-0.32	0.04
$[W_{min}, P50]$	441,424	13,568	0.08	0.04	0.25
$[P50, P75]$	516,047	22,237	0.20	0.08	0.50
$[P75, P90]$	584,986	33,729	0.28	0.11	0.70
$[P90, P95]$	682,008	50,342	0.34	0.13	0.93
$[P95, P99]$	802,292	68,162	0.37	0.15	1.42
$[P99, P99.9]$	1,048,610	115,041	0.42	0.20	3.74
Top 0.1%	1,354,062	274,699	0.74	0.16	29.61
Counterfactual	471,402	17,051	0.13	0.06	0.25

Notes: Table C.8 the average of the component of the budget constraint for households who are 50 to 54 years old. *Initial wealth is expressed relative to the average wealth in the economy. Labor and Inheritances (sum if inheritances and inter-vivos transfers) are in real NOK of 2018.

Table C.9 – Counterfactual Initial Wealth Under Different Assumptions

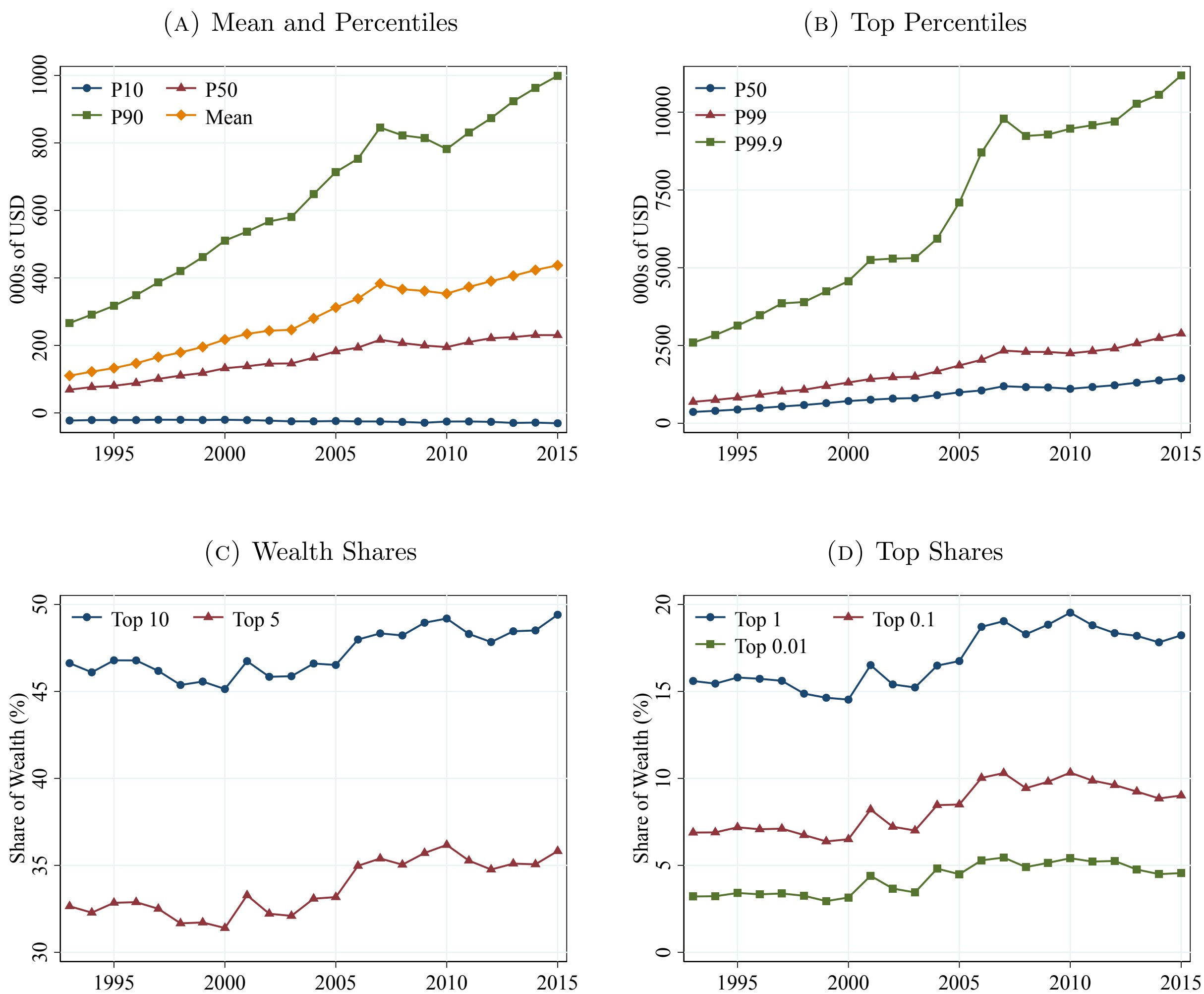
	Labor prior 1993		Counterfactual		AW in 1993 Data	
	Values in Multiples of Average Wealth					
	(1)	(2)	(3)	(4)	(5)	(6)
Age group	Top 0.1	Old Money	Top 0.1	Old Money	Top 0.1	Old Money
40	0.47	0.49	0.39	0.39	3.15	11.88
45	2.38	2.51	2.19	2.29	7.87	25.39
50	5.26	5.42	5.59	5.73	20.15	76.73
55	9.49	9.69	12.02	12.18	37.57	131.71

Notes: Columns (1) and (2) report the sum of labor income prior to 1993, for the top 0.1% (backward-ranking), respectively the subgroup Old Money. Counterfactual initial wealth in (3) and (4) refers to the estimated initial wealth (in 1993) when capitalizing observed post-tax and transfer labor income prior to 1993 with the observed saving rate and return on net wealth post-1993. We contrast this estimated counterfactual initial wealth to the actual observed initial wealth in 1993 of each group (all top 0.1% households in (5) and the subgroup of Old Money in (6)). All values are in units of average economy-wide wealth (AW).

E Additional Figures

E.1 Cross-Sectional Moments

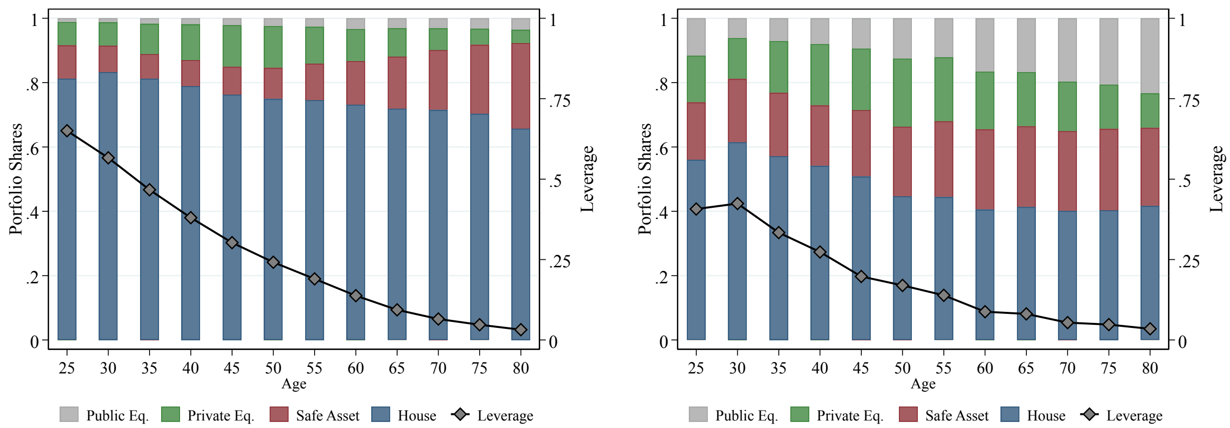
Figure D.1 – Time Series of Wealth and Concentration



Notes: Figure D.1 shows time series of different moments of the wealth distribution in Norway.

Figure D.2 – Portfolio Composition over the Life Cycle

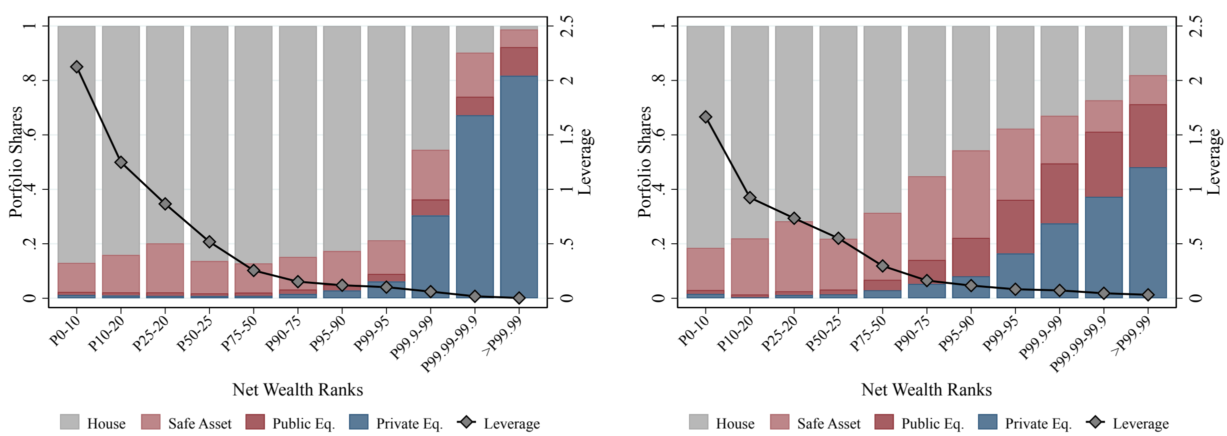
(A) Norway | (B) United States



Notes: Figure D.2 shows the portfolio shares and leverage within five-year age groups labeled by their starting age (25-29,30-34, and so on) for Norway and the United States. Portfolio shares are calculated as the ratio between the value of all assets in a particular category (e.g. total value of safe assets) over the total value of gross wealth (i.e. sum of wealth in housing, safe assets, public equity, and private equity) within an age group. Similarly, within-group leverage, is the ratio between the sum all debt (e.g. mortgages, student debt, credit card debt) within a wealth rank and age group and the sum of all total assets within the same group. See Appendix A for additional details and definitions.

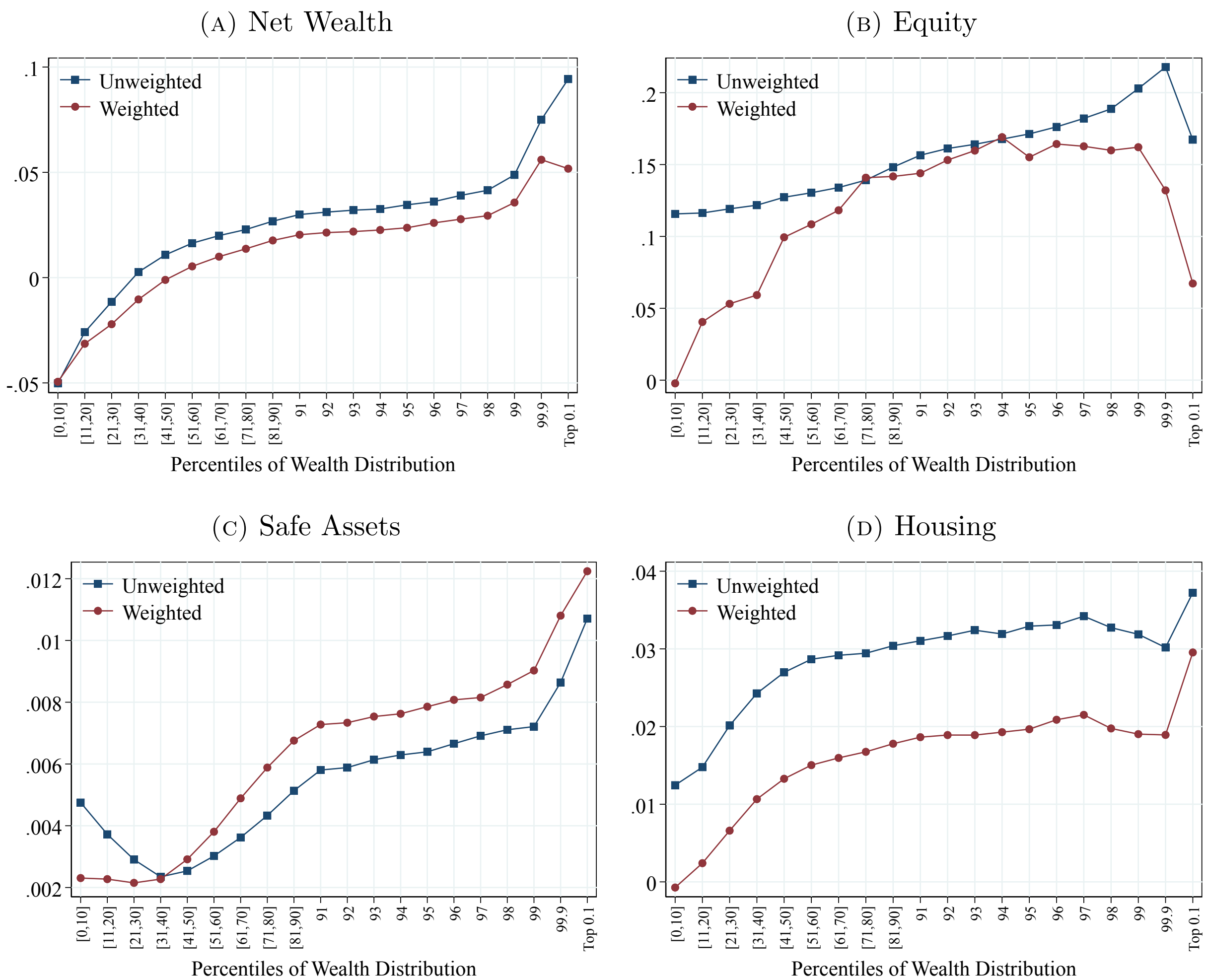
Figure D.3 – Portfolio Composition over the Wealth Distribution

(A) Norway | (B) United States



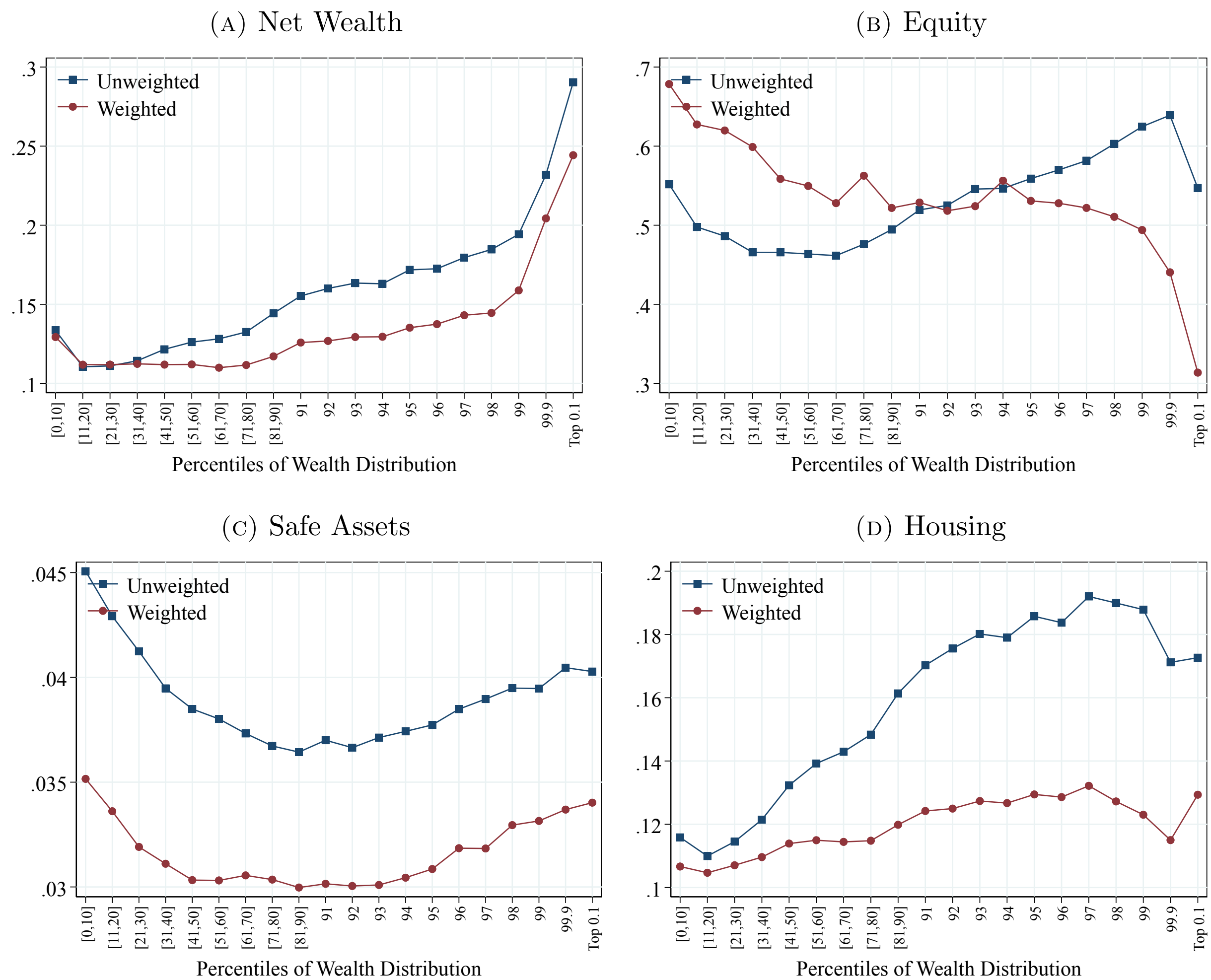
Notes: Figure D.3 shows the portfolio shares and leverage within wealth percentiles for Norway and the United States. Portfolio shares are calculated as the ratio between the value of all assets in a particular category (e.g. total value of safe assets) over the total value of gross wealth (i.e. sum of wealth in housing, safe assets, public equity, and private equity) within an wealth group. Similarly, within-group leverage, is the ratio between the sum all debt (e.g. mortgages, student debt, credit card debt) within a wealth group and the sum of all total assets within the same group. See Appendix A for additional details and definitions.

Figure D.4 – Cross-Sectional Mean Returns



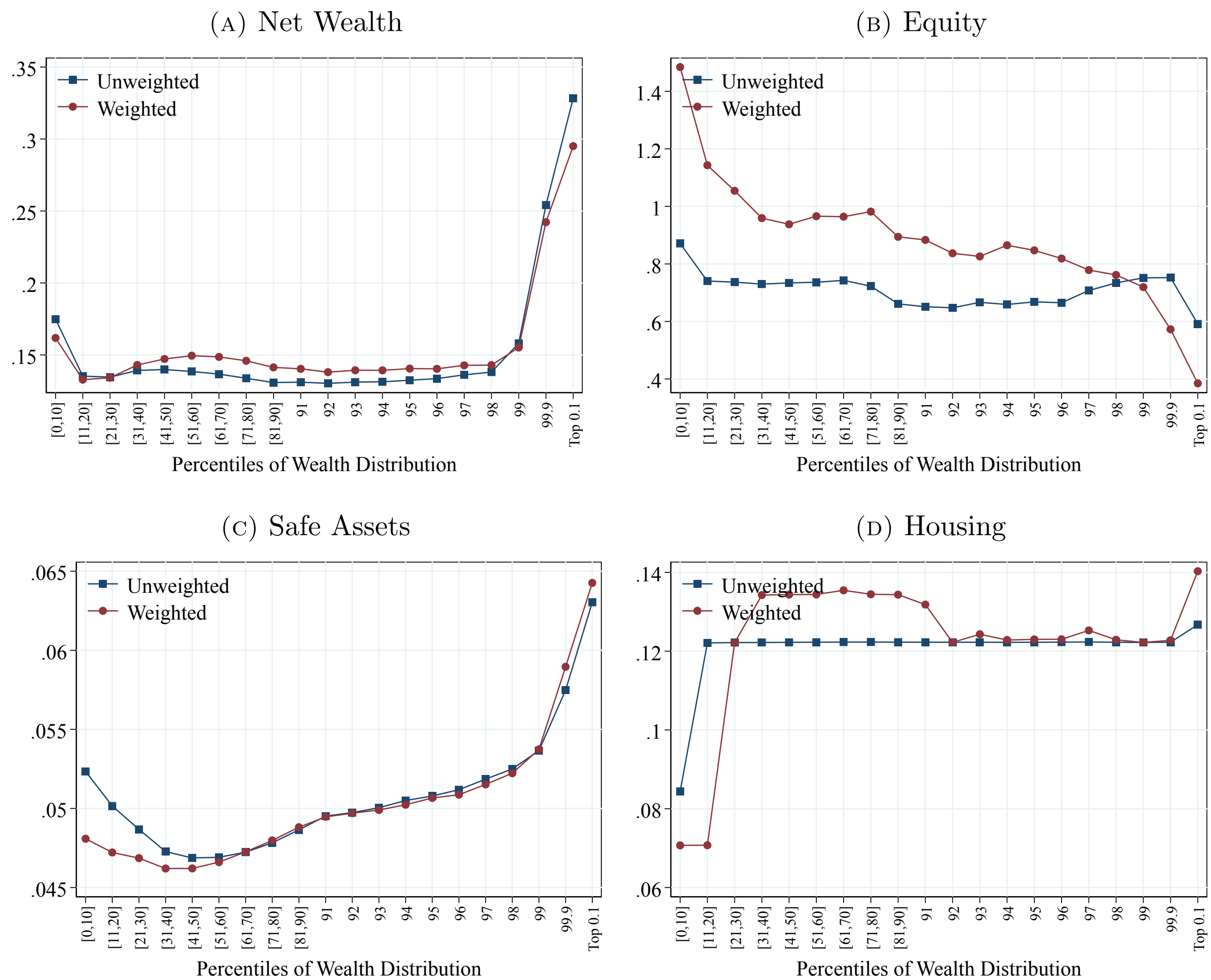
Notes: Figure D.4 shows the average returns within different quantiles of the households net worth distribution. To construct this figure, we pool household observations between 2005 and 2015. Weighted averages are weighted using the value of the corresponding asset. Negative or missing asset values are assigned a weight of 0.

Figure D.5 – Cross-Sectional Standard Deviation of Returns



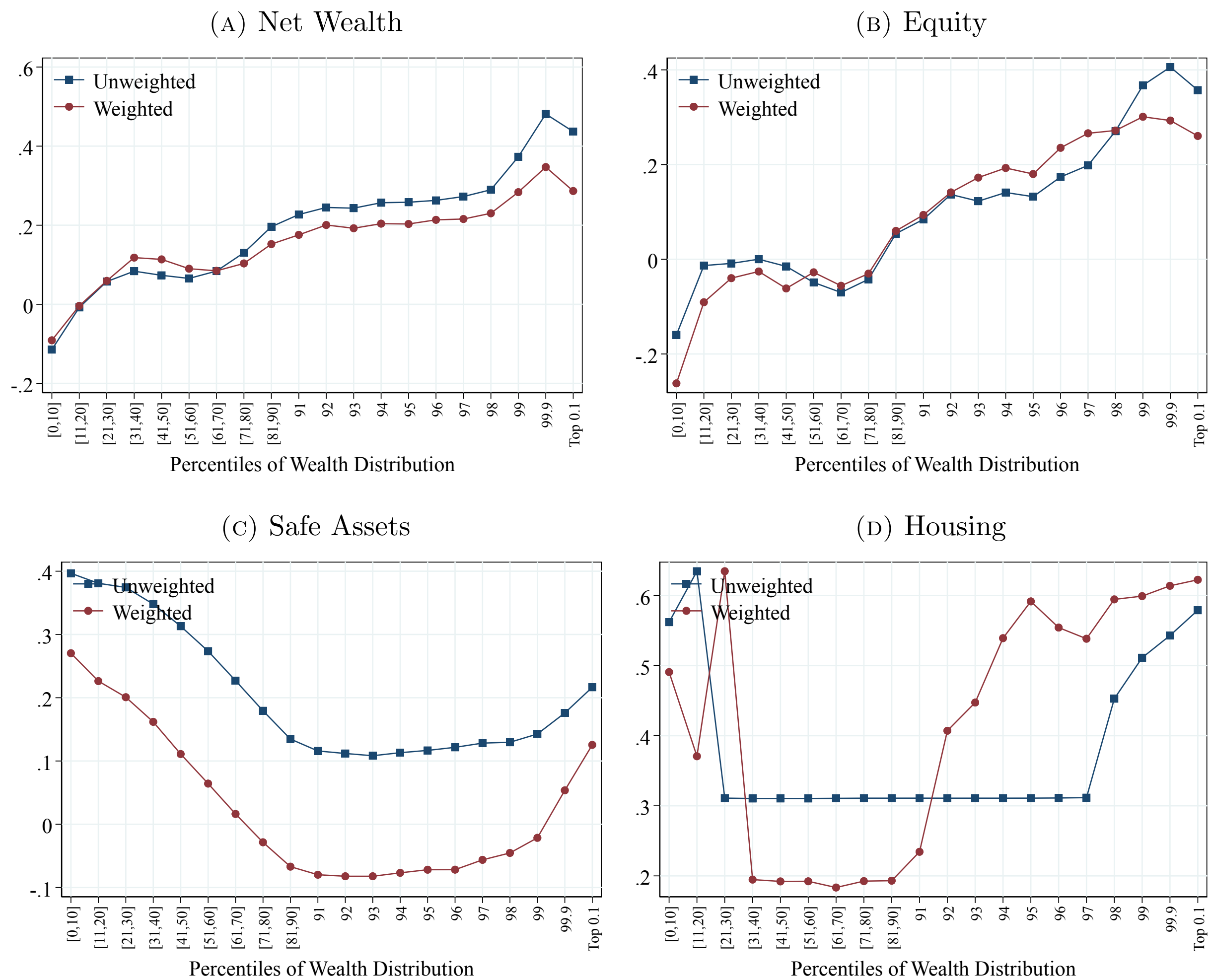
Notes: Figure D.5 shows the standard deviation returns within different quantiles of the households net worth distribution. To construct this figure, we pool household observations between 2005 and 2015. Weighted averages are weighted using the value of the corresponding asset. Negative or missing asset values are assigned a weight of 0.

Figure D.6 – Cross Sectional P90-P10 of Returns



Notes: Figure D.6 shows the P90-P10 of returns within different quantiles of the households net worth distribution. To construct this figure, we pool household observations between 2005 and 2015. Weighted averages are weighted using the value of the corresponding asset. Negative or missing asset values are assigned a weight of 0.

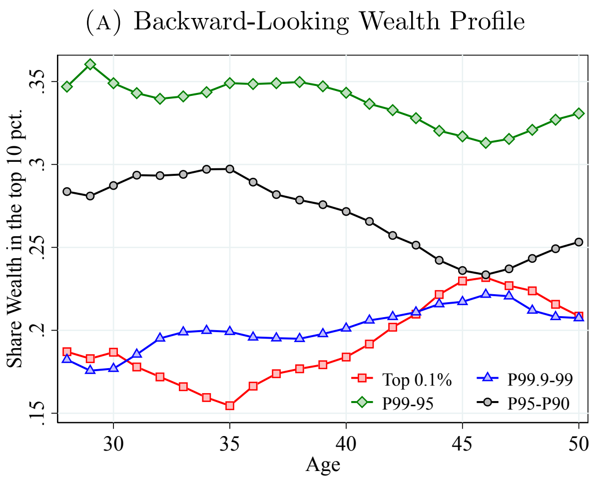
Figure D.7 – Cross Sectional Kelley Skewness of Returns

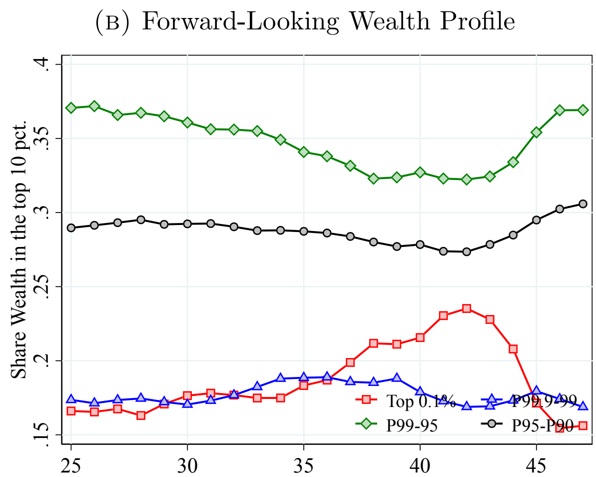


Notes: Figure D.7 shows the Kelley Skewness returns within different quantiles of the households net worth distribution. To construct this figure, we pool household observations between 2005 and 2015. Weighted averages are weighted using the value of the corresponding asset. Negative or missing asset values are assigned a weight of 0. Kelley Skewness is defined as $\mathcal{S}_{\mathcal{K}} = \frac{P90-P50}{P90-P10} - \frac{P50-P10}{P90-P10}$.

E.2 Backward-Looking Results

Figure D.8 – Share of Wealth at the Top 10 Percentile.

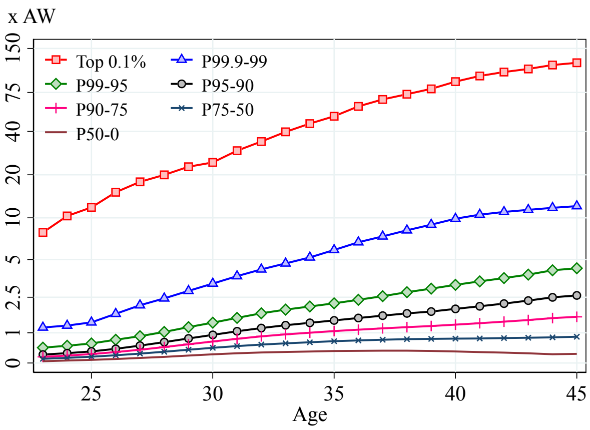




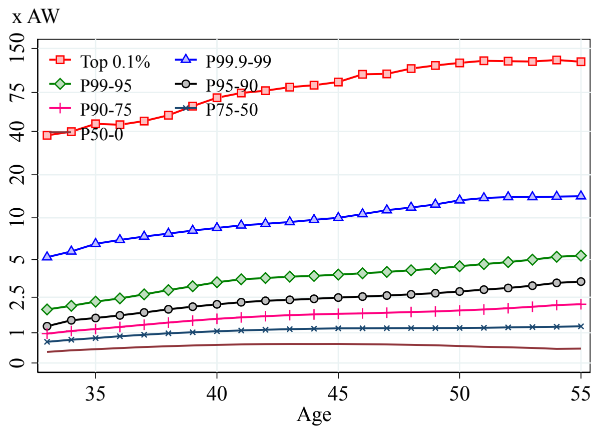
Notes: Figure shows the share of the economy-wide net wealth held by households at the top 10% of the distribution.

Figure D.9 – Backward-Looking Wealth Profiles: Age Groups

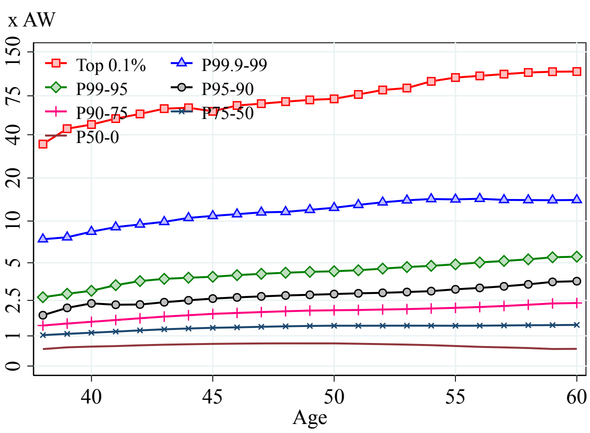
(A) Age 45/49



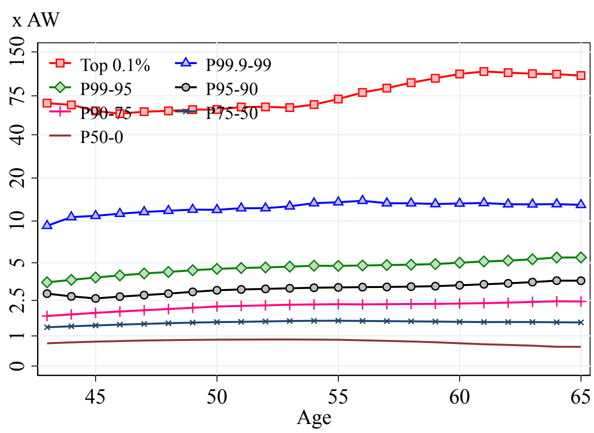
(B) Age 55/59



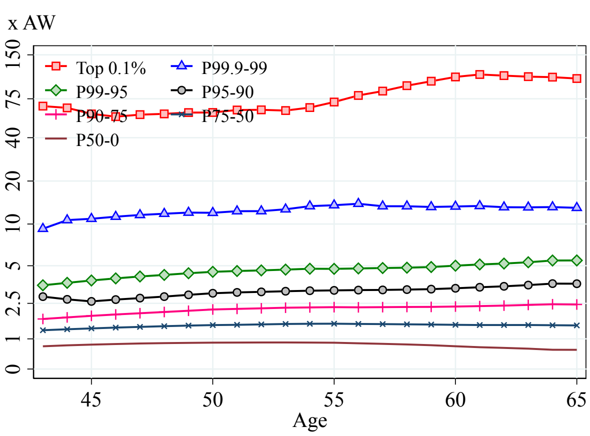
(C) Age 60/64



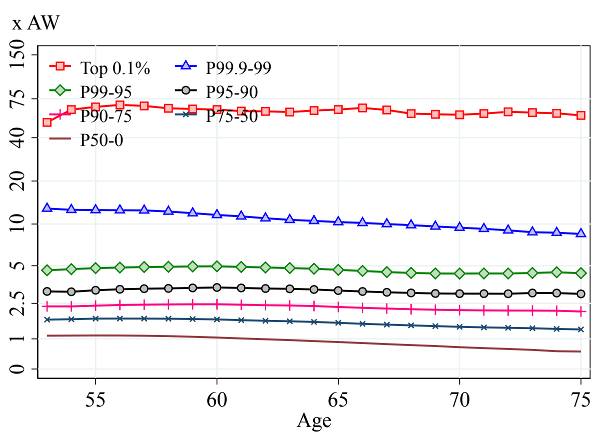
(D) Age 65/69



(E) Age 70/74



(F) Age 75/79



Notes: Figure D.9 shows the evolution of average wealth for different wealth groups conditional on their wealth at the end of the sample period sorted by BW_j^h.

Figure D.10 – Long-Term Transition Matrix: Age Groups

(a) Age 45/49

End-of-Period Wealh Rank, BW^h_j \ Initial Average Wealth Rank	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	60.3	23.4	11.2	2.9	1.9	0.3	0.0
(50-75]	44.9	26.4	18.4	5.9	3.8	0.5	0.0
(75-90]	40.7	24.2	19.6	8.0	6.4	1.0	0.0
(90-95]	37.7	22.1	19.3	9.0	9.7	2.1	0.1
(95-99]	33.9	19.3	18.1	9.0	12.7	6.7	0.4
(99-99.9]	30.0	15.1	16.9	8.3	14.3	11.2	4.2
Top 0.1%	29.6	8.6	9.5	7.0	11.1	11.2	23.0

(b) Age 55/59

End-of-Period Wealh Rank, BW^h_j \ Initial Average Wealth Rank	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	66.5	21.7	8.2	2.1	1.4	0.1	0.0
(50-75]	40.4	32.4	19.0	4.8	3.0	0.3	0.0
(75-90]	30.3	28.0	25.9	9.0	6.0	0.8	0.0
(90-95]	24.3	21.9	25.8	13.8	11.9	2.2	0.1
(95-99]	18.9	16.8	21.2	15.1	21.0	6.6	0.4
(99-99.9]	12.6	10.3	13.8	10.4	22.9	26.0	3.9
Top 0.1%	5.4	4.6	7.2	7.3	12.2	32.9	30.4

(c) Age 60/64

End-of-Period Wealh Rank, BW^h_j \ Initial Average Wealth Rank	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	68.8	20.6	7.4	2.0	1.1	0.1	0.0
(50-75]	39.3	34.3	18.8	4.6	2.8	0.2	0.0
(75-90]	27.2	29.2	27.9	8.9	6.0	0.6	0.0
(90-95]	20.5	21.3	28.3	14.9	12.9	2.0	0.1
(95-99]	14.3	15.2	22.6	16.1	24.4	7.1	0.3
(99-99.9]	7.9	8.0	11.9	10.5	25.5	31.8	4.4
Top 0.1%	3.9	3.4	7.1	6.2	10.7	34.9	33.8

(d) Age 65/69

End-of-Period Wealh Rank, BW^h_j \ Initial Average Wealth Rank	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	70.2	19.8	7.2	1.8	0.9	0.1	0.0
(50-75]	39.3	35.6	18.1	4.4	2.5	0.2	0.0
(75-90]	24.8	30.5	29.3	9.0	5.8	0.6	0.0
(90-95]	17.2	20.8	30.5	16.1	13.5	1.9	0.1
(95-99]	11.3	13.0	22.6	18.6	27.1	7.0	0.3
(99-99.9]	5.2	5.8	9.2	9.4	30.0	35.6	4.8
Top 0.1%	3.2	3.4	4.1	3.5	8.7	42.6	34.5

(e) Age 70/74

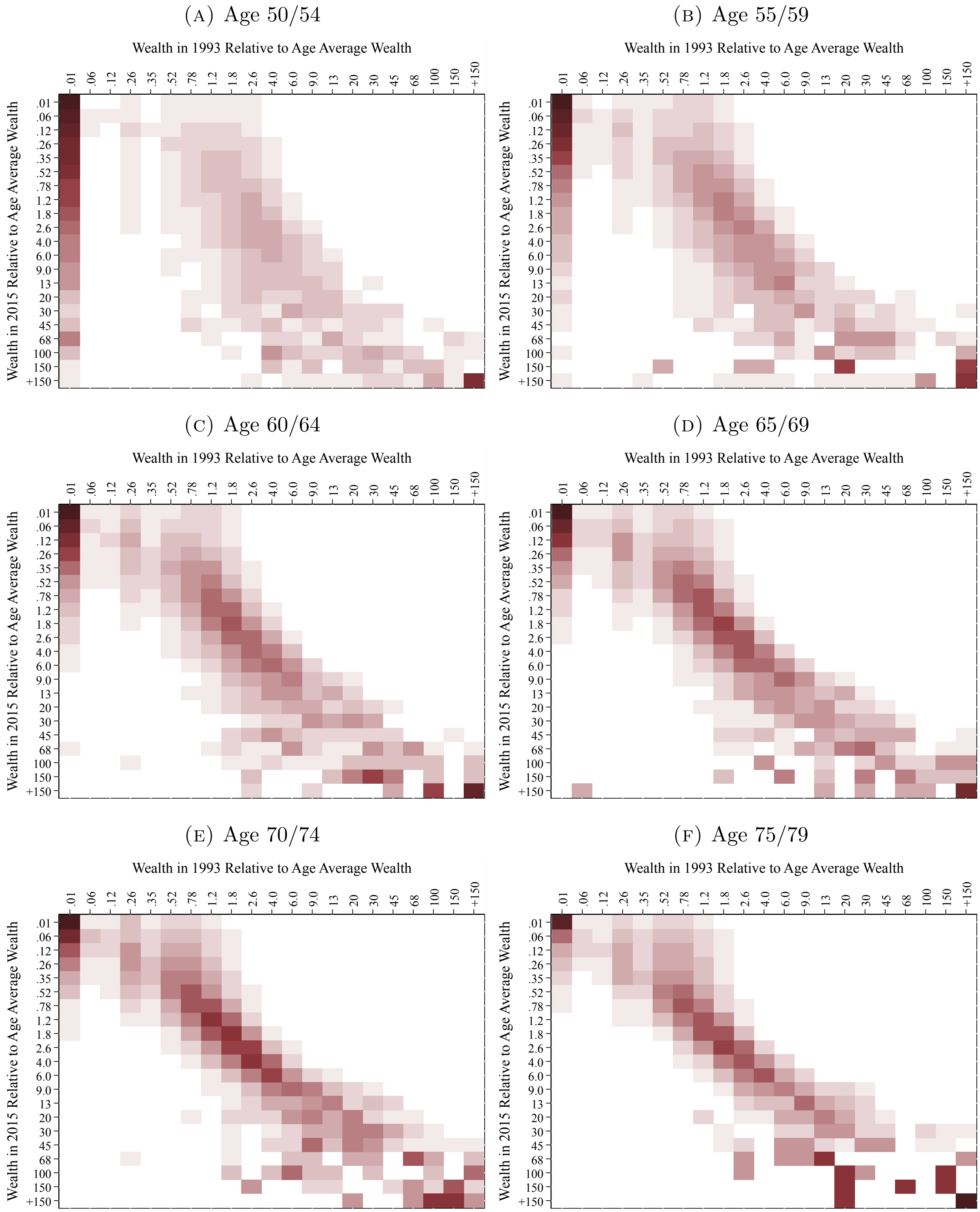
End-of-Period Wealh Rank, BW^h_j \ Initial Average Wealth Rank	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	71.0	19.1	7.1	1.8	0.8	0.1	0.0
(50-75]	39.6	36.0	17.7	4.1	2.3	0.2	0.0
(75-90]	23.1	32.5	29.0	9.0	5.8	0.6	0.0
(90-95]	14.6	20.8	33.5	16.2	13.1	1.7	0.1
(95-99]	8.7	11.8	22.9	20.5	28.9	7.1	0.2
(99-99.9]	2.8	4.6	8.0	9.8	33.5	36.0	5.2
Top 0.1%	1.4	2.9	4.2	2.6	13.3	42.3	33.4

(f) Age 75/79

End-of-Period Wealh Rank, BW^h_j \ Initial Average Wealth Rank	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	71.6	18.7	7.0	1.8	0.8	0.1	0.0
(50-75]	39.9	36.0	17.4	4.1	2.3	0.2	0.0
(75-90]	22.0	33.9	29.2	9.0	5.3	0.7	0.0
(90-95]	12.1	21.5	35.7	16.1	12.8	1.7	0.1
(95-99]	7.0	10.8	23.7	21.2	30.1	6.9	0.3
(99-99.9]	1.7	3.1	6.9	9.2	39.1	35.5	4.4
Top 0.1%	0.2	2.3	3.0	2.4	9.2	42.4	40.6

Notes: Figure D.10 shows the intragenerational persistence of net wealth. Figure 5a shows the results by first sorting household whose head is in different age groups in the conditioning year and then again by $\overline{W}_{i,1993}$. Each cell represent the fraction of household in different percentiles of the wealth distribution in $\overline{W}_{i,1993}$ (columns), conditional on their percentile of the wealth distribution in the conditioning year, BW^h_j (rows).

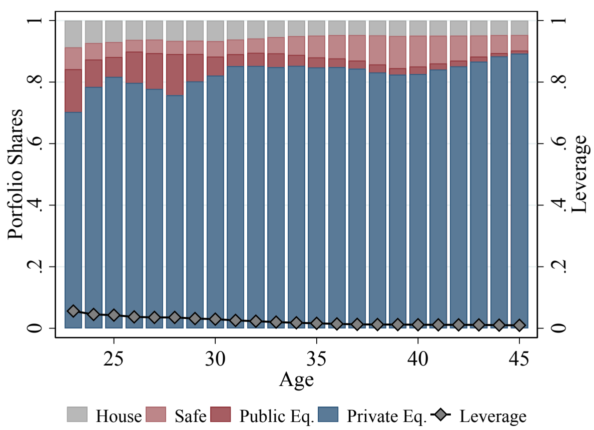
Figure D.11 – Backward-Looking Transition Matrix: Level



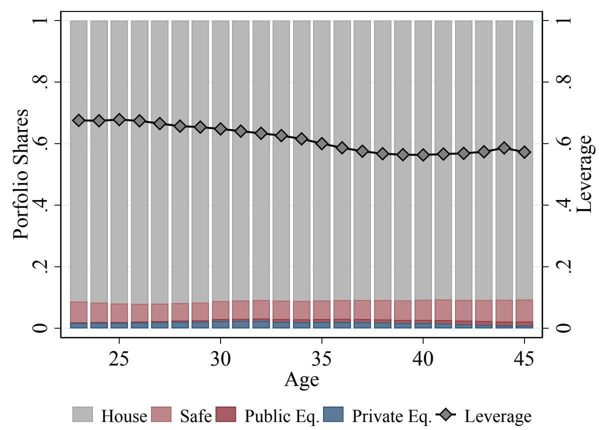
Notes: In the different panels of Figure D.11, each cell represent the fraction of household in different levels of the wealth distribution in $\overline{W}_{i,1993}$ (columns), conditional on their levels of the wealth distribution in the conditioning year, BW^h_j (rows). Wealth is expressed in multiple of AW.

Figure D.12 – Backward-Looking Portfolio Shares: Age Groups

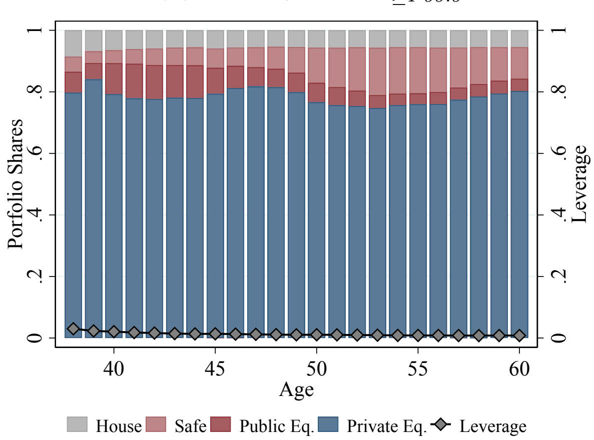
(a) Age 45/49: $BW^{[45-49]}_{\geq P99.9}$



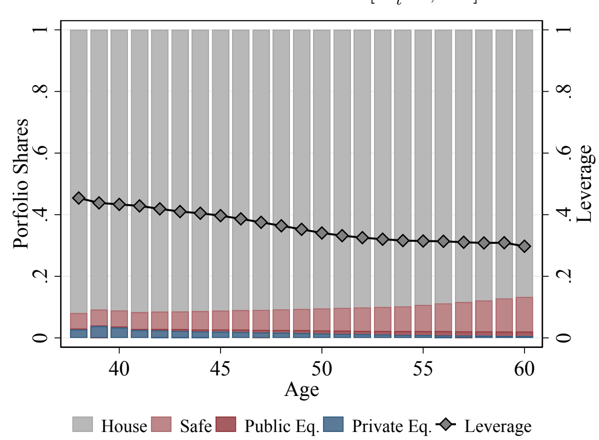
(b) Age 45/49: $BW^{[45-49]}_{[W_t^{\min}, P50]}$



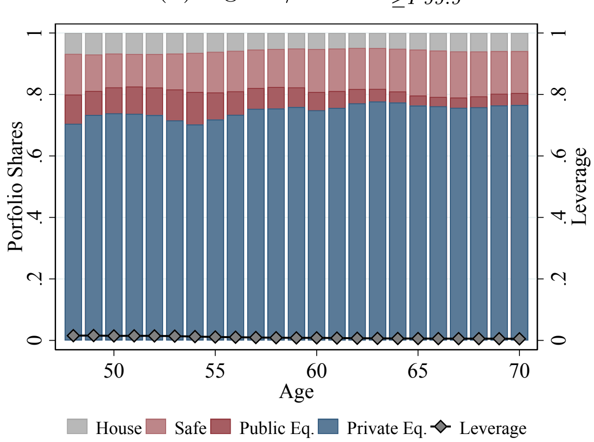
(c) Age 60/64: $BW^{[60-64]}_{\geq P99.9}$



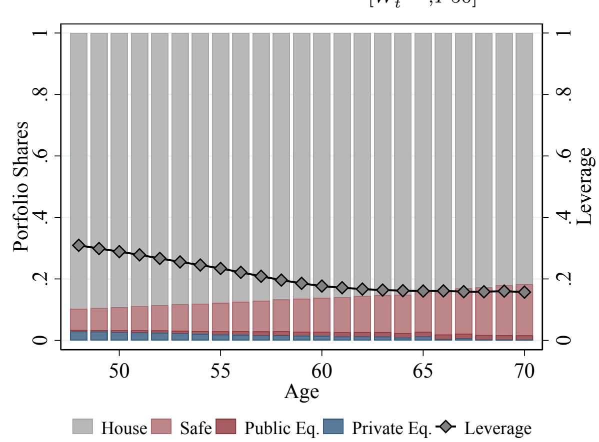
(d) Age 60/64: $BW^{[60-64]}_{[W_t^{\min}, P50]}$



(e) Age 70/74: $BW^{[70-74]}_{\geq P99.9}$

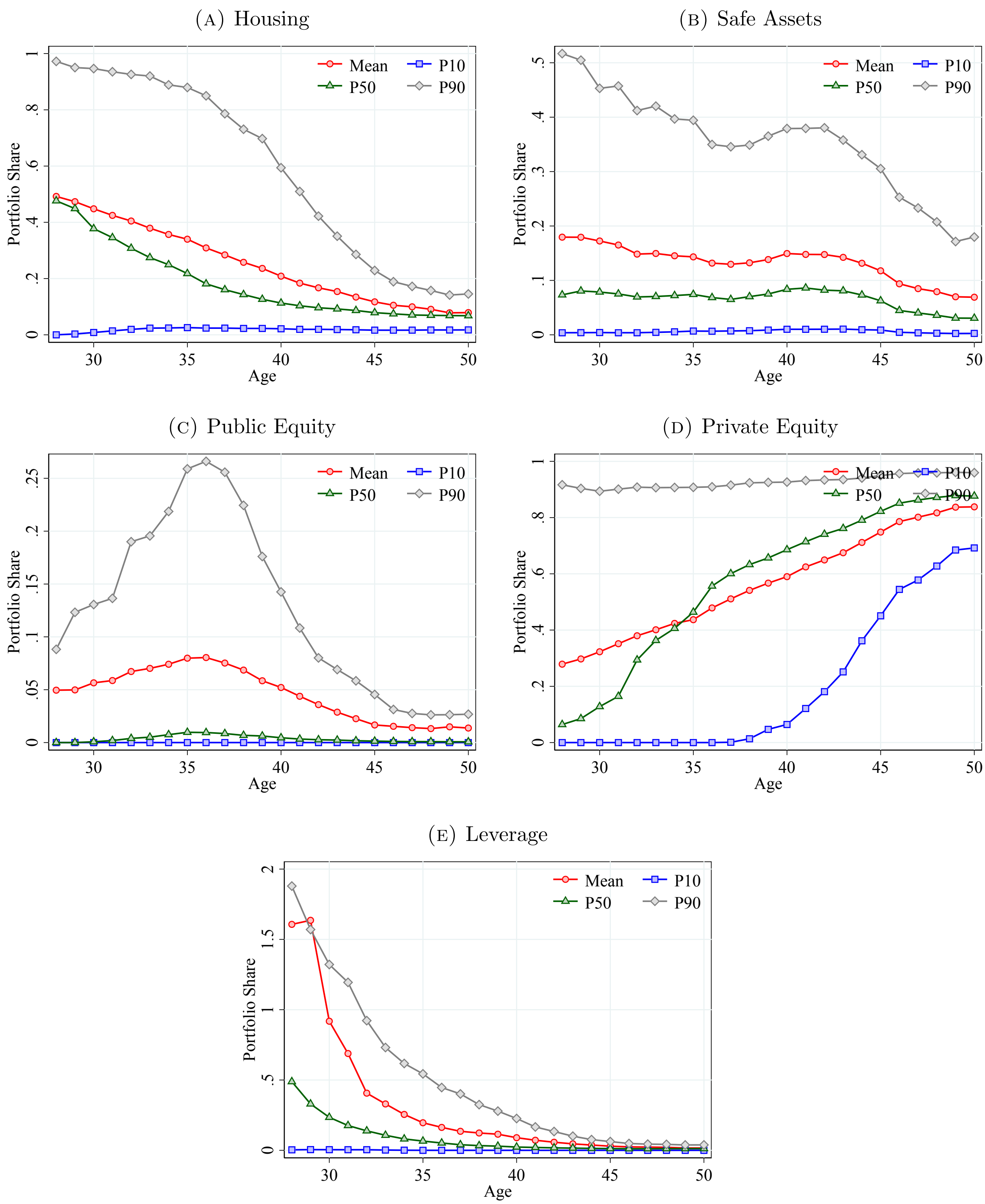


(f) Age 70/74: $BW^{[70-74]}_{[W_t^{\min}, P50]}$



Notes: Figure D.12 shows the evolution of the portfolio shares (left y-axis) and leverage (right y-axis).

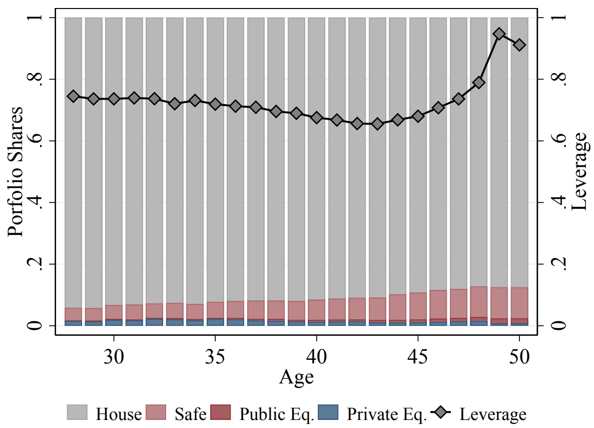
Figure D.13 – Cross-Sectional Portfolio Shares for $BW^{[50-54]}_{\geq P99.9}$



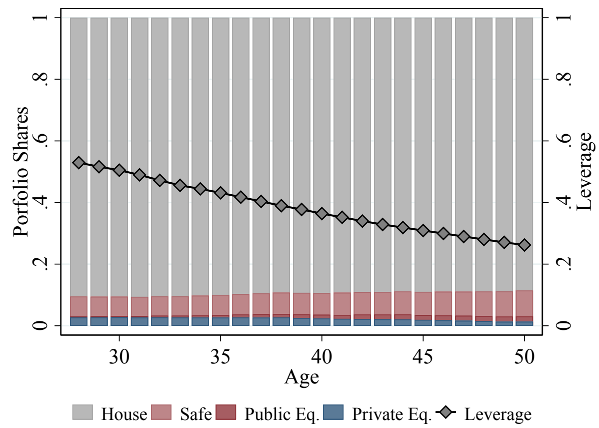
Notes: Figure D.13 cross-sectional moments of the distribution portfolio shares for households in $BW^{[50-54]}_{\geq P99.9}$.

Figure D.14 – Backward-Looking Portfolio Shares for $BW^{[50-54]}_{\geq P99.9}$

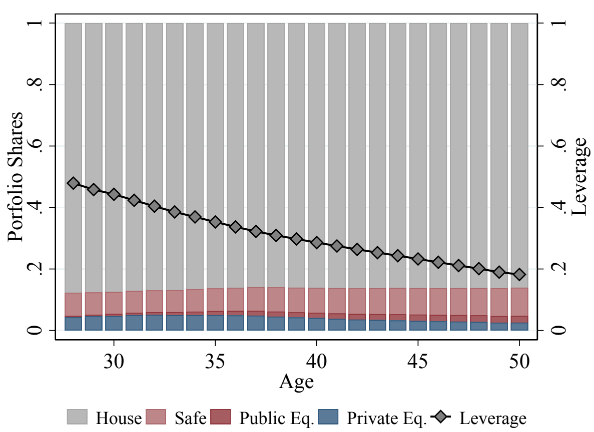
(a) Between 0 and $W_t^{\min}$



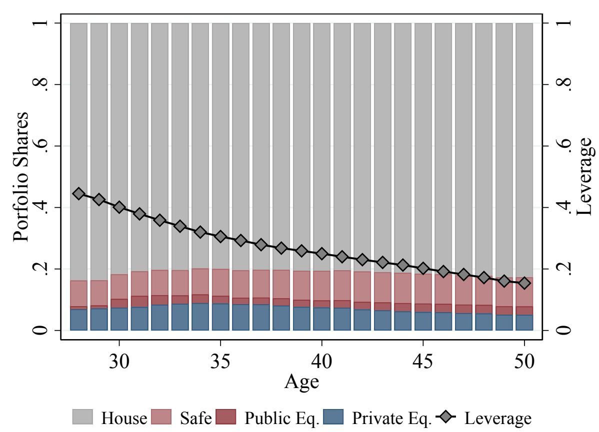
(b) Between 50th and 75th



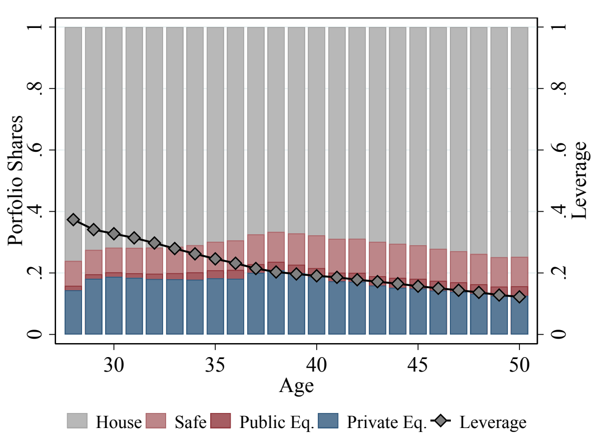
(c) Between 75th and 90th



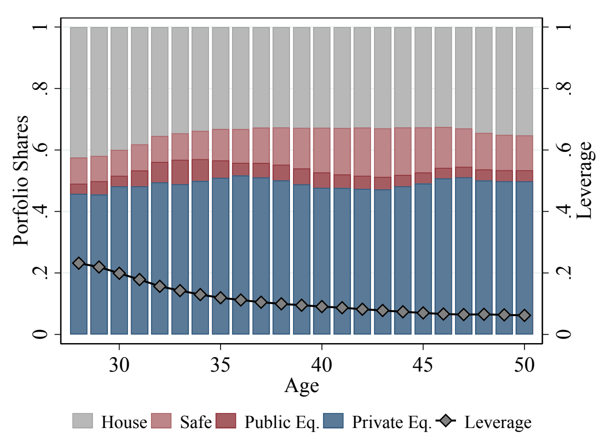
(d) Between 90th and 95th



(e) Between 95th and 99th



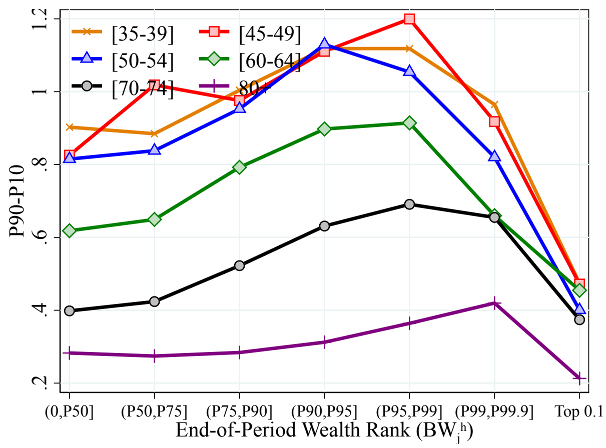
(f) Between 99th and 99.9th



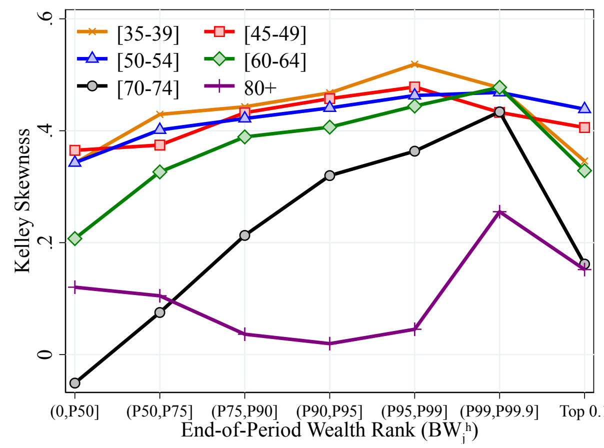
Notes: Figure D.14 shows the evolution of the portfolio shares (left y-axis) and leverage (right y-axis) for households.

Figure D.15 – Dispersion and Skewness of Equity Returns

(a) Dispersion



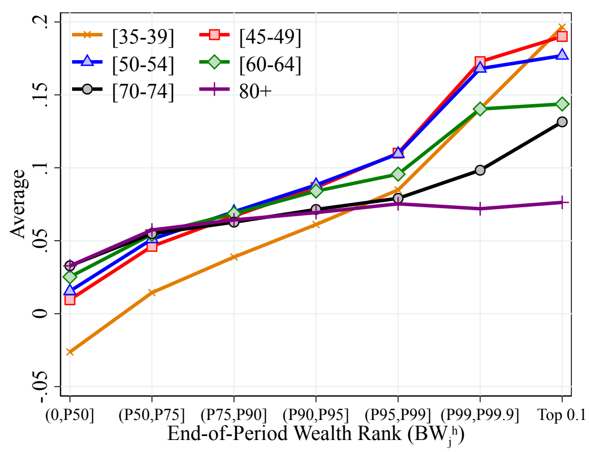
(b) Skewness



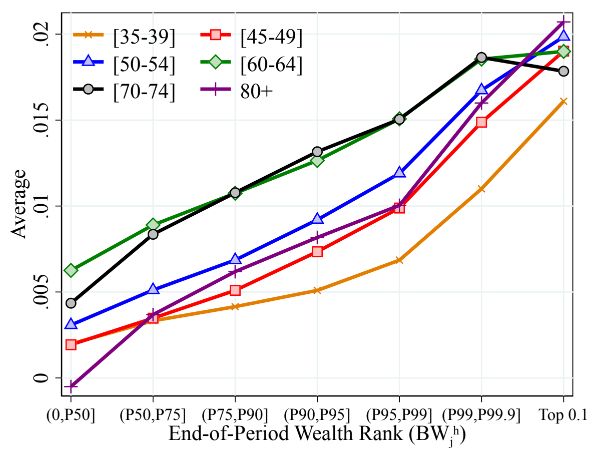
Notes: Figure D.15 shows value-weighted cross-sectional moments of annual returns within age and wealth groups.

Figure D.16 – Returns on Assets Across the Wealth Distribution-Unweighted

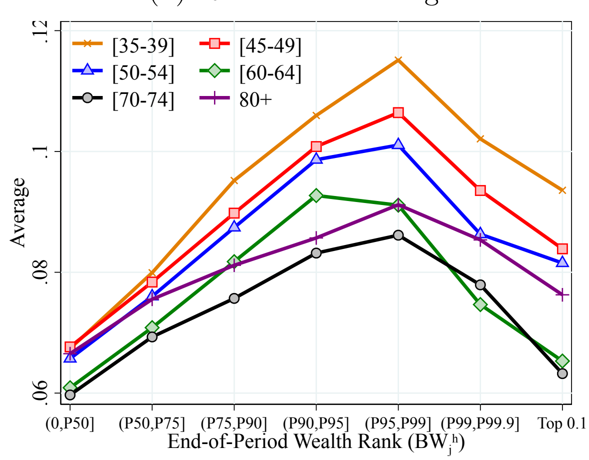
(a) Return on Net Wealth



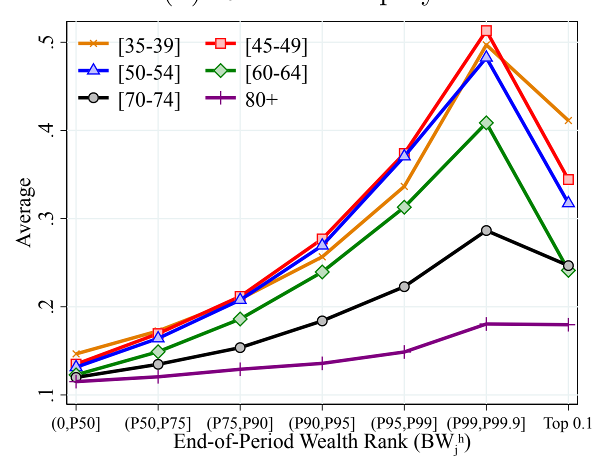
(b) Return on Safe Assets



(c) Return on Housing

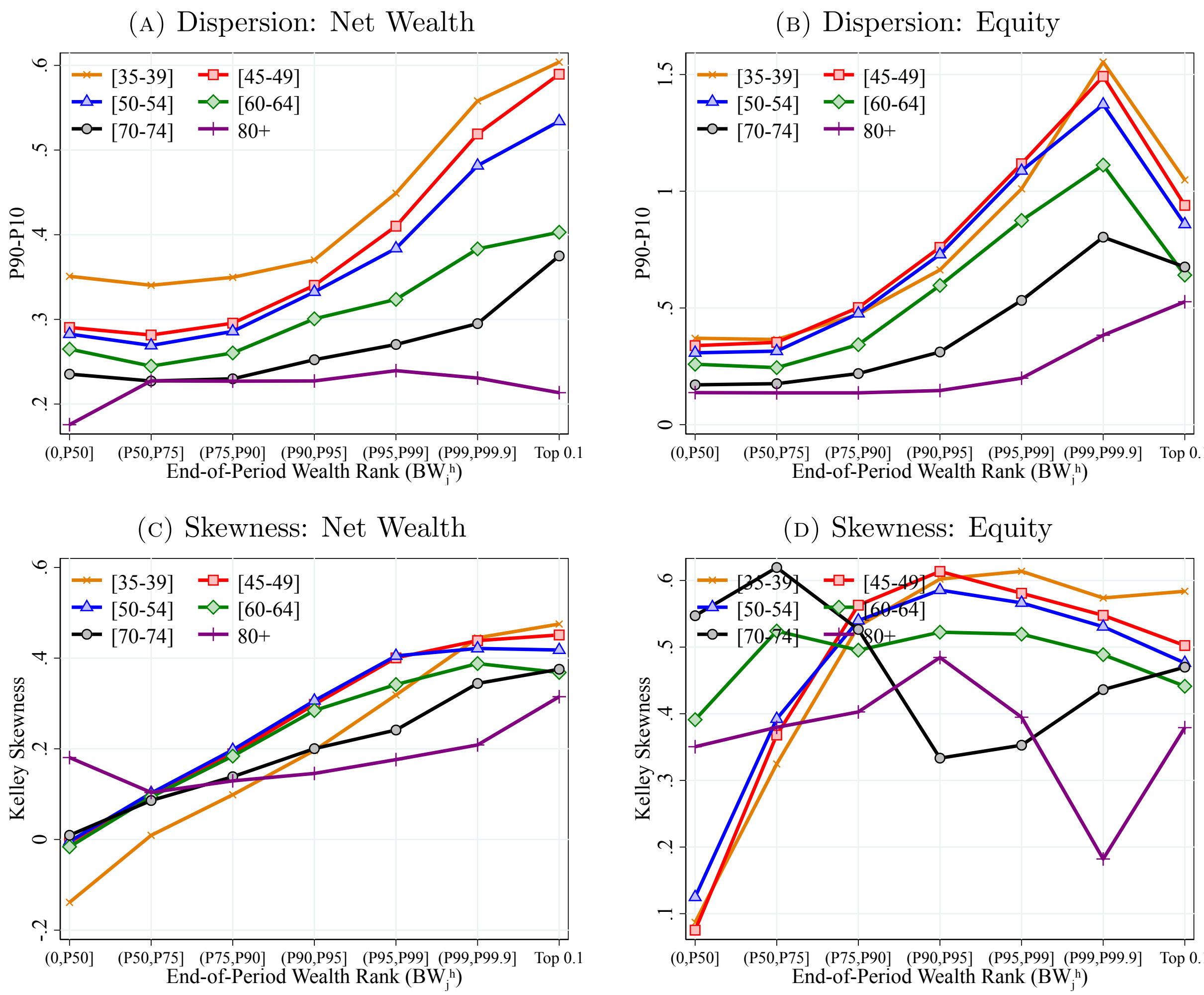


(d) Return on Equity



Notes: Figure D.16 shows the 11-years mean of the value-weighted average gross annual returns within age and wealth groups across different conditioning years for different asset classes.

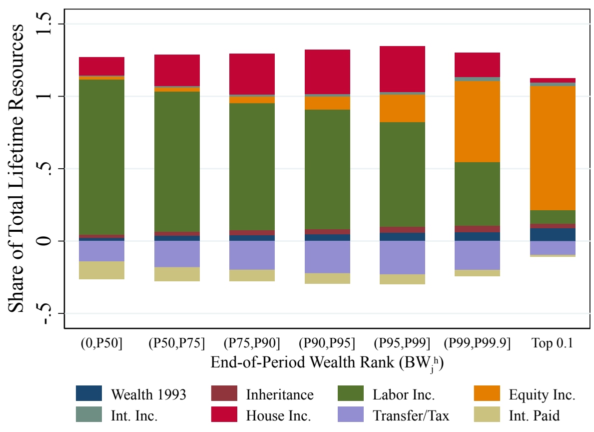
Figure D.17 – Dispersion and Skewness of Rates of Log-term Returns-Unweighted



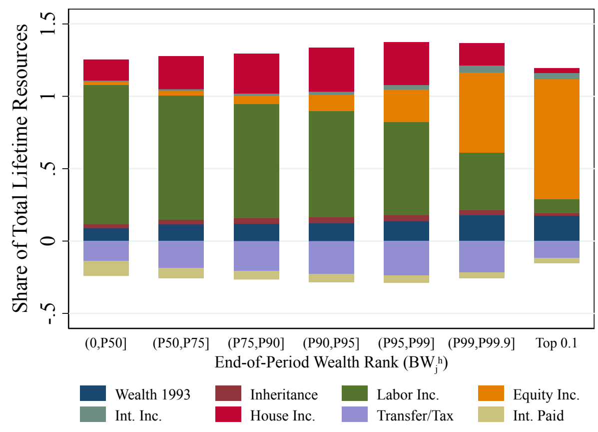
Notes: Figure D.17 shows the 11-years mean of the value-weighted cross-sectional moments of the gross annual returns within age and wealth groups across different conditioning years for different asset classes.

Figure D.18 – Decomposition of Life Time Resources: Age Groups

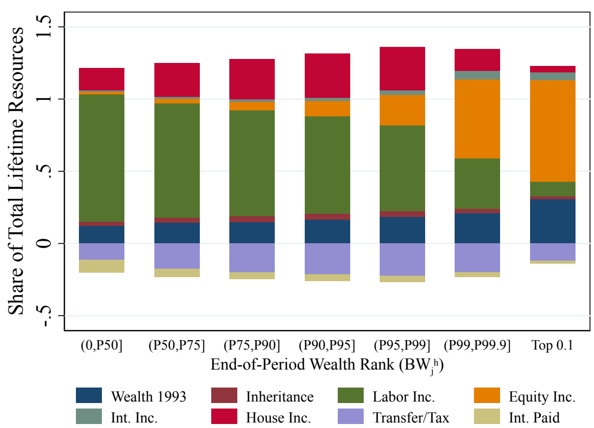
(a) Age 45/49



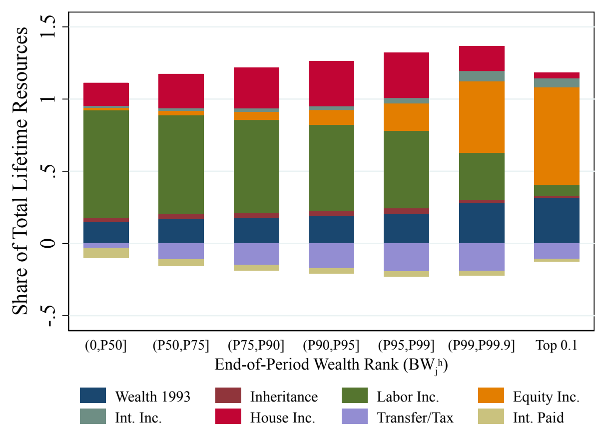
(b) Age 55/59



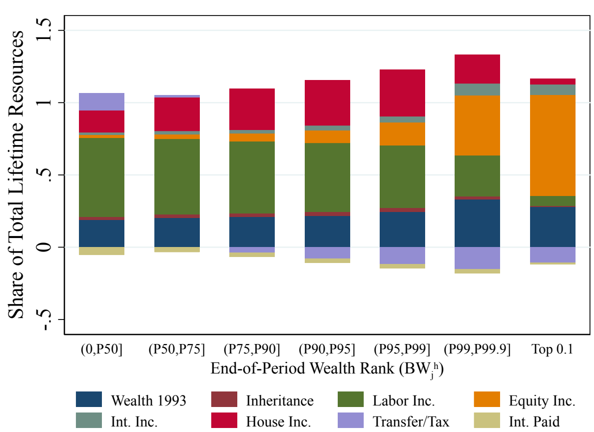
(c) Age 60/64



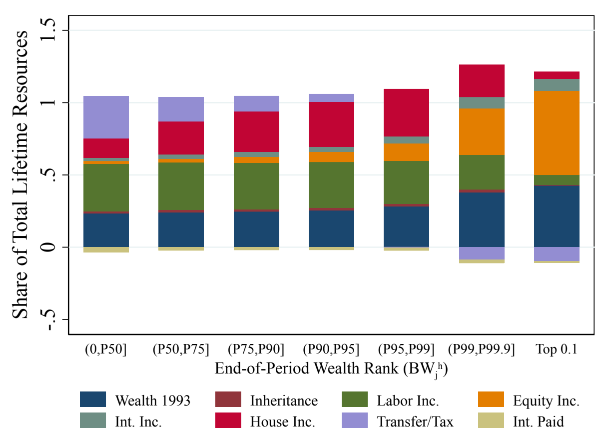
(d) Age 65/69



(e) Age 70/74

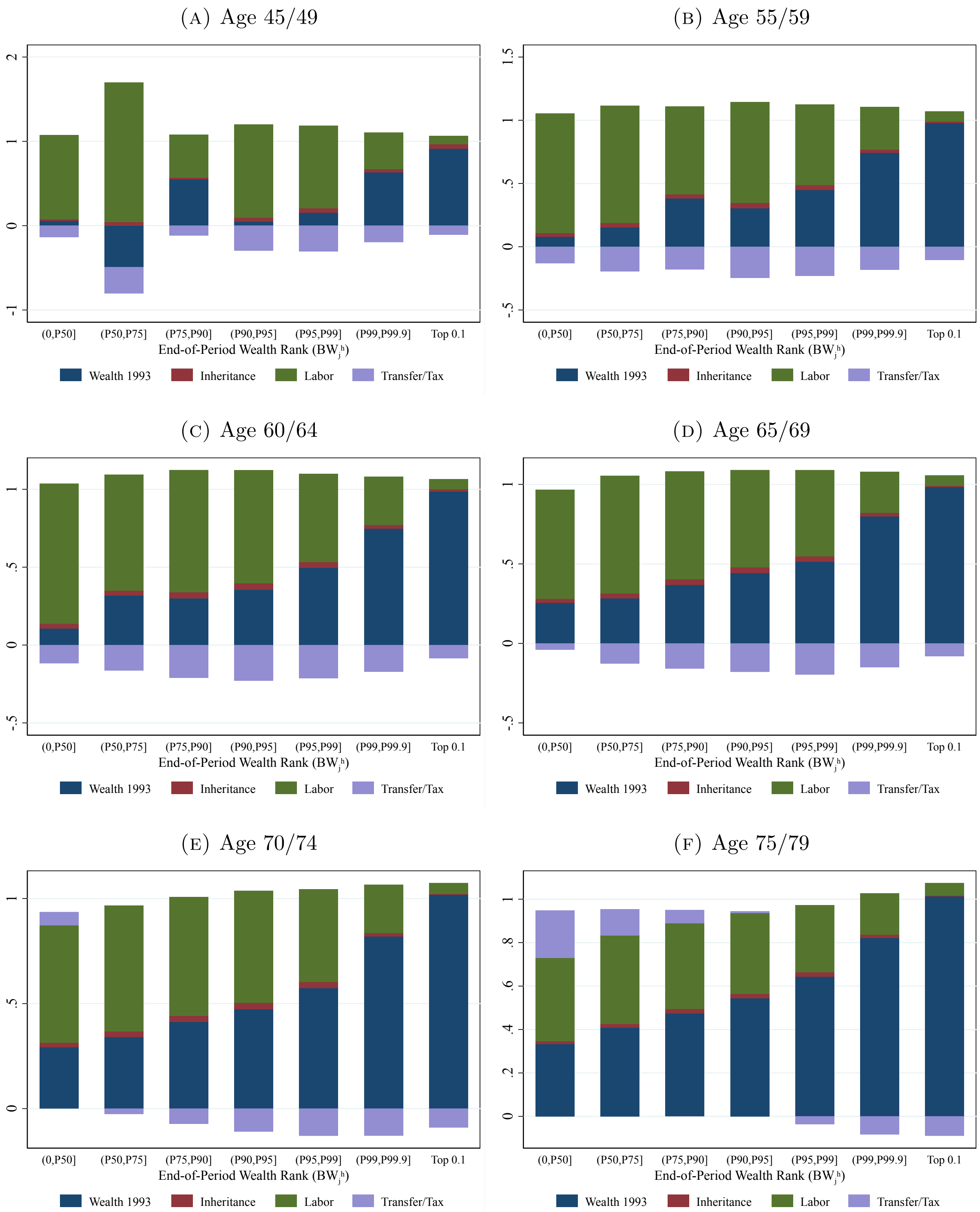


(f) Age 75/79



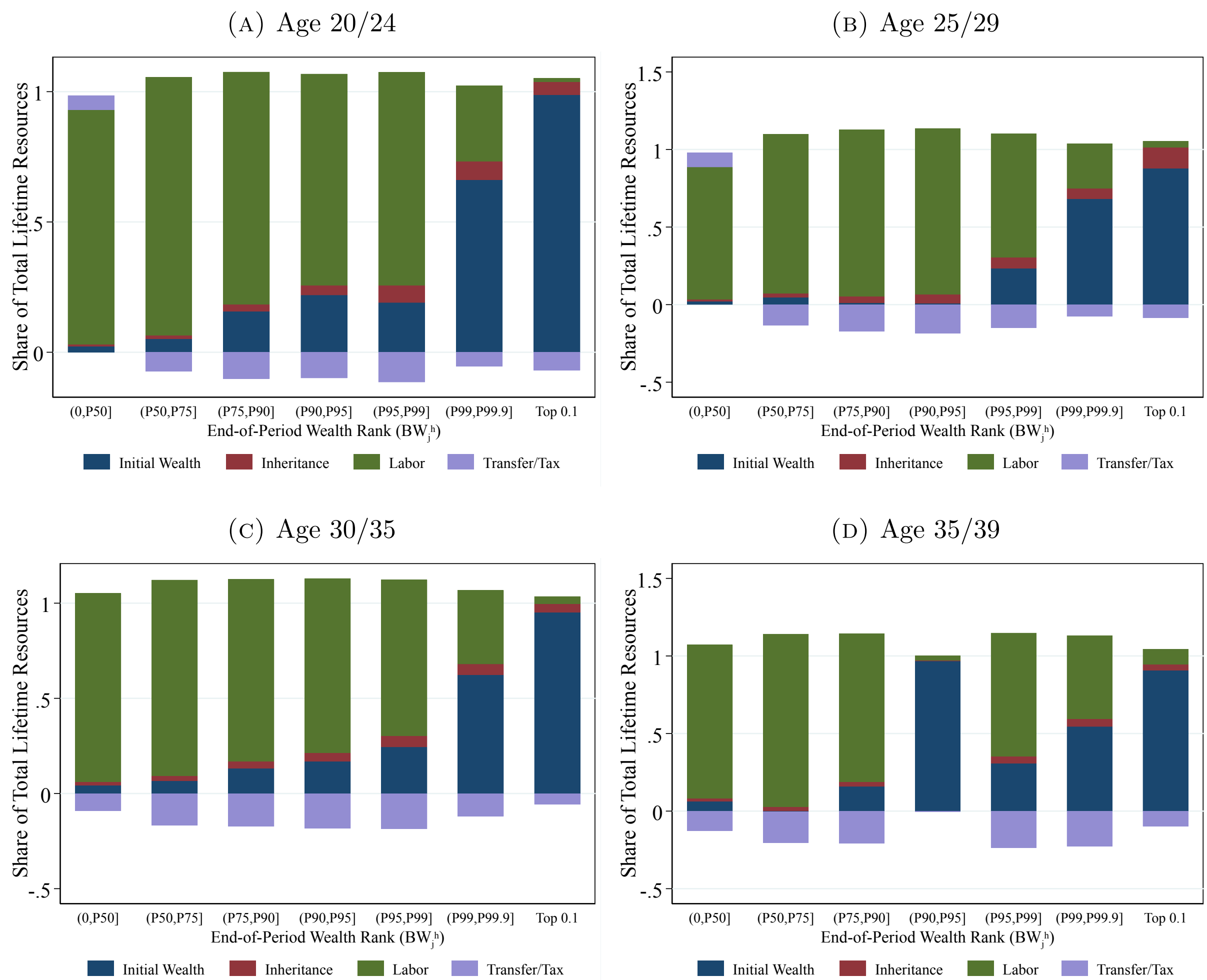
Notes: Figure D.18 shows the shares of lifetime income for a sample of households in a given conditioning year for different age groups conditional on BW_j^h. Lifetime income refers to the sum of initial wealth (net worth in 1993) and all income sources between 1994 and the conditioning year. We average these shares across conditioning years.

Figure D.19 – Fundamental Income Decomposition: Age Groups



Notes: Figure D.19 shows the shares of lifetime income for a sample of households in a given conditioning year for different age groups conditional on BW_j^h and accounting for capitalization.

Figure D.20 – Fundamental Income Decomposition: Young Age Groups



Notes: Figure D.20 shows the shares of lifetime income for a sample of households in a given conditioning year for different age groups conditional on BW_j^h and accounting for capitalization.

Figure D.21 – Intergenerational Transition Matrix: Age Groups

(a) Age 45/49

Parents Life Time Wealth Rank (columns); End-of-Period Wealth Rank (BW^h_j) (rows)

End-of-Period Wealh Rank (BW^h_j)	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	47.6	36.8	12.7	2.1	0.7	0.1	0.0
(50-75]	34.7	41.1	18.8	3.8	1.5	0.1	0.0
(75-90]	27.0	39.1	24.5	6.1	3.0	0.3	0.0
(90-95]	21.9	35.6	27.1	8.7	5.8	0.9	0.0
(95-99]	19.5	30.6	26.5	11.1	9.8	2.3	0.1
(99-99.9]	14.0	22.9	23.1	10.0	17.3	11.5	1.3
Top 0.1%	9.2	16.6	18.4	6.1	8.6	18.4	22.7

(b) Age 55/59

Parents Life Time Wealth Rank (columns); End-of-Period Wealth Rank (BW^h_j) (rows)

End-of-Period Wealh Rank (BW^h_j)	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	47.2	37.6	12.5	2.0	0.7	0.0	0.0
(50-75]	33.9	41.7	18.7	4.0	1.6	0.1	0.0
(75-90]	26.4	40.1	23.7	6.3	3.2	0.3	0.0
(90-95]	21.8	35.0	27.0	9.2	6.4	0.6	0.0
(95-99]	16.3	32.0	27.2	12.2	10.3	2.0	0.1
(99-99.9]	14.0	28.1	21.3	10.9	15.5	8.6	1.6
Top 0.1%	7.0	22.8	15.8	11.4	13.9	17.7	11.4

(c) Age 60/64

Parents Life Time Wealth Rank (columns); End-of-Period Wealth Rank (BW^h_j) (rows)

End-of-Period Wealh Rank (BW^h_j)	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	48.8	36.7	11.8	2.0	0.7	0.0	0.0
(50-75]	36.4	40.6	17.5	3.7	1.7	0.1	0.0
(75-90]	28.8	39.7	21.8	6.1	3.4	0.3	0.0
(90-95]	22.5	36.0	25.2	8.9	6.4	0.9	0.0
(95-99]	18.3	31.2	27.0	11.3	9.8	2.2	0.1
(99-99.9]	16.2	25.6	22.0	10.5	15.9	8.5	1.2
Top 0.1%	13.7	17.6	19.8	11.5	9.9	16.8	10.7

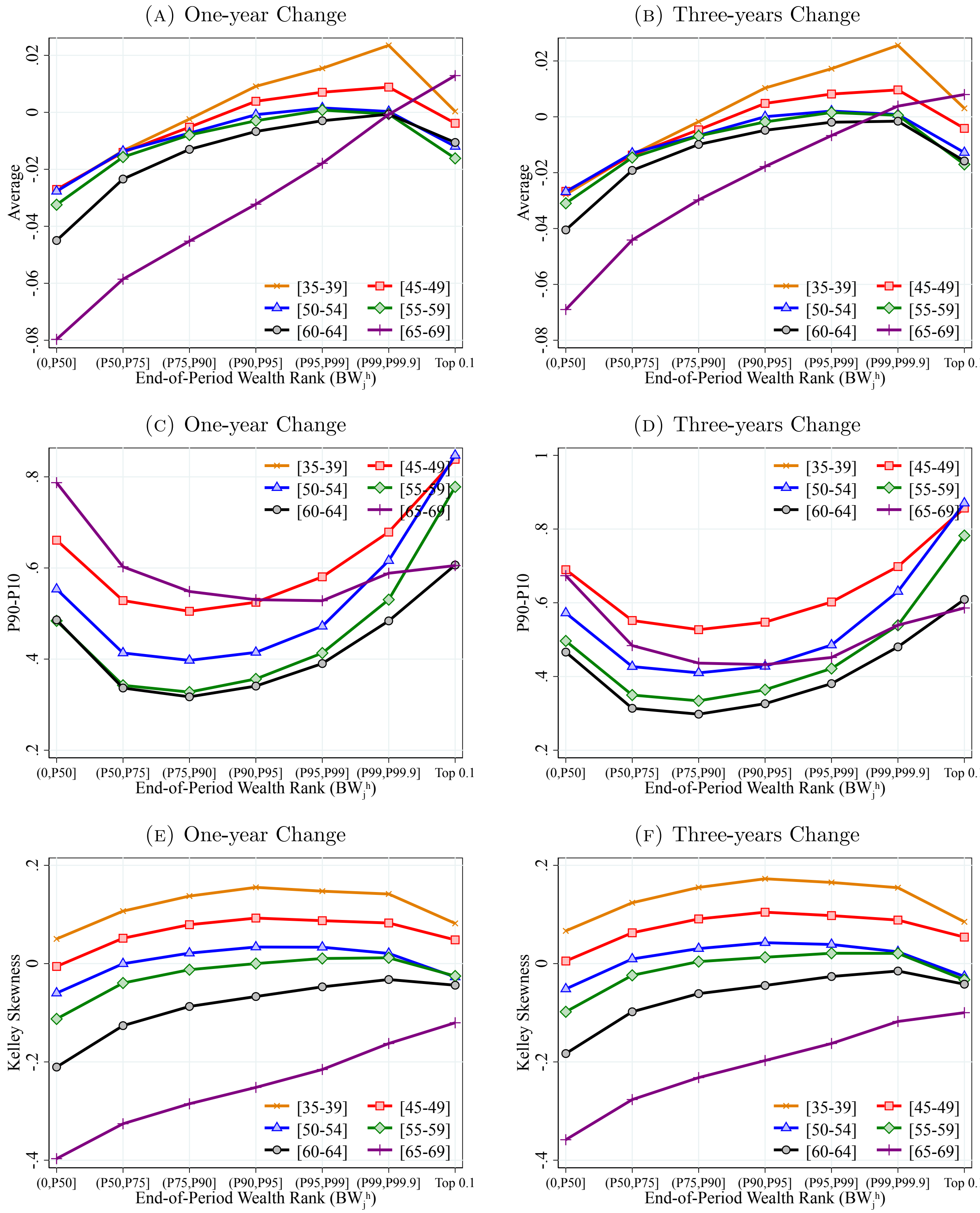
(d) Age 65/69

Parents Life Time Wealth Rank (columns); End-of-Period Wealth Rank (BW^h_j) (rows)

End-of-Period Wealh Rank (BW^h_j)	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	51.9	34.4	10.9	2.0	0.8	0.0	0.0
(50-75]	38.9	38.4	17.2	3.7	1.7	0.1	0.0
(75-90]	31.8	36.6	21.8	5.9	3.6	0.3	0.0
(90-95]	25.0	33.3	25.7	8.3	6.8	1.0	0.0
(95-99]	20.4	29.7	25.0	11.8	10.7	2.3	0.1
(99-99.9]	16.1	25.9	22.3	10.9	16.3	8.1	0.3
Top 0.1%	7.1	14.3	24.3	10.0	18.6	20.0	5.7

Notes: Figure D.21 shows the intergenerational persistence of net wealth. It shows the results by first sorting household within age groups by the lifetime wealth of their parents. Each cell represent the fraction of household in different percentiles of the parents wealth distribution (columns), conditional on their percentile of the wealth distribution in the conditioning year, BW_j^h (rows). Each row sums to 100. The Parents Life Time Wealth Rank is calculate as the rank of the average wealth adjusted for an age and year specific mean.

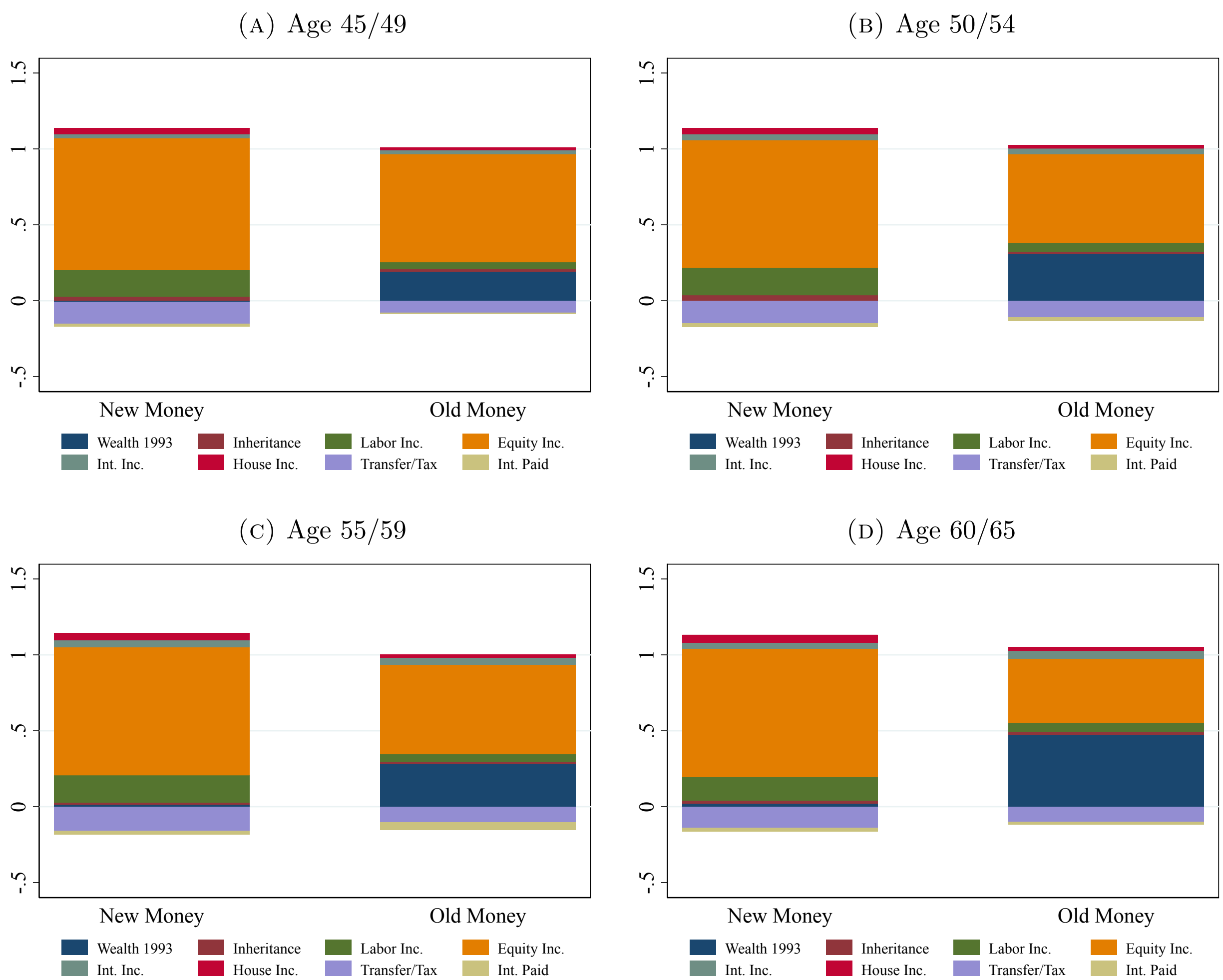
Figure D.22 – Labor Income Growth Across the Wealth Distribution



Notes: Figure D.22 shows time series average of the distribution of residuals earnings growth conditional on age and wealth group $\left(BW_j^h\right)$.

E.3 New Money and Old Money: Additional Figures

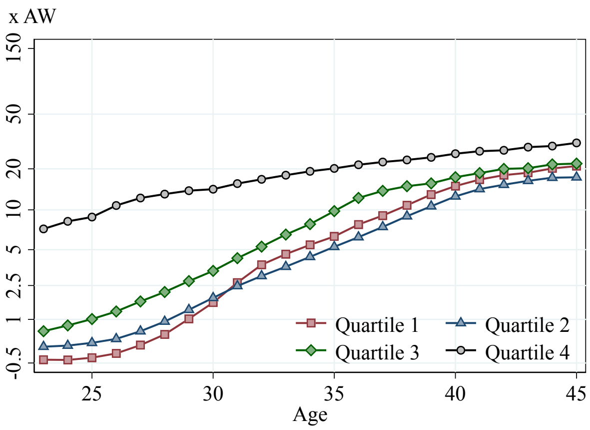
Figure D.23 – Income Sources for New- and Old-Money Households



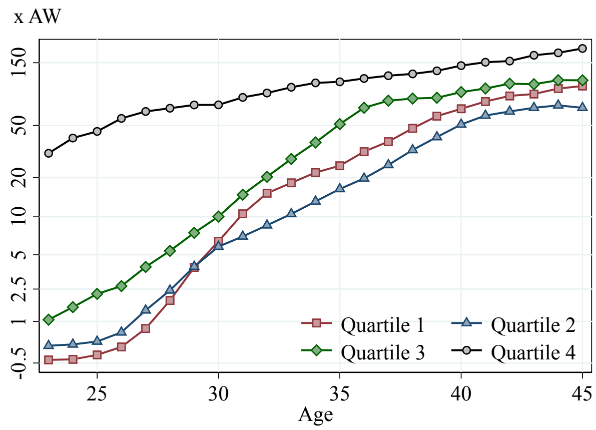
Notes: Figure D.23 shows the shares of lifetime income for a sample of households in a given conditioning year for different age groups conditional on $BW^h_{\geq P99.9}$ and were in different quartiles of the initial average wealth distribution $(\overline{W}_{i,1994})$. Lifetime income refers to the sum of initial wealth (net worth in 1993) and all income sources between 1994 and the conditioning year. We average these shares across conditioning years.

Figure D.24 – Average Wealth Profile: Old Money and New Money

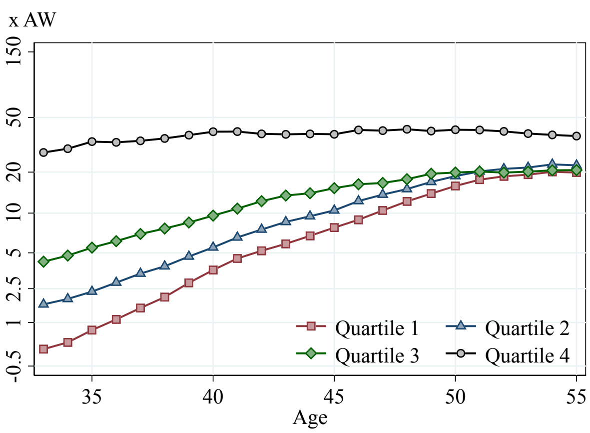
(a) Age 45/49: Top 1% Households



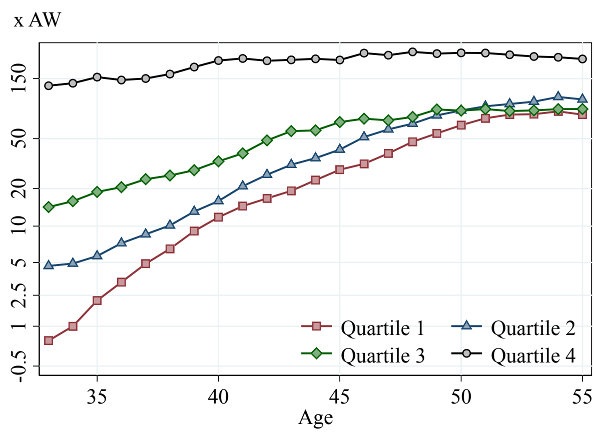
(b) Age 45/49: Top 0.1% Households



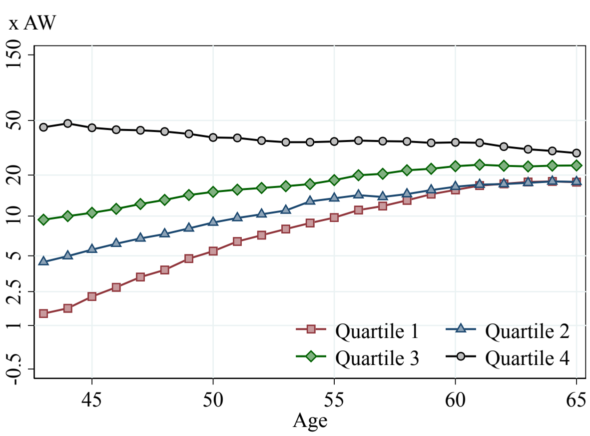
(c) Age 55/59: Top 1% Households



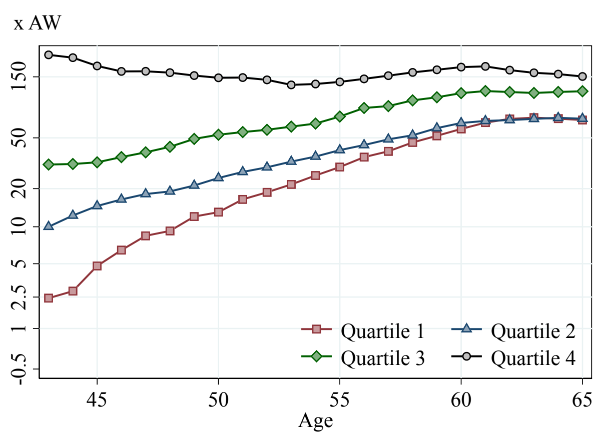
(d) Age 55/59: Top 0.1% Households



(e) Age 65/69: Top 1% Households



(f) Age 65/69: Top 0.1% Households



Notes: Figure D.24 shows the average wealth profile for household whose head is in different wealth age and belong to the top 0.1% of the wealth distribution at the end of the sample $\left(BW^h_{\geq P99.9}\right)$ and were in different quartiles of the initial average wealth distribution $(\overline{W}_{i,1994})$.

Figure D.25 – Intergenerational Transition Matrix: Age Groups

(a) Age 50/54

Parents Life Time Wealth Rank (columns); Children Wealth Rank in 1993 (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
Q1	20.8	22.8	27.2	9.6	12.7	5.7	1.1
Q2	17.2	24.5	28.3	8.4	14.6	5.5	1.5
Q3	12.1	28.0	23.6	10.4	15.7	8.4	1.8
Q4	6.4	15.7	18.7	11.2	21.6	20.3	6.2

(b) Age 45/49

Parents Life Time Wealth Rank (columns); Children Wealth Rank in 1993 (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
Q1	16.3	24.8	28.9	9.5	12.9	5.3	2.4
Q2	16.9	24.6	20.6	9.5	17.2	8.7	2.5
Q3	12.8	23.6	23.3	11.3	13.0	12.5	3.5
Q4	7.6	15.4	17.0	8.1	23.0	23.2	5.7

(c) Age 55/59

Parents Life Time Wealth Rank (columns); Children Wealth Rank in 1993 (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
Q1	18.4	37.9	19.2	12.4	7.4	3.7	1.1
Q2	15.7	30.6	27.5	9.2	12.6	3.9	0.5
Q3	11.3	24.7	19.2	13.6	17.8	10.8	2.6
Q4	7.8	17.0	17.2	8.6	23.5	19.6	6.3

(d) Age 60/64

Parents Life Time Wealth Rank (columns); Children Wealth Rank in 1993 (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
Q1	21.7	31.6	24.0	8.9	11.2	2.3	0.3
Q2	19.6	26.0	23.2	14.1	11.3	4.8	1.0
Q3	12.9	26.5	22.6	10.6	17.4	8.7	1.3
Q4	9.7	15.2	17.4	8.7	21.3	21.6	6.1

(e) Age 65/69

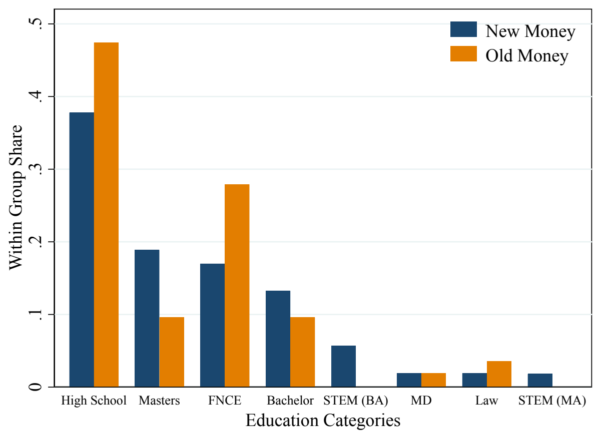
Parents Life Time Wealth Rank (columns); Children Wealth Rank in 1993 (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
Q1	22.6	30.2	23.1	7.5	12.6	3.5	0.5
Q2	14.8	26.7	24.3	12.4	16.7	5.2	0.0
Q3	13.0	22.3	24.9	11.9	18.7	8.8	0.5
Q4	10.9	20.2	17.6	11.4	18.1	19.7	2.1

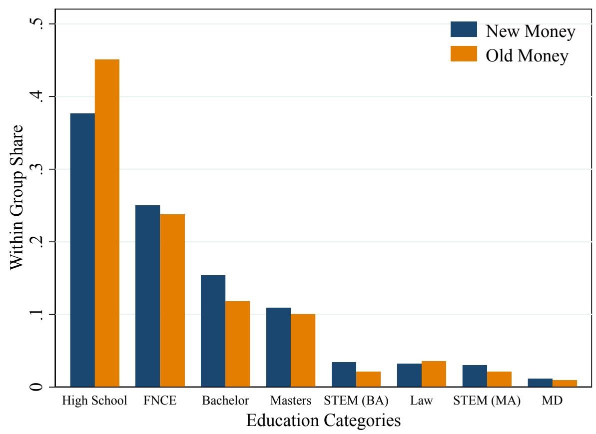
Notes: Figure D.25 shows a intergenerational transition matrix between households wealth in 2015 and their parental household wealth for households in different age groups. Each cell represent the fraction of household in different percentiles of the parents wealth distribution (columns), conditional on their percentile of the wealth distribution in the conditioning year, BW_j^h (rows). Each row sums to 100. The Parents Life Time Wealth Rank is calculate as the rank of the average wealth adjusted for an age and year specific mean.

Figure D.26 – Education Shares for New and Old Money Households

(a) Top 0.1%



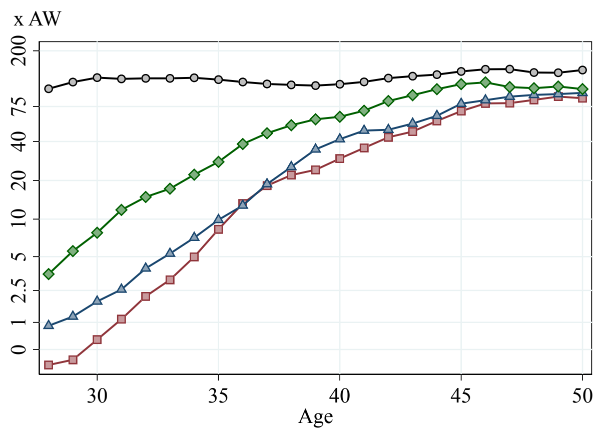
(b) Top 1%



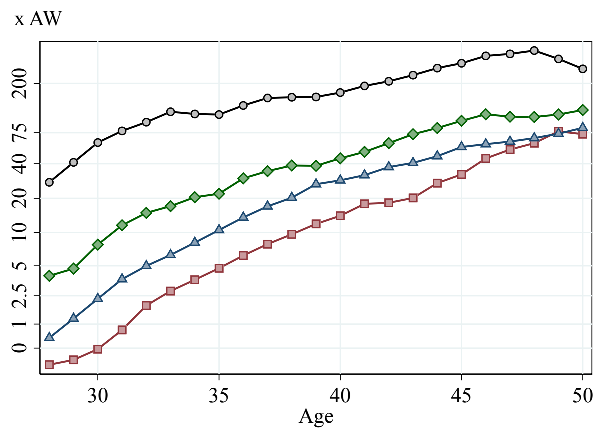
Notes: Figure D.26 the share of different education groups households (highest degree of the head of the household) for households at the top 0.1% and top 1% among 50 to 54 year old households ($BW^{50-54}_{\geq P99.9}$and $BW^{50-54}_{\geq P99}$ respectively) divided in New Money (first quartile in the initial average wealth, $\overline{W}_{i,1994}$) and Old Money (forth quartile in the initial average wealth, $\overline{W}_{i,1994}$). HS is High-school or less, FNCE BA/MA is Bachelor or MBA on a finance or business administration major, BA and MA are other bachelor degrees or master degrees, MD is Medical Doctor or Dentist, H-STEM is BA or MA on a health related degree (except for Medical Doctor or Dentist) and STEM major.

Figure D.27 – Average Wealth Profile by Education

(a) Top 0.1%: Law and Medical Doctor

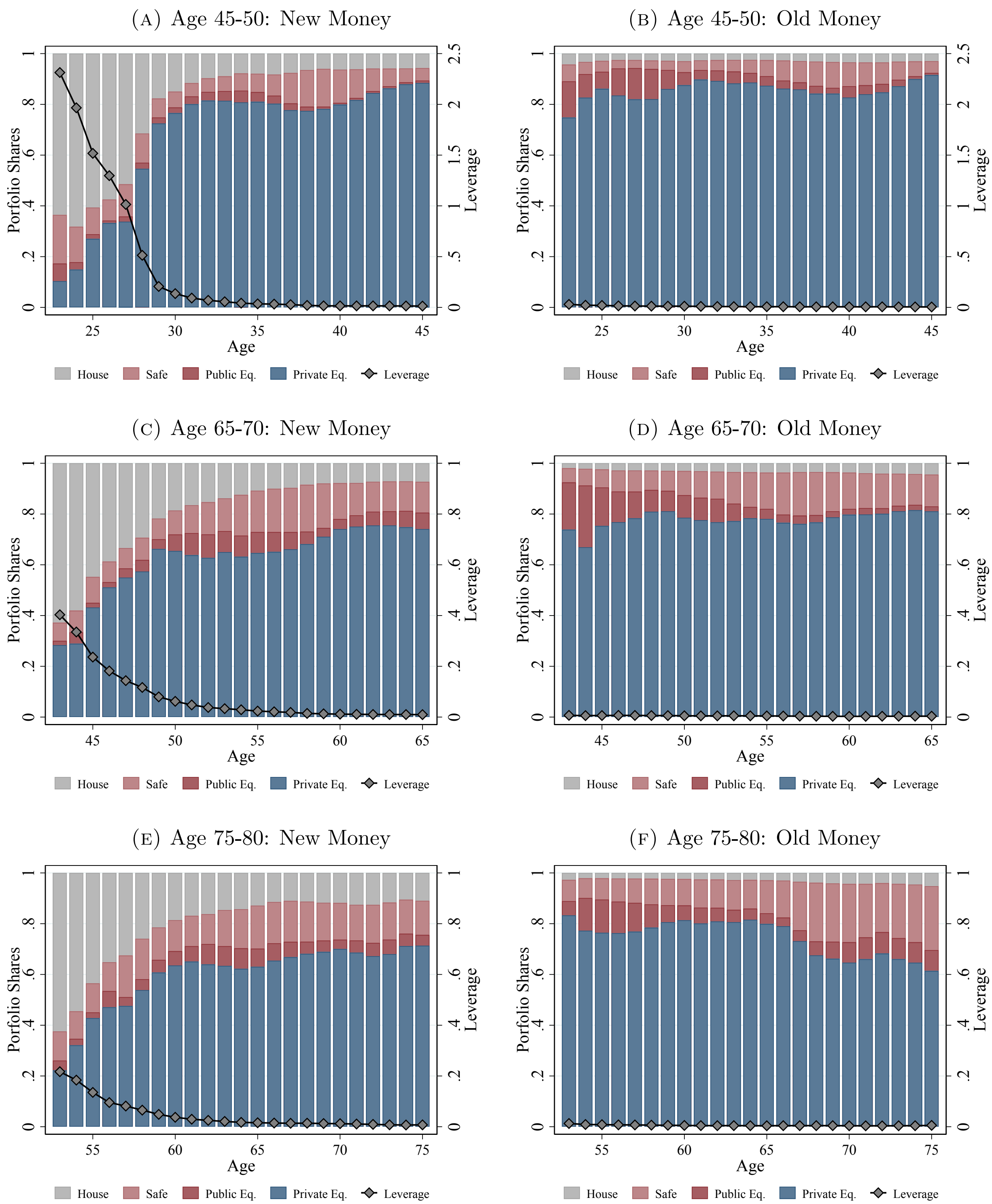


(b) Top 0.1%: Other



Notes: Figure D.27 shows the average wealth profile for household whose head is between 50 and 54 years old in 2015 and belong to the top 0.1% in that year. Each line is the average wealth for individuals in different quartiles of the wealth distribution in 1993. Panel A shows households whose head has the title of lawyer or medical doctor. Panel B shows all other educational titles.

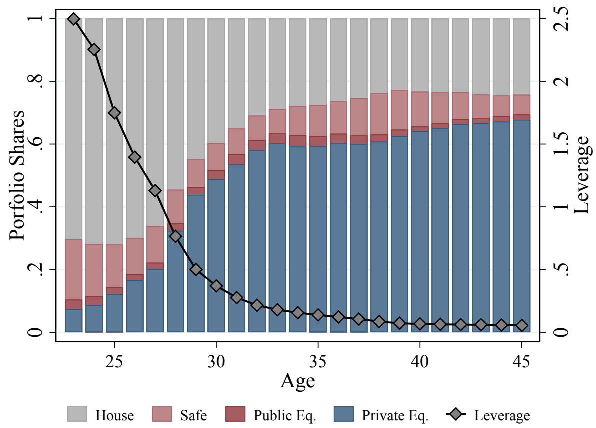
Figure D.28 – Portfolio Shares: Old Money and New Money and Age Groups



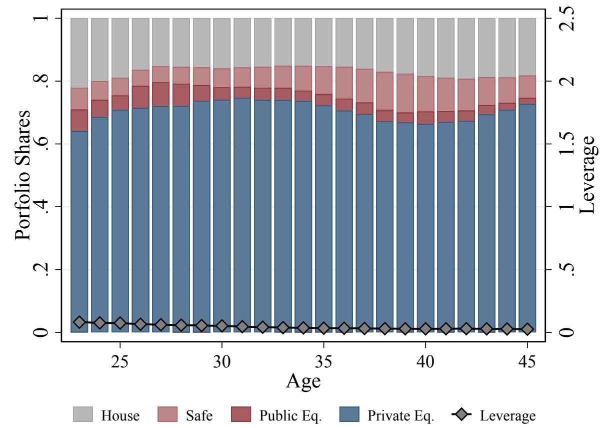
Notes: Figure D.28 shows the portfolio composition and leverage for households that belong to the top 1% in 2015. New Money households (Panel A, C and E) are those household that where in the first quartile of the wealth distribution in 1993; Old Money households (panel B, D, and E) are those households that were in the fourth quartile of $\overline{W}_{1993}$.

Figure D.29 – Portfolio Shares: Old Money and New Money at top 1%

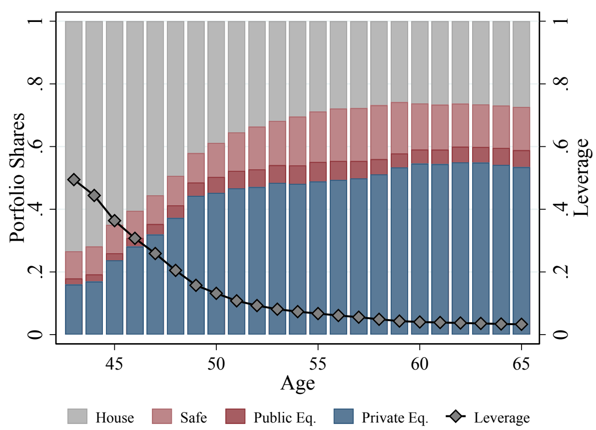
(a) Age 45-50: New Money



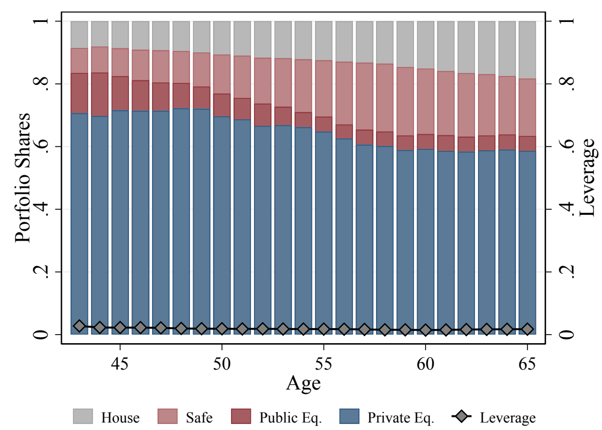
(b) Age 45-50: Old Money



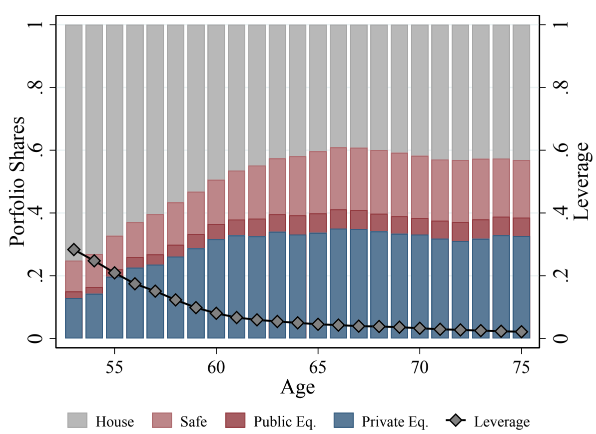
(c) Age 65-70: New Money



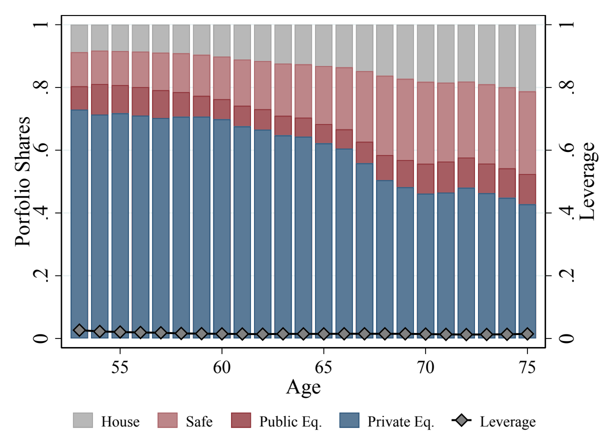
(d) Age 65-70: Old Money



(e) Age 75-80: New Money



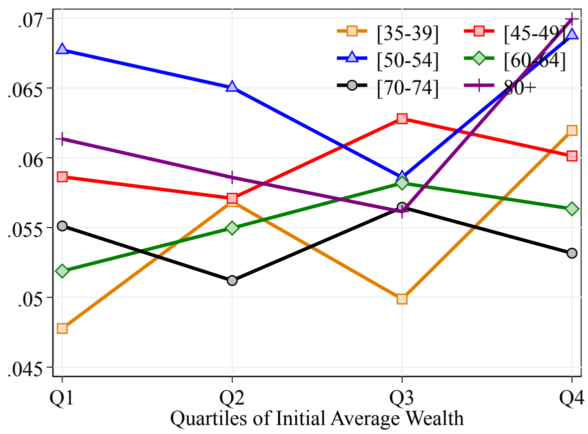
(f) Age 75-80: Old Money



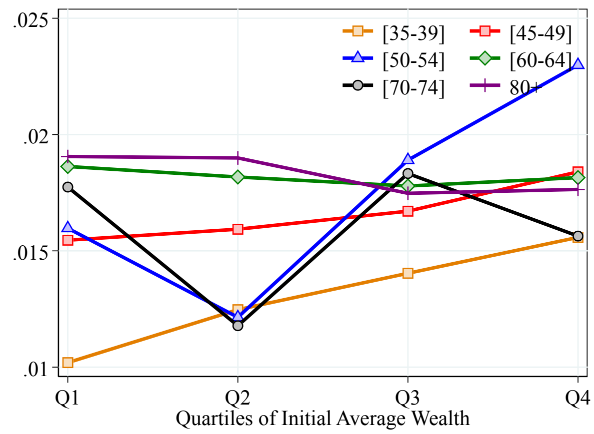
Notes: Figure D.29 shows the portfolio composition and leverage for households that belong to the top 1%. New Money households (Panel A, C, E) are those household that where in the first quartile of the wealth distribution in 1993; Old Money households (panel B, D, and E) are those households that were in the fourth quartile of $\overline{W}_{1993}$.

Figure D.30 – Average Long-Term Returns: Old Money and New Money

(a) Returns on Housing

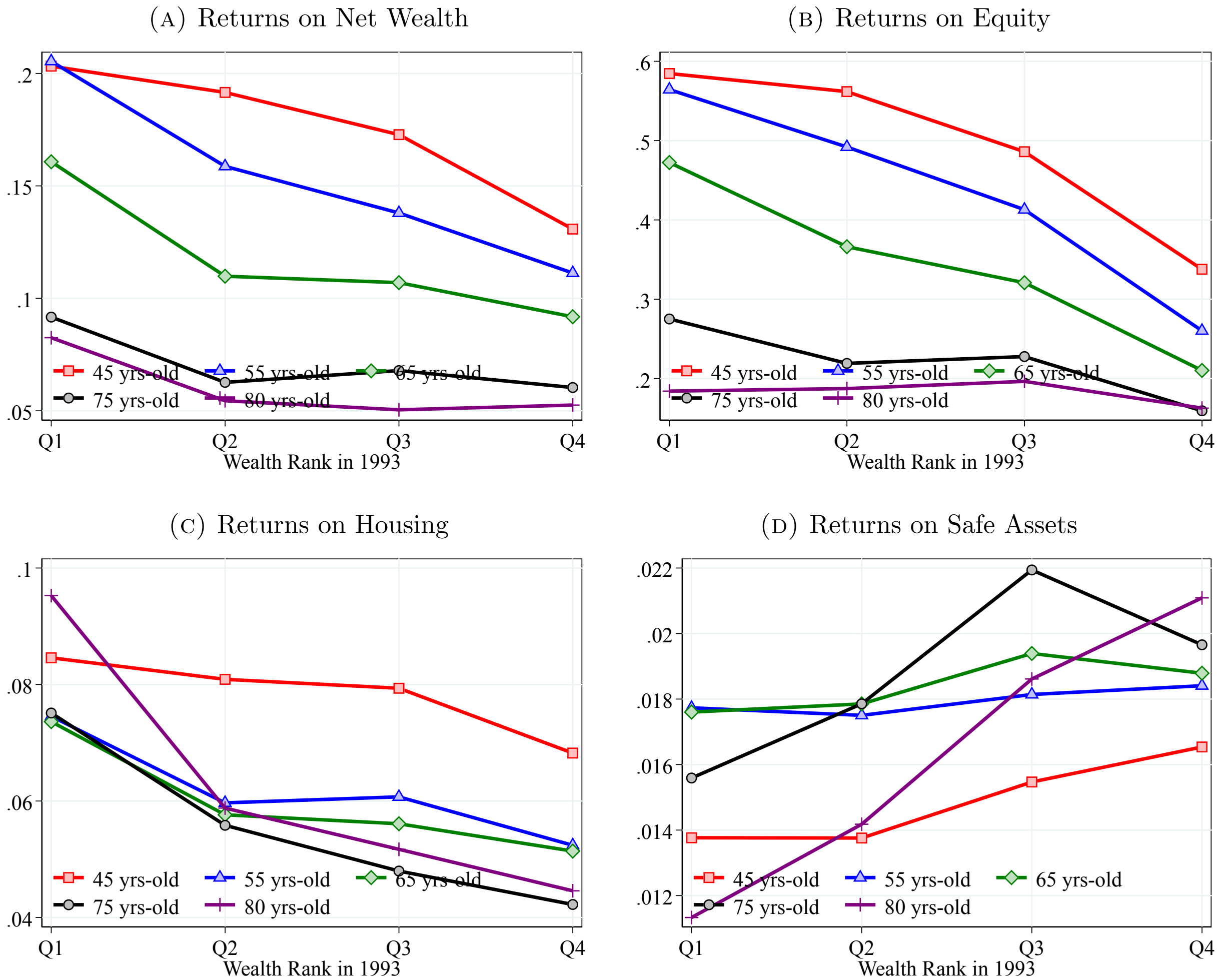


(b) Returns on Safe Assets



Notes: Figure D.30 shows the 11-years mean of the value-weighted average gross annual returns within age and wealth groups across different conditioning years for different asset classes.

Figure D.31 – Lifetime Returns: Old Money and New Money (Unweighted)

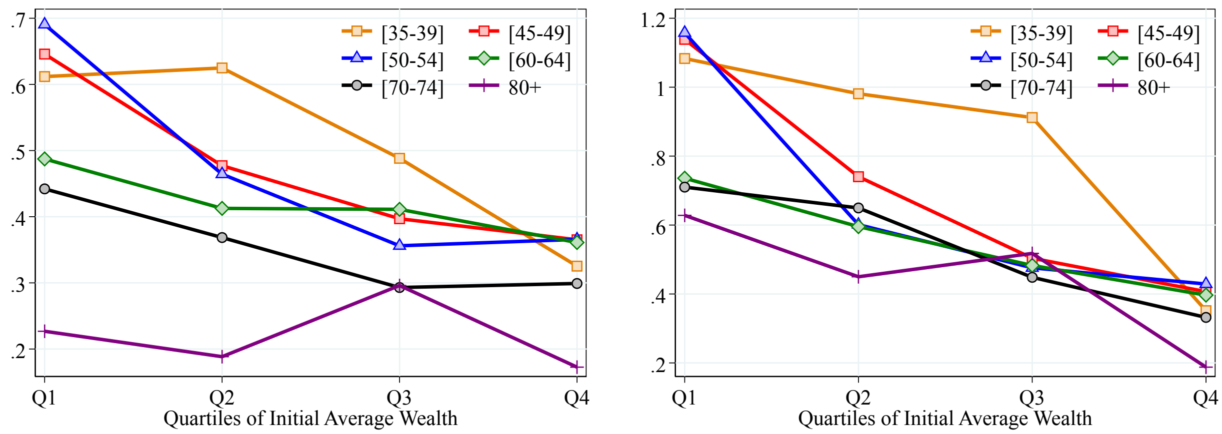


Notes: Figure D.31 shows the average lifetime returns for households who are at the top 1% of the wealth distribution at the end of the sample period (2015) and were in different quarterlies of the wealth distribution at the start of the sample period (1993) identified as Quartile 1 (Q1) to Quartile 4 (Q4).

Figure D.32 – Dispersion of Long-Term Returns: Old Money and New Money

(a) P90-P10 of Returns on Assets

(b) P90-P10 of Returns on Equity

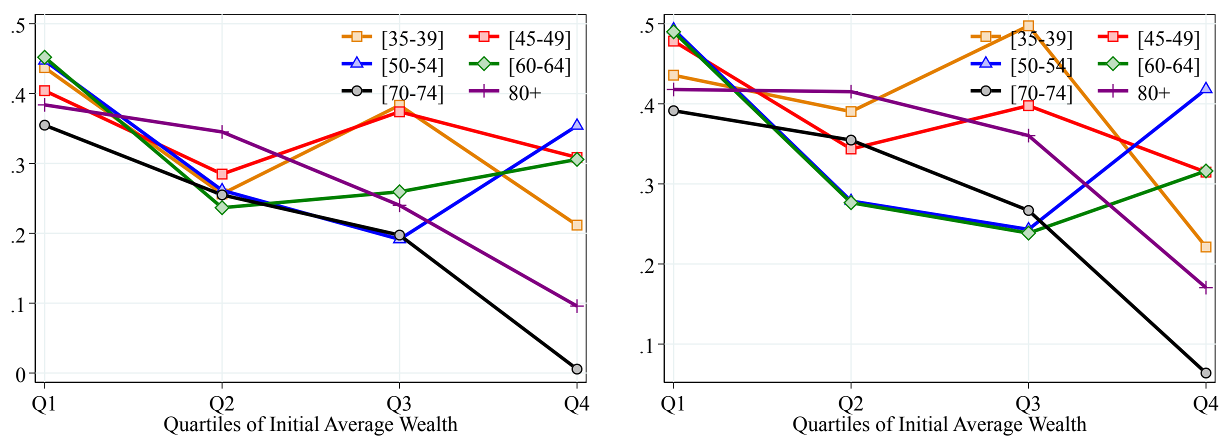


Notes: Figure D.32 shows the 11-years mean of the value-weighted P90-P10 of returns for households who are at the top 0.1% of the wealth distribution at the end of the sample period $\left(BW^{h}_{\geq P99.9}\right)$ and were in different quarterlies of the initial average wealth distribution $(\overline{W}_{i,1994})$identified as Quartile 1 (Q1) to Quartile 4 (Q4).

Figure D.33 – Skewness of Long-Term Returns: Old Money and New Money

(a) Kelley Skewness of Returns on Assets

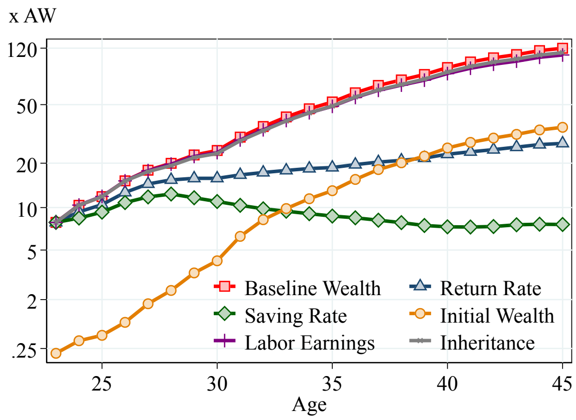
(b) Kelley Skewness of Returns on Equity



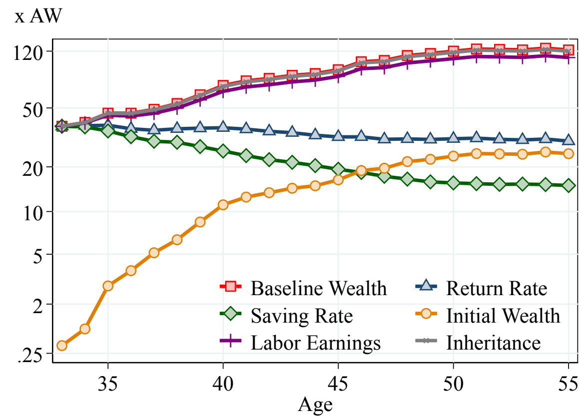
Notes: Figure D.33 shows the 11-years mean of the value-weighted Kelley Skewness of returns for households who are at the top 0.1% of the wealth distribution at the end of the sample period $\left(BW^{h}_{\geq P99.9}\right)$ and were in different quarterlies of the initial average wealth distribution $(\overline{W}_{i,1994})$identified as Quartile 1 (Q1) to Quartile 4 (Q4).

Figure D.34 – Top wealth Households for Different Age Groups

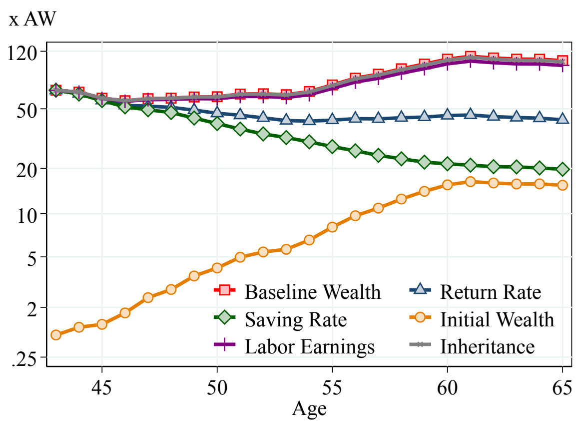
(A) Age 45-49



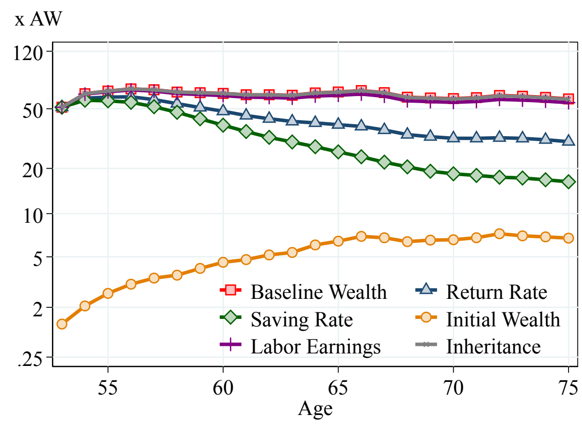
(B) Age 55-59



(C) Age 65-69

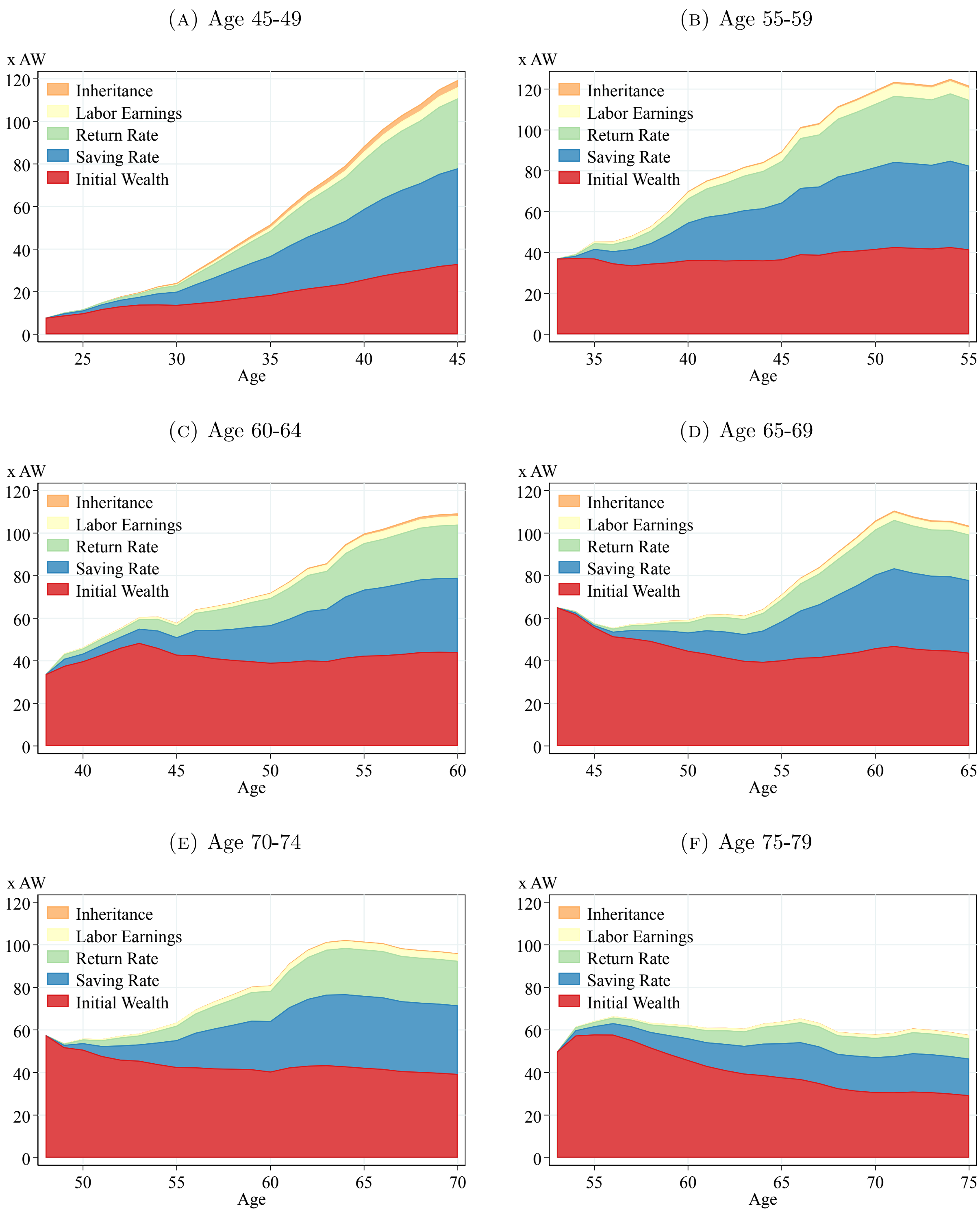


(D) Age 75-79



Notes: Figure D.34 shows the counterfactual wealth profiles for households at the top 0.1% of the wealth distribution if 2015 for different age groups.

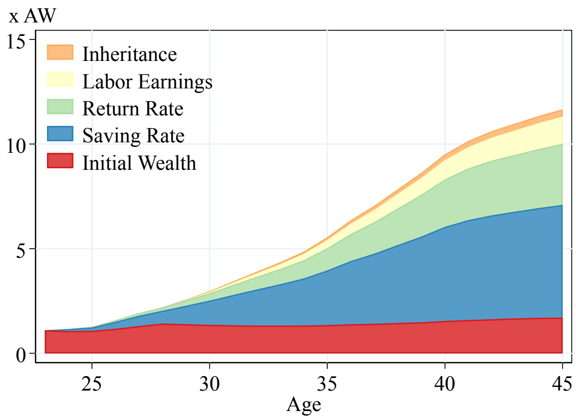
Figure D.35 – Shapley-Owen Decomposition of Wealth Gap: Age Groups



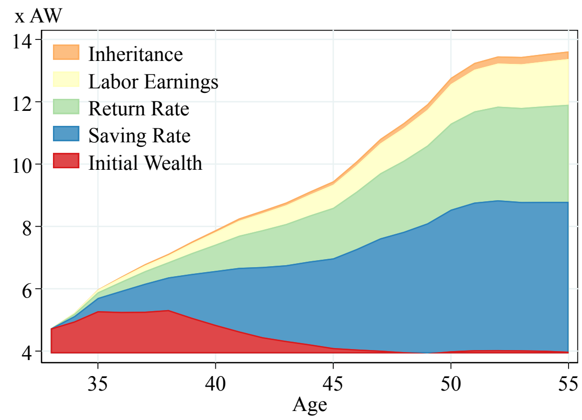
Notes: Figure D.35 shows the counterfactual wealth profiles for households at the top 0.1% of the wealth distribution if 2015 for different age groups.

Figure D.36 – Shapley-Owen Decomposition of Wealth Gap: 99 to 99.9%

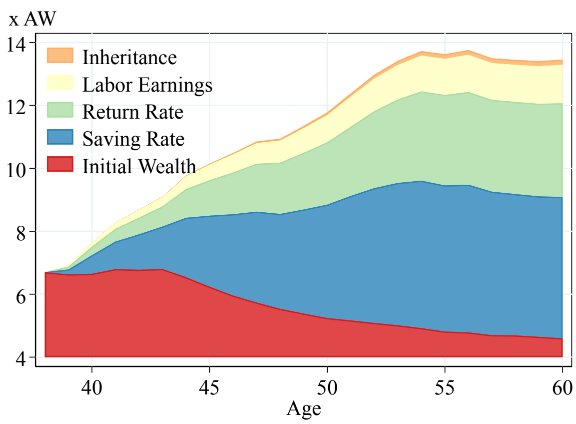
(a) Age 45-49



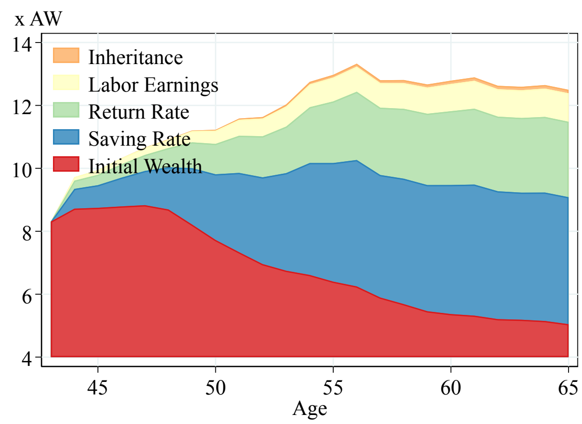
(b) Age 55-59



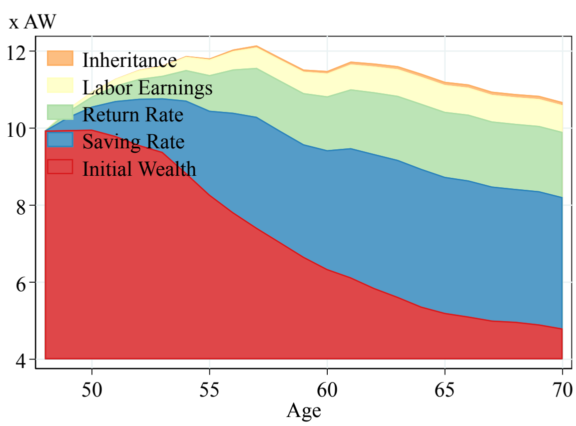
(c) Age 60-64



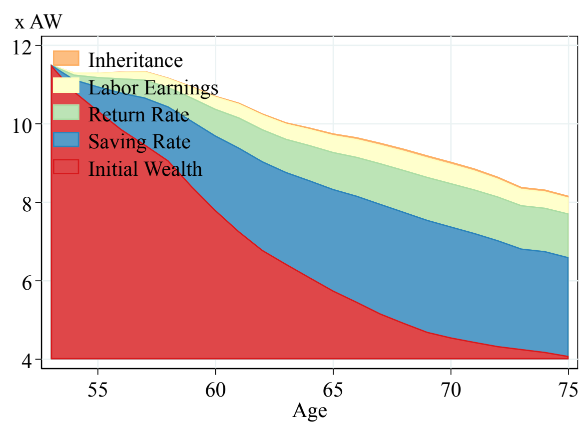
(d) Age 65-69



(e) Age 70-74

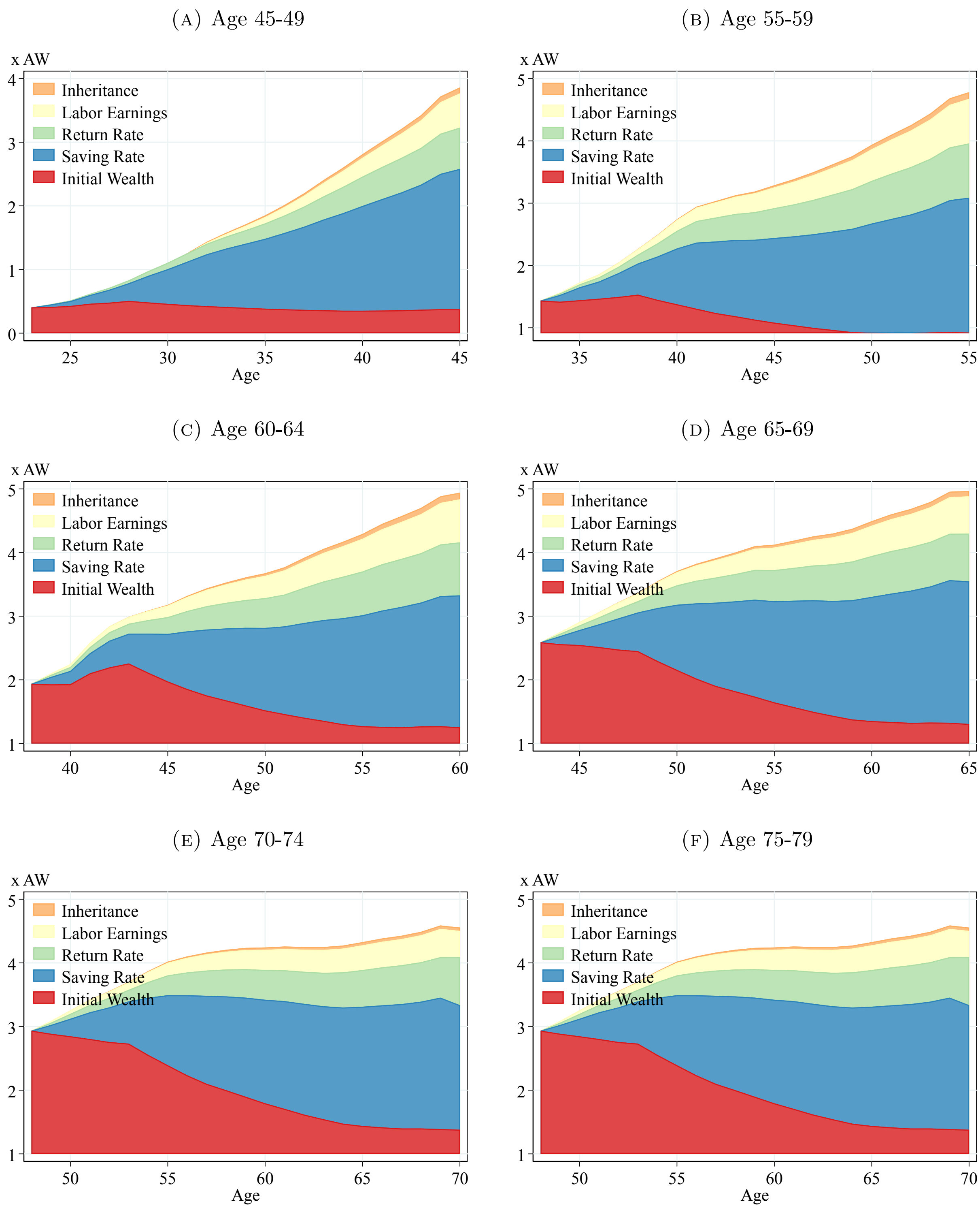


(f) Age 75-79



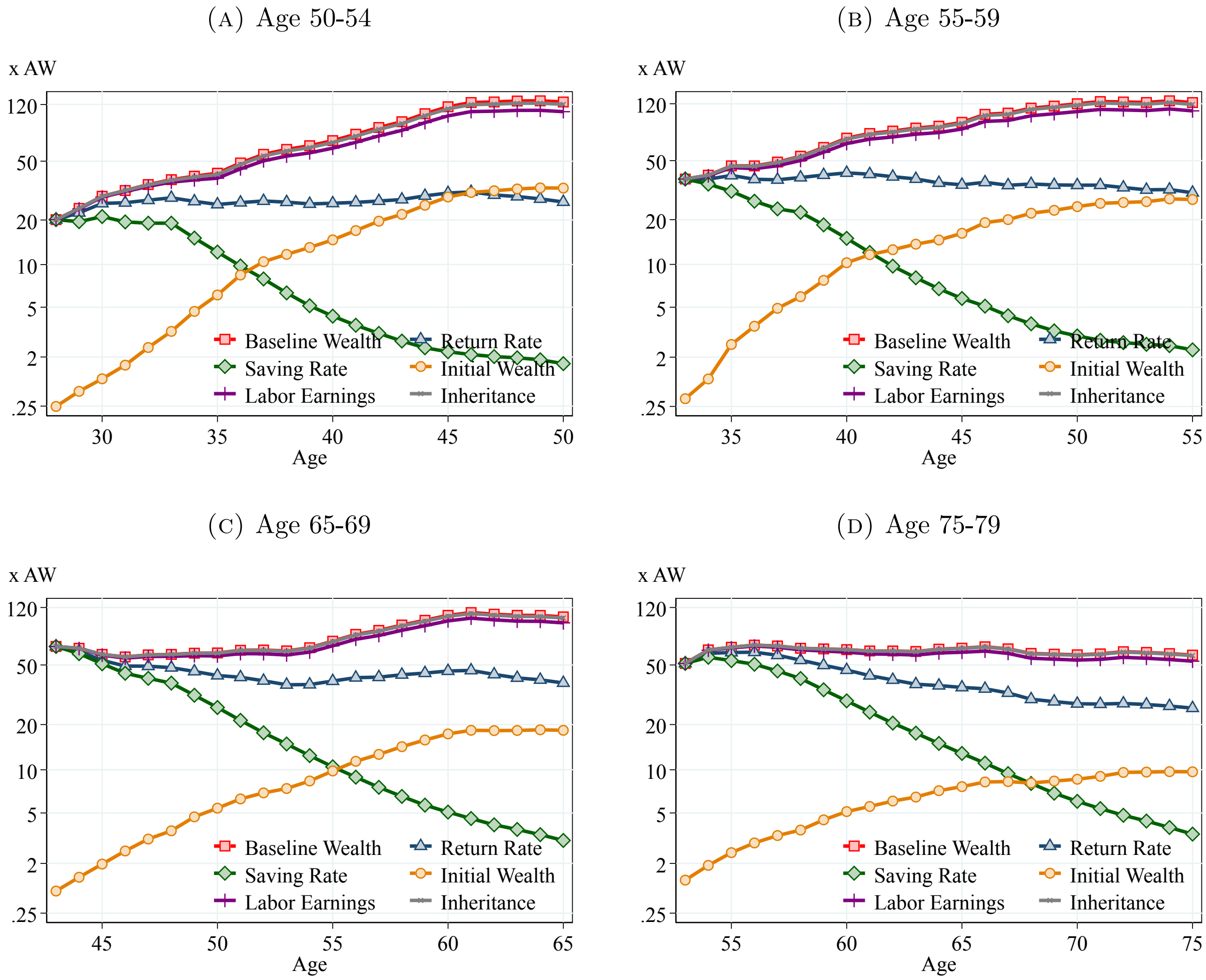
Notes: Figure D.36 shows the counterfactual wealth profiles for households between the 99 and 99.9th percentiles of the wealth distribution if 2015 for different age groups.

Figure D.37 – Shapley-Owen Decomposition of Wealth Gap: 95 to 99%



Notes: Figure D.37 shows the counterfactual wealth profiles for households between the 95 and 99th percentiles of the wealth distribution if 2015 for different age groups.

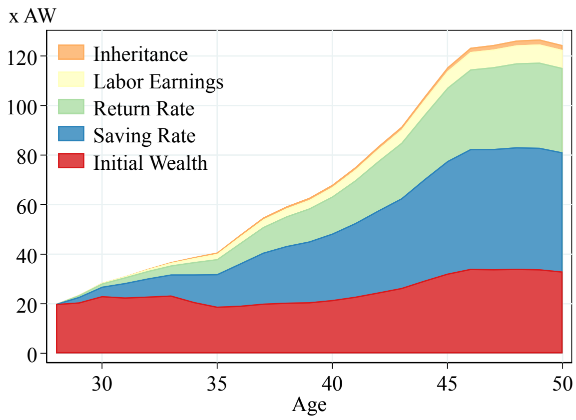
Figure D.38 – Decomposition Using Cash-on-Hand Saving Rate



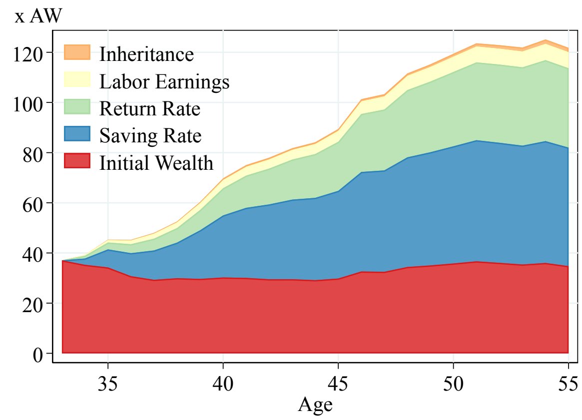
Notes: Figure D.38 shows the counterfactual wealth profiles for households at the top 0.1% of the wealth distribution if 2015 for different age groups. The saving rate is defined as $\tilde{S}_{it} = W_{i,t}/\left(W_{i,t-1} + \tilde{L}_{i,t} + \tilde{H}_{i,t} + \tilde{R}_{i,t}W_{i,t-1}\right)$.

Figure D.39 – Shapley-Owen Decomposition: Cash-on-Hand Saving Rate

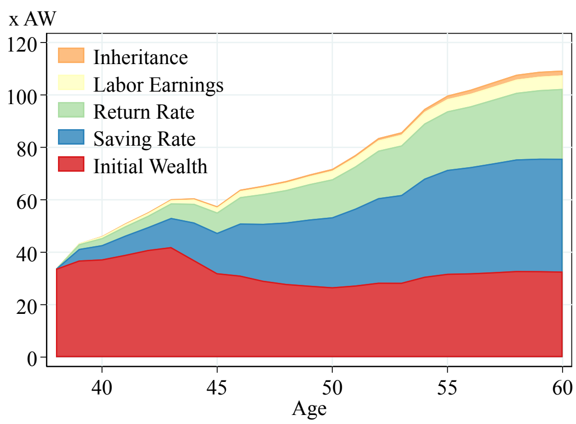
(A) Age 50-54



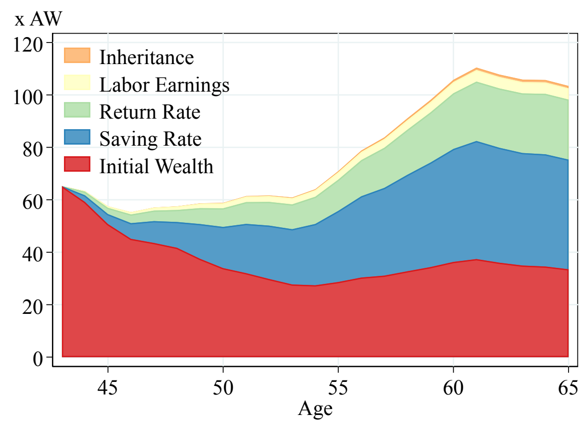
(B) Age 55-59



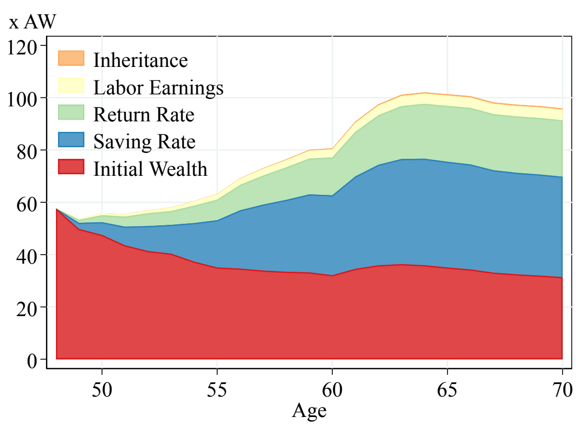
(C) Age 60-64



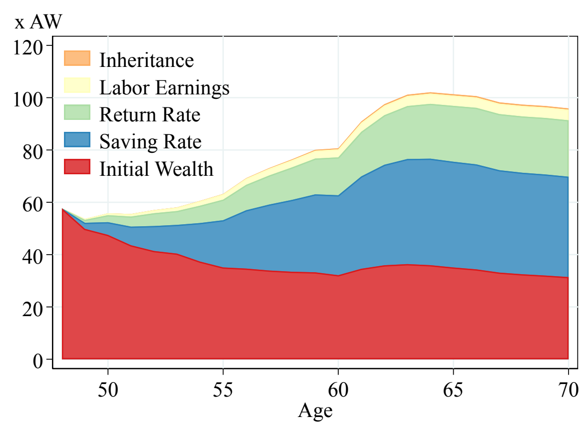
(D) Age 65-69



(E) Age 70-74



(F) Age 75-79

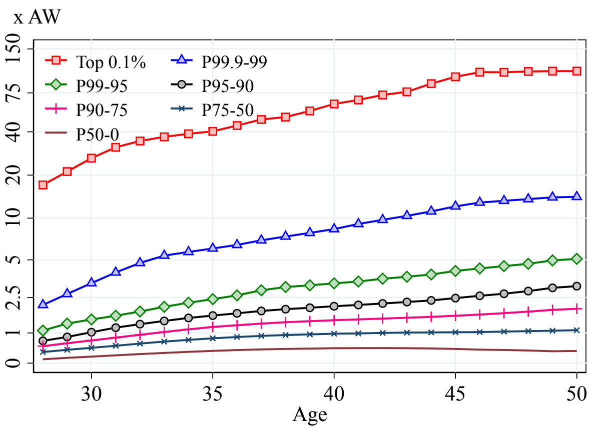


Notes: Figure D.39 shows the counterfactual wealth profiles for households at the top 0.1% of the wealth distribution if 2015 for different age groups. The saving rate is defined as $\tilde{S}_{it} = W_{i,t} / \left(W_{i,t-1} + \tilde{L}_{i,t} + \tilde{H}_{i,t} + \tilde{R}_{i,t} W_{i,t-1} \right)$.

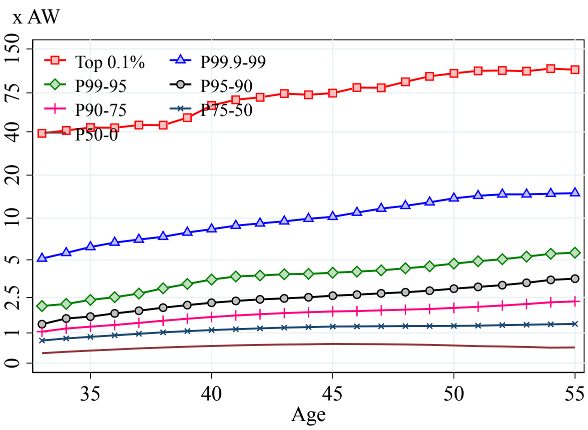
E.4 Balanced Sample

Figure D.40 – Balanced Backward-Looking Wealth Profiles: Age Groups

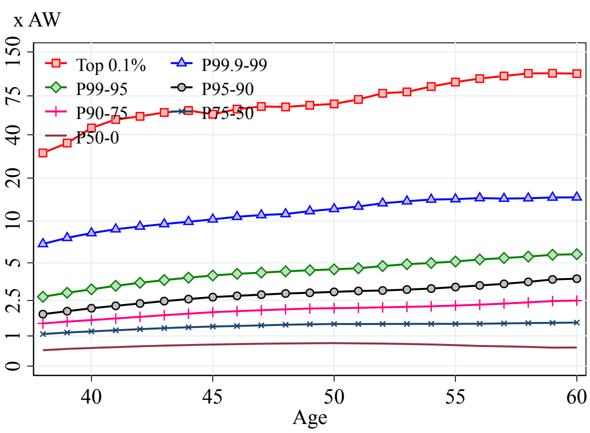
(a) Age 50/54



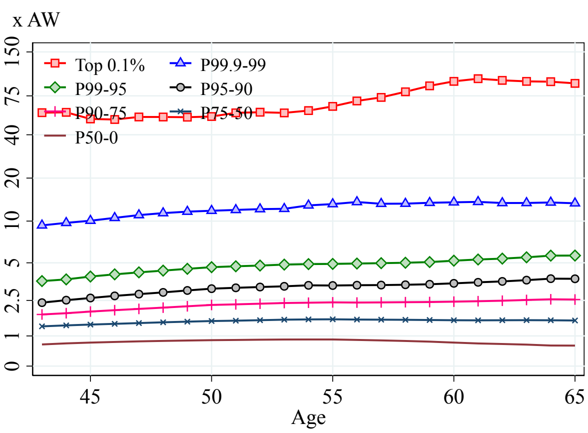
(b) Age 55/59



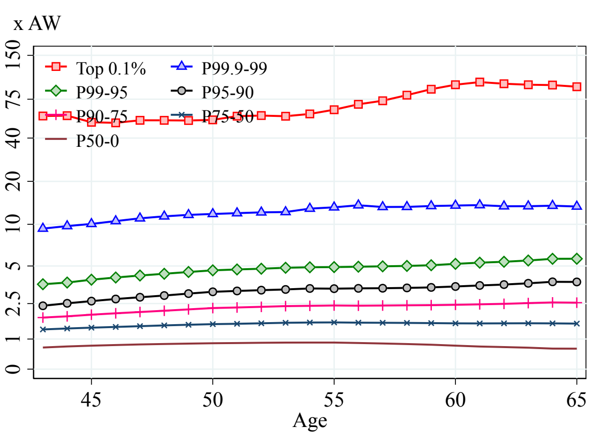
(c) Age 60/64



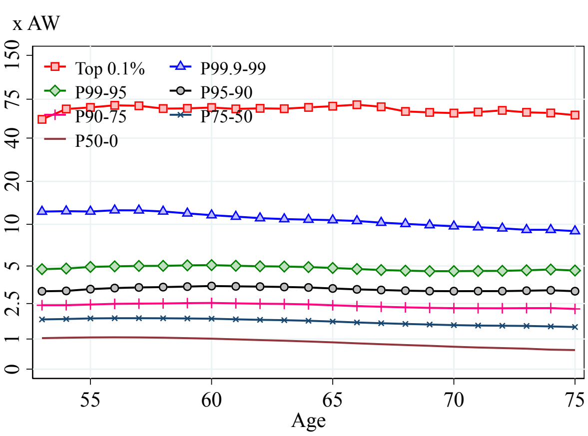
(d) Age 65/69



(e) Age 70/74



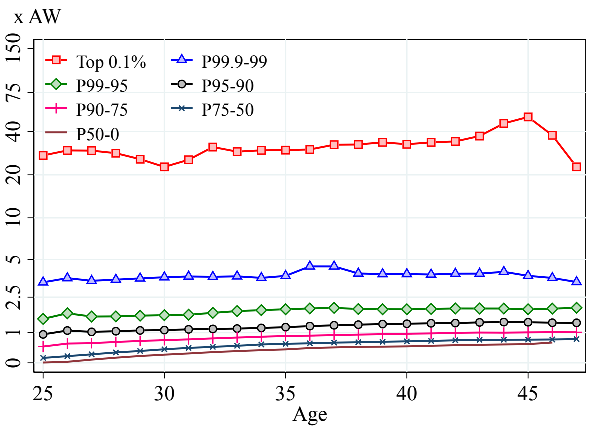
(f) Age 75/79



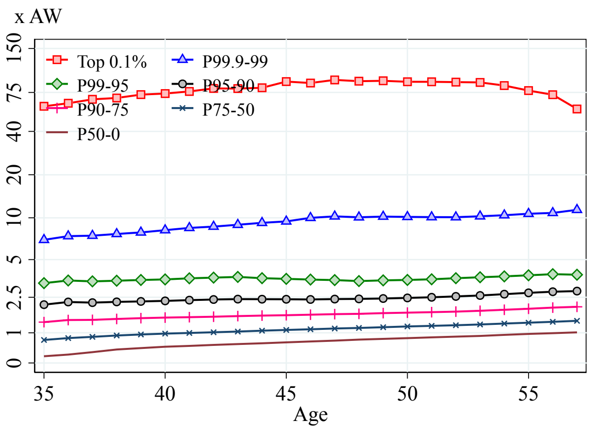
Notes: Figure D.40 shows average wealth for different BW_j^h groups considering households that have been stable for at least ten years.

Figure D.41 – Balanced Forward-Looking Wealth Profiles: Age Groups

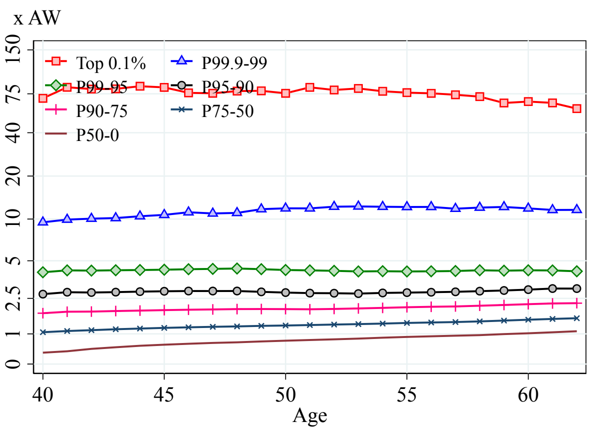
(a) Age 25/29



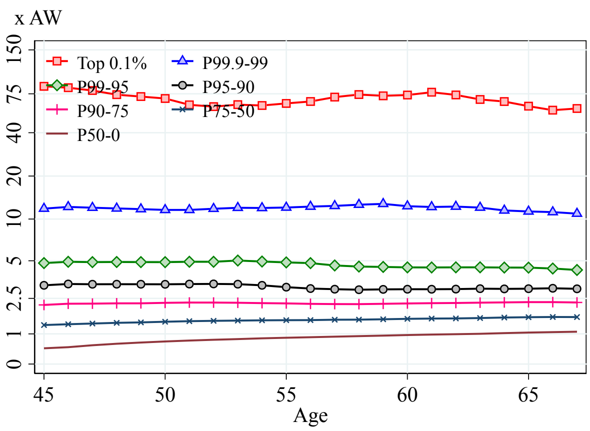
(b) Age 35/39



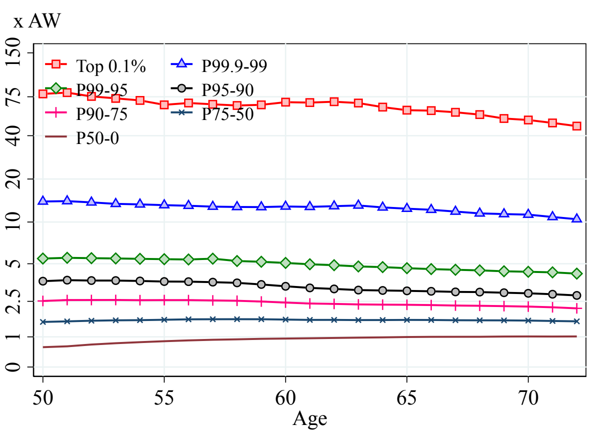
(c) Age 40/44



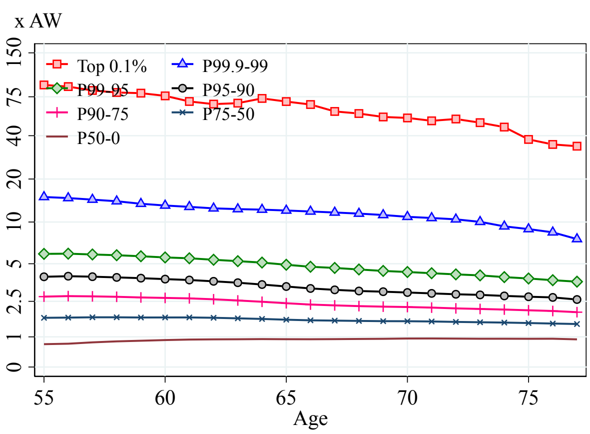
(d) Age 45/49



(e) Age 50/54



(f) Age 55/59

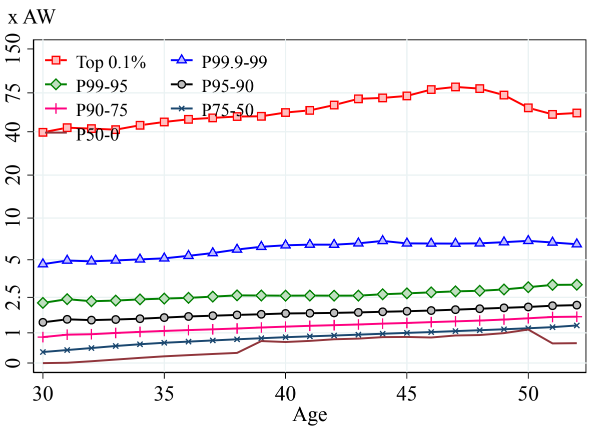


Notes: Figure D.41 shows average wealth for different FW_j^h groups considering households that have been stable for at least ten years.

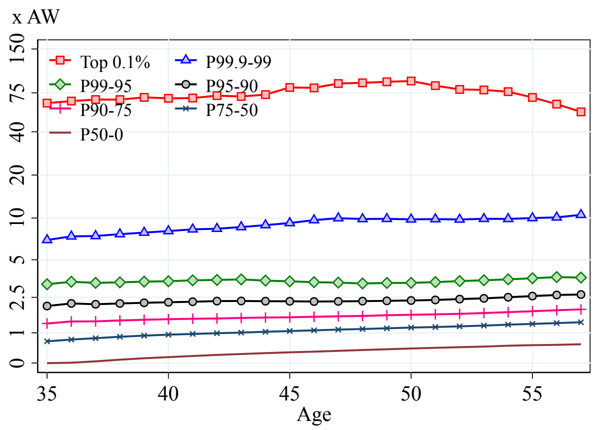
E.5 Forward-Looking Results

Figure D.42 – Forward-Looking Wealth Profiles: Age Groups

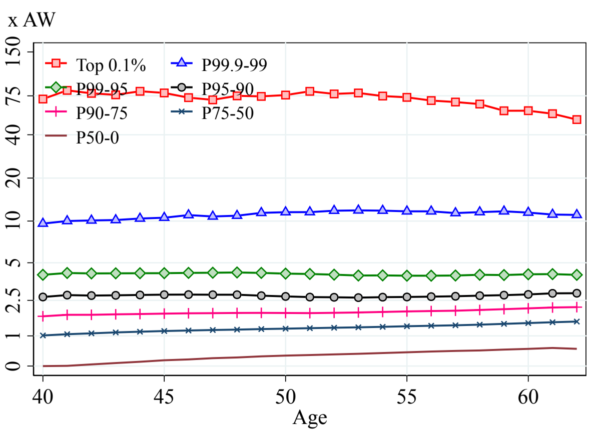
(a) Age 30/34



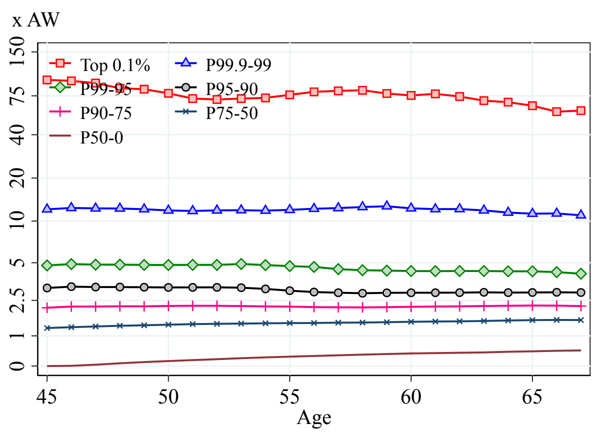
(b) Age 35/39



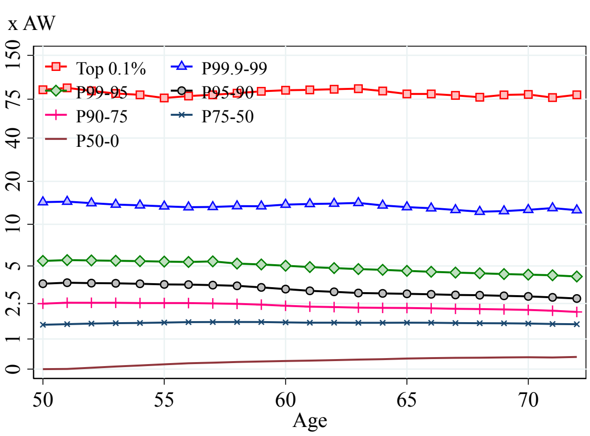
(c) Age 40/44



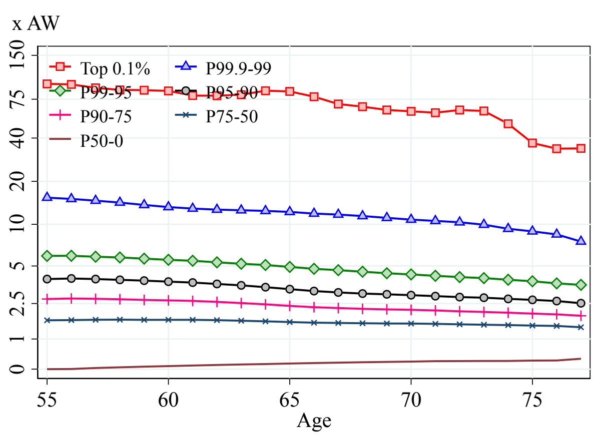
(d) Age 45/49



(e) Age 50/54



(f) Age 55/59



Notes: Figure D.42 shows the evolution of average household for households in different FW_j^h groups.

Figure D.43 – Forward-Looking Transition Matrix: Age Groups

(a) Age 30/34

Rows: Start-of-Period Wealth Rank, FW^h_j; columns: Ending Average Wealth Rank

Start-of-Period Wealth Rank, FW^h_j	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	62.6	21.0	10.7	3.2	2.2	0.4	0.0
(50-75]	48.0	28.6	15.2	4.7	3.1	0.5	0.0
(75-90]	32.5	32.9	21.6	6.9	5.1	0.9	0.1
(90-95]	22.7	28.8	27.8	10.3	8.5	1.6	0.1
(95-99]	16.2	21.8	27.3	14.3	16.1	4.0	0.3
(99-99.9]	7.5	10.7	16.9	13.5	33.5	16.0	2.0
Top 0.1%	3.1	2.5	2.6	4.4	14.1	44.1	29.2

(b) Age 35/39

Start-of-Period Wealth Rank, FW^h_j	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	67.1	19.7	8.9	2.5	1.6	0.2	0.0
(50-75]	44.4	32.0	16.0	4.4	2.8	0.4	0.0
(75-90]	26.4	33.9	25.6	7.8	5.4	0.8	0.0
(90-95]	17.1	25.6	31.0	13.3	11.0	1.9	0.1
(95-99]	11.7	18.8	26.5	16.7	21.0	5.2	0.2
(99-99.9]	4.9	6.6	14.1	13.1	32.7	25.0	3.5
Top 0.1%	2.8	0.9	4.4	3.7	11.8	41.2	35.2

(c) Age 40/44

Start-of-Period Wealth Rank, FW^h_j	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	69.9	18.9	7.9	2.1	1.2	0.1	0.0
(50-75]	41.9	34.5	16.6	4.3	2.4	0.3	0.0
(75-90]	22.7	33.8	28.3	8.8	5.7	0.7	0.0
(90-95]	14.9	24.1	31.3	15.1	12.6	1.9	0.1
(95-99]	9.6	15.5	25.5	17.9	25.3	5.8	0.3
(99-99.9]	3.5	5.0	10.8	11.2	33.6	31.7	4.2
Top 0.1%	1.7	1.4	3.9	2.3	12.2	45.5	32.9

(d) Age 45/49

Start-of-Period Wealth Rank, FW^h_j	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	71.7	18.5	7.1	1.7	0.9	0.1	0.0
(50-75]	39.9	36.6	17.1	4.1	2.1	0.2	0.0
(75-90]	21.0	32.7	30.5	9.5	5.8	0.6	0.0
(90-95]	14.0	21.9	32.2	16.8	13.5	1.6	0.1
(95-99]	8.1	13.5	23.6	19.3	28.9	6.5	0.2
(99-99.9]	2.5	4.1	8.1	10.1	34.4	36.6	4.3
Top 0.1%	1.7	0.7	2.9	1.6	9.2	44.9	39.0

(e) Age 50/54

Start-of-Period Wealth Rank, FW^h_j	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	72.8	18.7	6.2	1.4	0.7	0.1	0.0
(50-75]	38.2	38.0	18.0	3.8	1.8	0.2	0.0
(75-90]	20.2	31.4	32.0	10.1	5.7	0.5	0.0
(90-95]	13.7	19.5	31.8	18.4	15.2	1.5	0.0
(95-99]	7.2	11.0	22.8	20.3	31.4	7.1	0.2
(99-99.9]	2.7	3.8	8.7	9.6	31.8	38.7	4.6
Top 0.1%	0.8	1.2	2.5	0.8	10.2	42.5	42.0

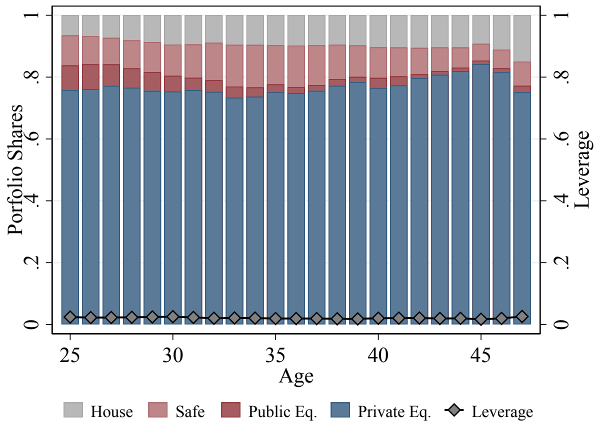
(f) Age 55/59

Start-of-Period Wealth Rank, FW^h_j	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	73.9	18.8	5.6	1.1	0.6	0.0	0.0
(50-75]	36.3	39.0	19.2	3.7	1.7	0.1	0.0
(75-90]	20.0	29.9	33.0	10.9	5.7	0.4	0.0
(90-95]	13.3	18.1	30.5	19.9	16.4	1.6	0.1
(95-99]	7.7	11.5	20.7	19.6	32.7	7.6	0.2
(99-99.9]	2.2	3.6	8.9	9.2	32.3	39.0	4.8
Top 0.1%	0.9	0.0	3.1	2.5	7.8	46.1	39.5

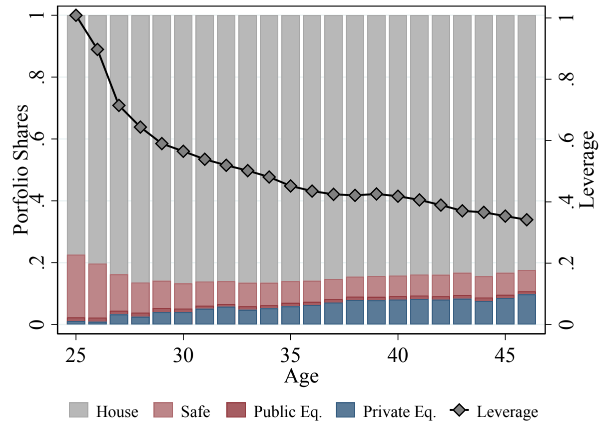
Notes: Figure D.43 shows the intragenerational persistence of net wealth. Figure D.43 shows the results by first sorting household whose head is in different age groups in the conditioning year and then again by $\overline{W}_{i,2015}$. Each cell represent the fraction of household in different percentiles of the wealth distribution in $\overline{W}_{i,2015}$ (columns), conditional on their percentile of the wealth distribution in the conditioning year, FW^h_j (rows).

Figure D.44 – Forward-Looking Portfolio Shares: Age Groups

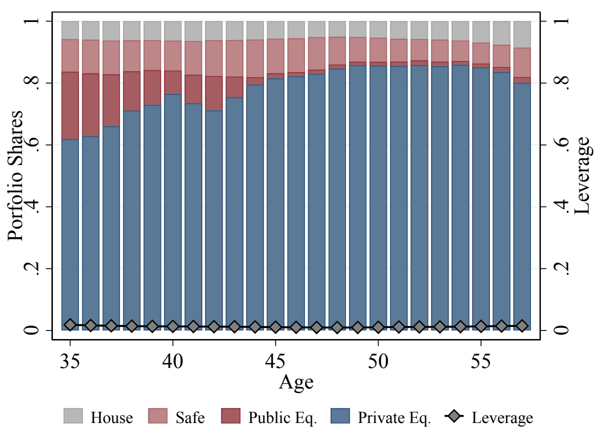
(a) Age 25/29: Top 0.1%



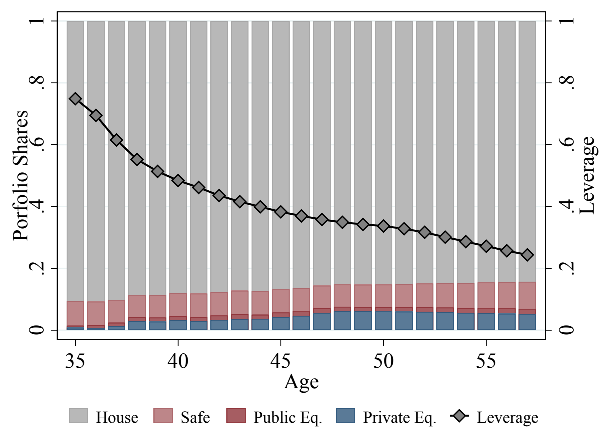
(b) Age 25/29: Below the 50th pct. with pos. wealth



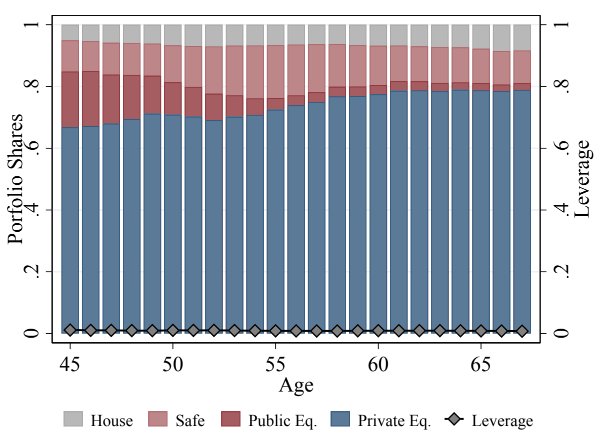
(c) Age 35/39: Top 0.1%



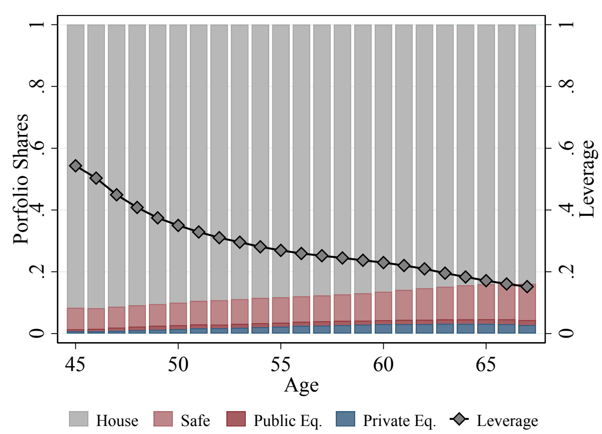
(d) Age 35/39: Below the 50th pct. with pos. wealth



(e) Age 45/49: Top 0.1%



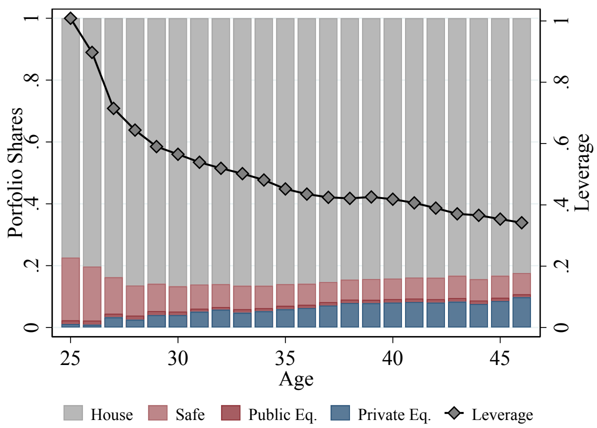
(f) Age 45/49: Below the 50th pct. with pos. wealth



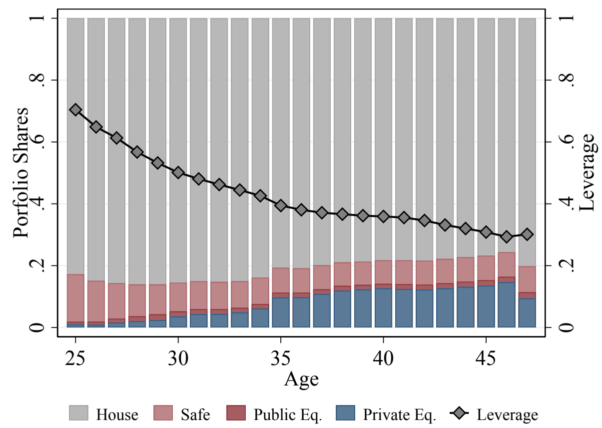
Notes: Figure D.44 shows the evolution of the portfolio shares (left y-axis) and leverage (right y-axis) for households.

Figure D.45 – Forward-Looking Portfolio Shares: Other Groups (25-29 Years Old)

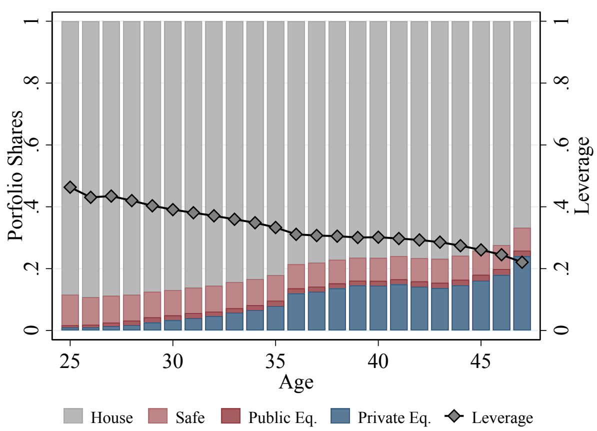
(a) Between 0 and $W_t^{\min}$



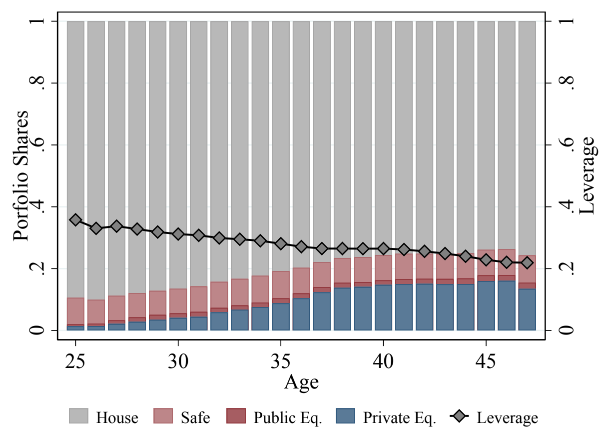
(b) Between 50th and 75th



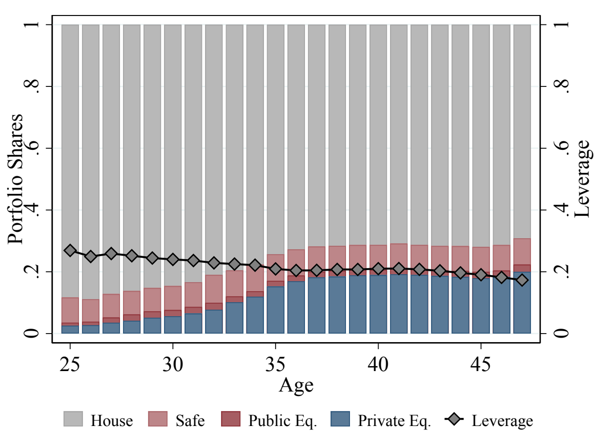
(c) Between 75th and 90th



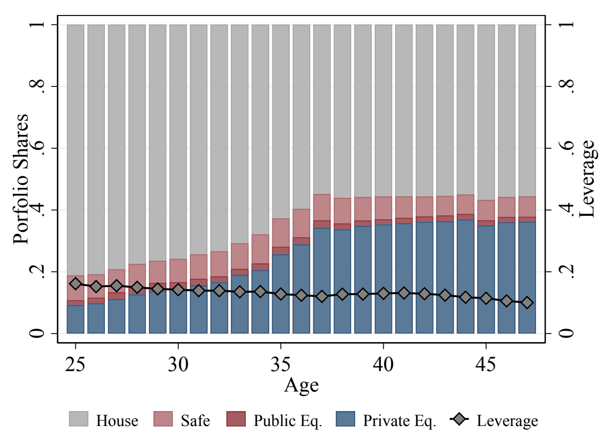
(d) Between 90th and 95th



(e) Between 95th and 99th



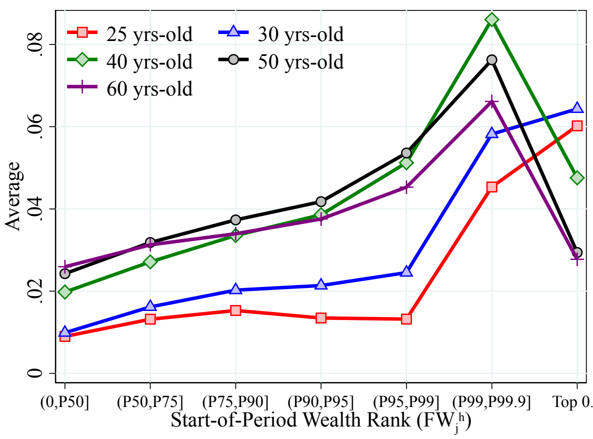
(f) Between 99th and 99.9th



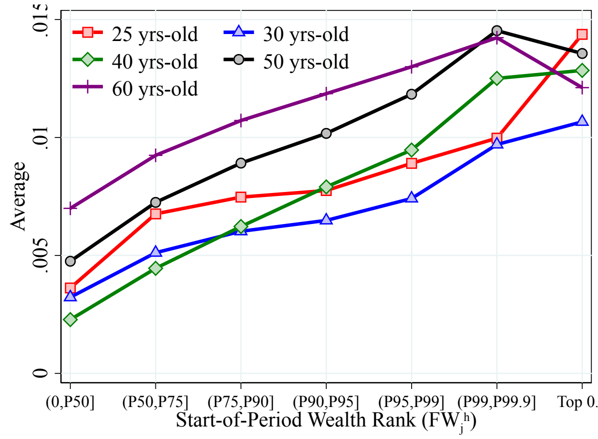
Notes: Figure D.45 shows the evolution of the portfolio shares (left y-axis) and leverage (right y-axis) for households.

Figure D.46 – Lifetime Returns by Start-of-the-Period Wealth

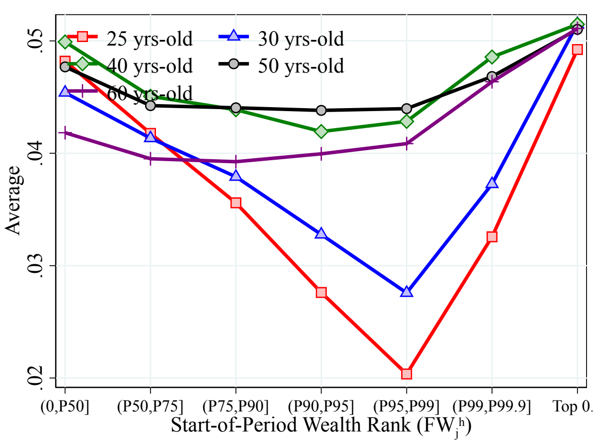
(a) Mean Return on Net Wealth



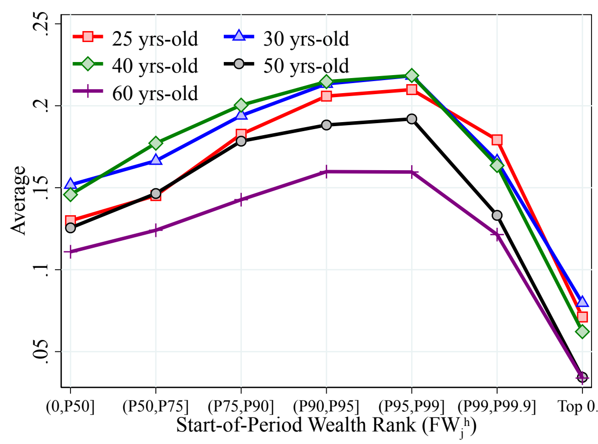
(b) Mean Return on Safe Assets



(c) Mean Return on Housing

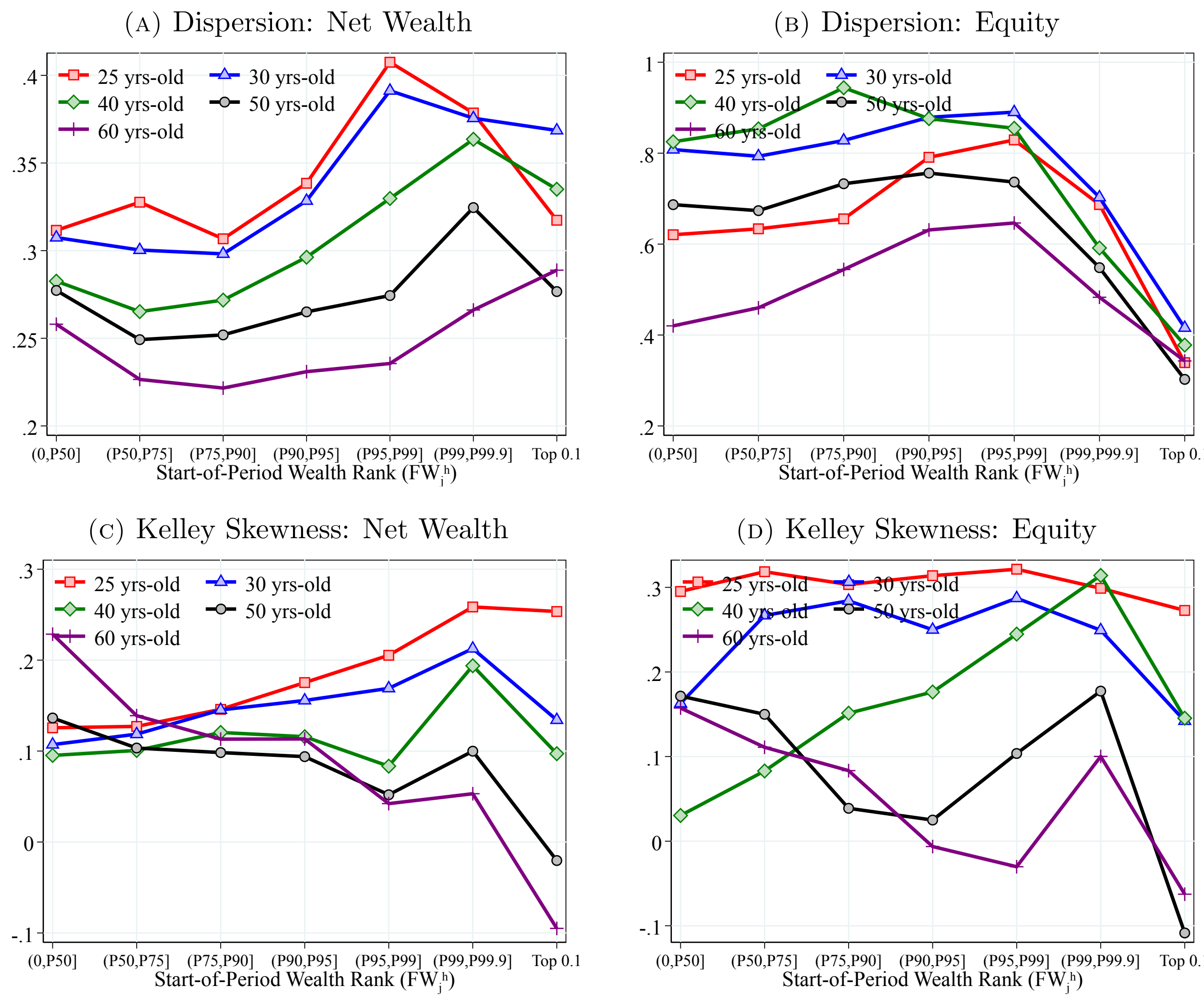


(d) Mean Return on Equity



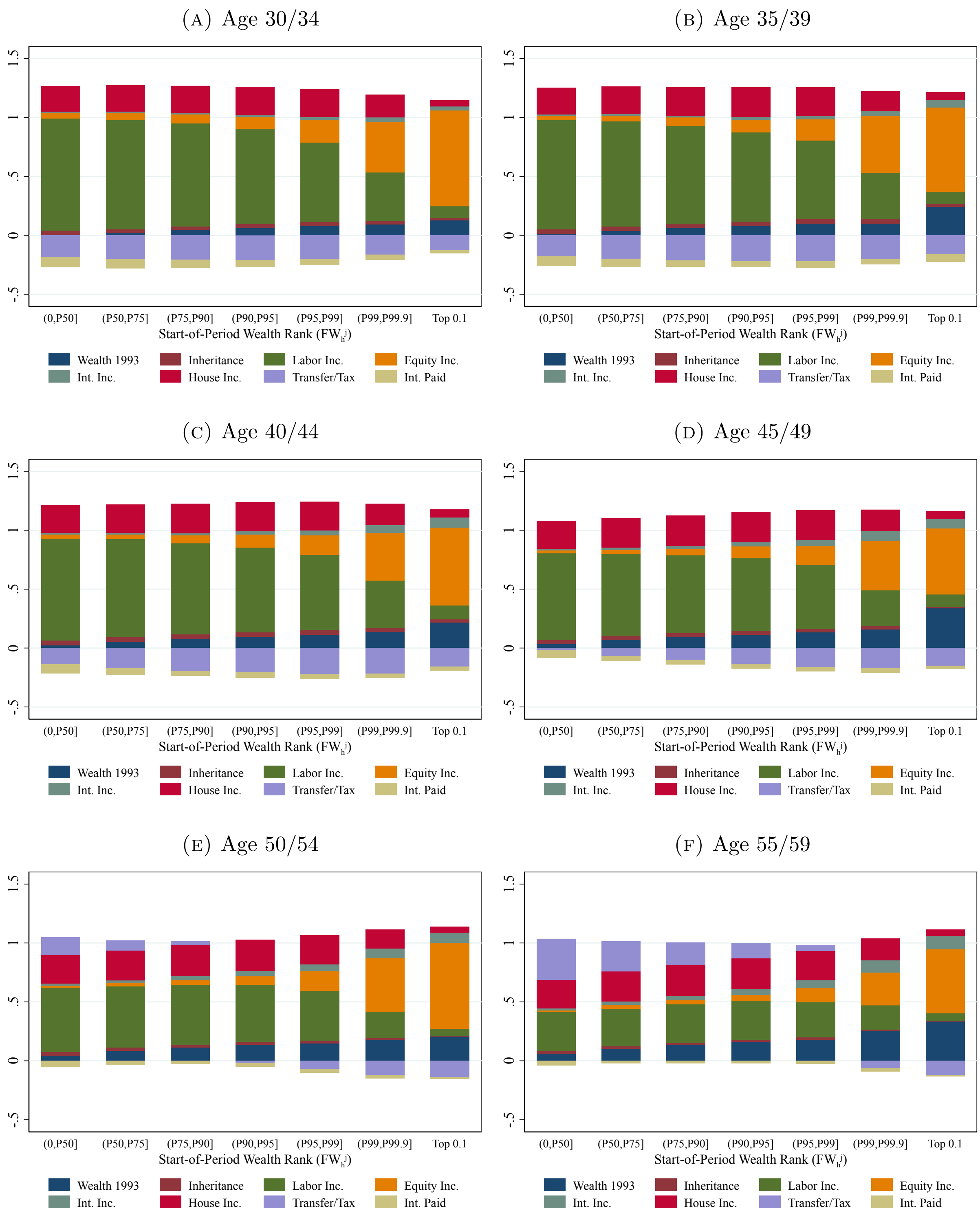
Notes: Figure D.46 shows the 11-years mean of the value-weighted average gross annual returns within age and wealth groups across different conditioning years for different asset classes.

Figure D.47 – Dispersion and Skewness of Rates of Returns



Notes: Table D.47 shows the 11-years mean of the value-weighted cross-sectional moments of the gross annual returns within age and wealth groups across different conditioning years for different asset classes.

Figure D.48 – Lifetime Resources Decomposition: Age Groups

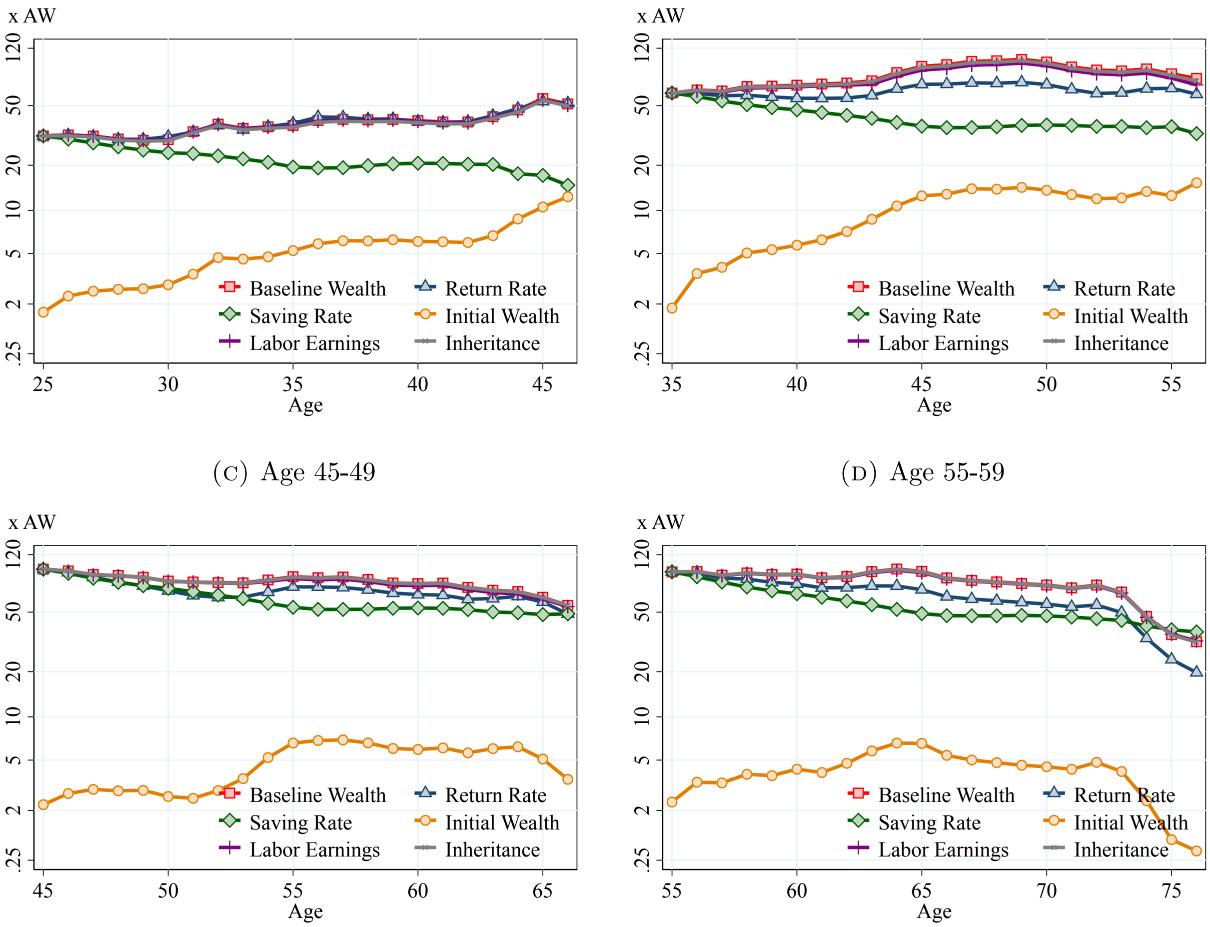


Notes: Figure D.48 shows lifetime resources shares for households in different age groups and wealth rank, FW_j^h.

Figure D.49 – Forward-Looking Dynamic Decomposition: Age Groups

Notes: Figure D.49 shows the shares of lifetime resources for a sample of households in different age groups and wealth rank, FW_j^h, accounting for capitalization.

Figure D.50 – Counterfactual: Top wealth Households; Age Groups



(a) Age 25-29

(b) Age 35-39

(c) Age 45-49

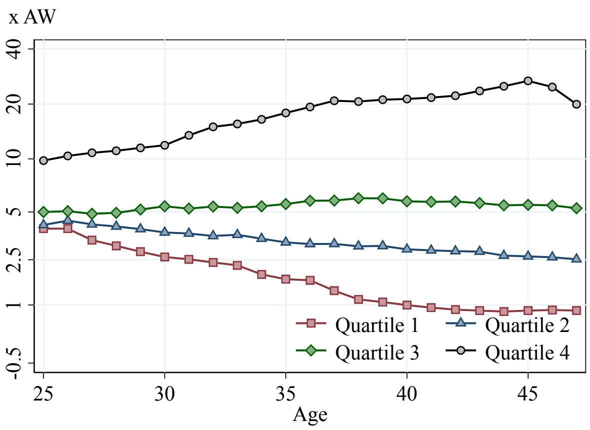
(d) Age 55-59

Notes: Figure D.50 shows the counterfactual wealth profiles for households at the top 0.1% of the wealth distribution.

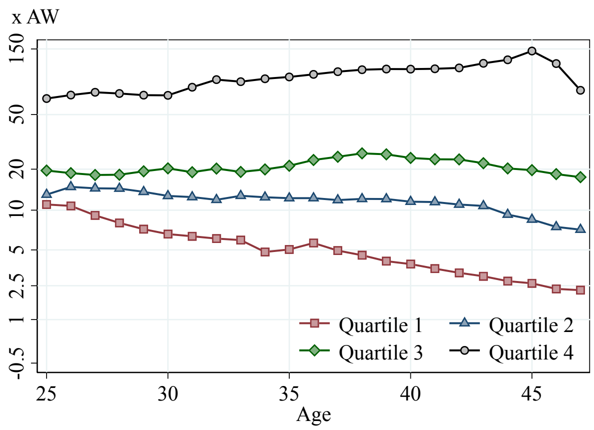
E.6 Forward-Looking Evolution of the Rich

Figure D.51 – Forward Wealth Profile: Old Money and New Money

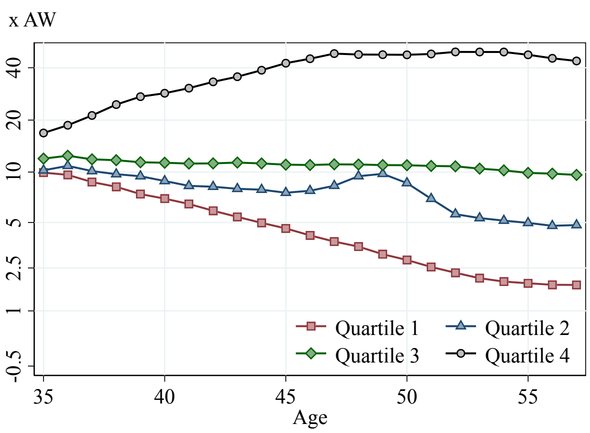
(a) Age 25/29: Top 1% Households



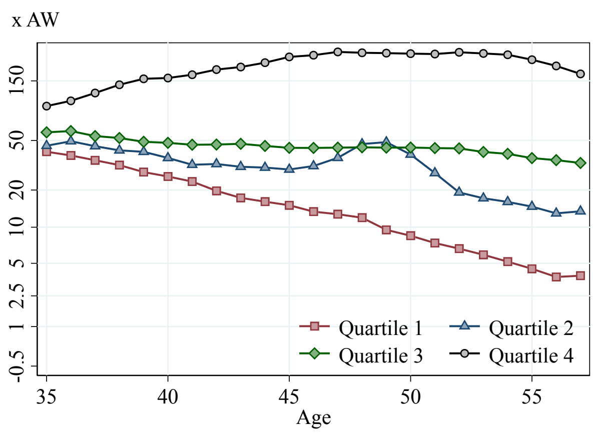
(b) Age 25/29: Top 0.1% Households



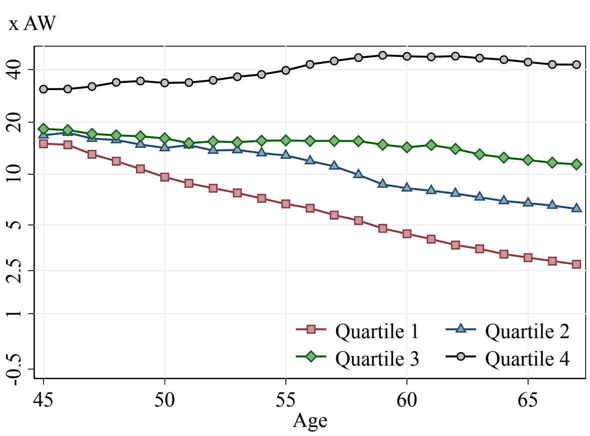
(c) Age 35/39: Top 1% Households



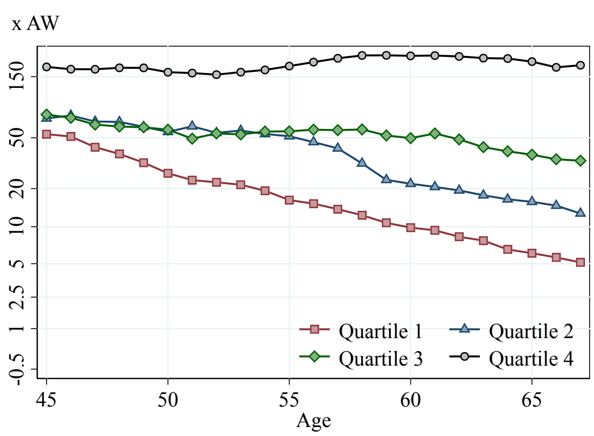
(d) Age 35/39: Top 0.1% Households



(e) Age 45/49: Top 1% Households



(f) Age 45/49: Top 0.1% Households



Notes: Figure D.51 shows the average wealth profile for household whose head is in $FW^{h}_{\geq P99.9}$ different age groups, h and belong to the top 0.1% of the wealth distribution at the start of the sample and were in different quartiles of the end-of-period average wealth distribution $(\overline{W}_{i,2015})$.