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

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Abstract

We use Norwegian administrative panel data on wealth and income between 1993 and 2015 to empirically study lifecycle wealth dynamics, focusing on the wealthiest. On average, the wealthiest start their lives substantially richer than other households in the same cohort, own mostly private equity in their portfolios, earn higher returns, derive most of their income from dividends and capital gains, and save at higher rates. We empirically decompose the roles of different factors behind their wealth accumulation. At age 50, the excess wealth of the top 0.1% group relative to mid-wealth households is accounted for in about equal terms by higher saving rates (34%), higher initial wealth (32%), and higher returns (27%), while higher labor income (5%) and inheritances (1%) account for the small residual. We also document significant heterogeneity among the wealthiest: around one-fourth of them—which we dub the "New Money"—start below median wealth but experience rapid wealth growth early in life. Relative to households who started their life rich—the "Old Money"—the New Money are characterized by even higher saving rates and returns and also by higher labor income. Their excess wealth at age 50 is mainly explained by higher saving rates (46%), followed by higher returns (34%) and higher labor income (16%).

Keywords: Wealth inequality, life-cycle wealth dynamics, rate of return heterogeneity, bequests, saving rate heterogeneity

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1 Introduction

The large concentration of wealth is a topic increasingly at the center of academic and public discourse (see Piketty (2014)) prompting an active debate on, for example, whether and in what form—and by how much—the government should tax wealth (e.g., Guvenen *et al.* (2019); Boar and Midrigan (2022)). To study these questions, however, it is not enough to rely on cross-sectional evidence; one also needs to know how the wealthiest accumulate their fortunes over their life cycle as different mechanisms will 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 as a result of a higher precautionary savings motive (Castañeda *et al.* (2003)) or lower discount rates (Krusell and Smith (1998)), or by saving more because of their higher lifetime earnings (Huggett (1996))? In this paper, we shed light on these questions by empirically investigating household life-cycle 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 and inequality 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) has also collected data on household wealth biennially since 1999 but does not sample the wealthiest (Insolera *et al.* (2021)), even though the top 1% households own more than one-third of total wealth. Finally, Saez and Zucman (2016) back out the wealth distribution from administrative tax data by capitalizing incomes from different asset classes, but this method requires strong assumptions on asset returns (Smith *et al.* (2023)).

Our data have several advantages that are crucial for the study of life-cycle wealth dynamics. First, its long panel dimension 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 empirical analysis employs a nonparametric descriptive approach. For that, we retrospectively investigate the evolution of wealth, portfolio composition, income sources, rates of return, 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 actually 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' life-cycle wealth dynamics.

First, we document the evolution of average net worth over the life cycle for different wealth groups. We find that on average, the wealthiest start their lives substantially richer than other households in the same cohort. For instance, the richest 0.1% group among households aged 50—54 owns on average about 120 times the average wealth ($437,000 in 2015 and hereafter referred to as "*AW*"). The same individuals already owned 20 × 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 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 over the life cycle, we construct long-term transition probability matrices within narrow wealth rank groups. We find that 29% of households at the top 0.1% of the wealth distribution at age 50–54 were also in the top 0.1% group 22 years prior. Moreover, 65% of those that reach the top 0.1% already started out within the top 5%. However, a significant fraction of top wealth owners start their careers below the 75th percentile of the wealth distribution. We denote this group as the "New Money" and compare their lifecycle wealth dynamics to those who already started rich, the "Old Money."

Second, we study households' lifetime portfolio composition and long-term returns.

[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.

As has been extensively documented in cross-sectional data, wealthy households on average hold most of their wealth in equity (e.g., Carroll (2000)). However, we find that the current wealthiest have invested a substantially higher share of their portfolio in equity, in particular private businesses, starting from very young ages, even compared to those with the same wealth and age in the past. For instance, the portfolio share of equity for the wealthiest 0.1% households aged 50—54 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 past wealth. For below-median households, in contrast, housing is the single most important asset in their portfolios, constituting around 90% of their gross wealth over the life cycle. Consistent with these large differences in portfolios, 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 0% for the bottom 50% of the wealth distribution to about 10% for the top 0.1% group. Interestingly, these differences are more pronounced among the younger cohorts. 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 (including 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 the top 0.1% wealth owners aged 50–54 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, we find that 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—we find that initial wealth is the single most important component for the wealthiest and, interestingly, much more than labor income is. This is because capital income compounds for more years for initial wealth compared with 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 50% 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 households up the wealth distribution); we find that the saving rate over the next 22 years increases with initial wealth.[2]

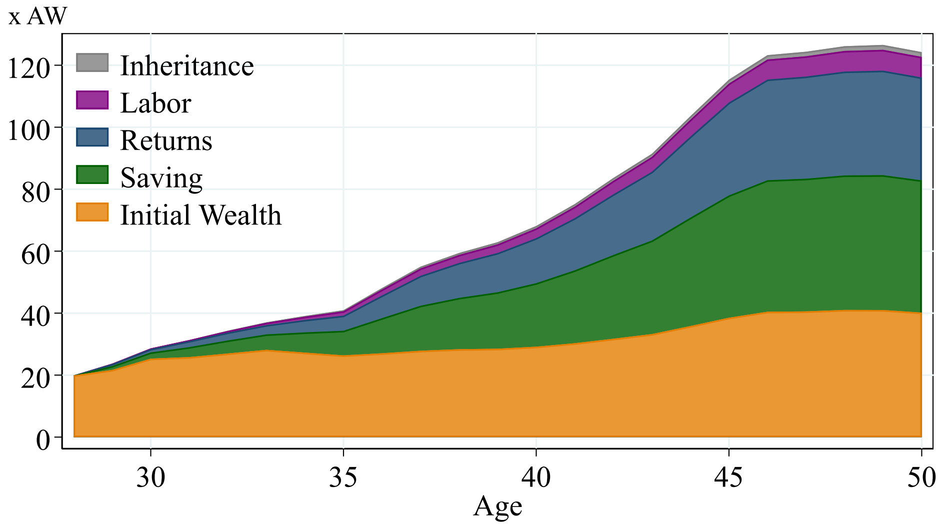
As our primary major contribution, we quantify the importance of each of the different factors discussed above for top wealth accumulation. To do so, we simulate counterfactual wealth profiles by replacing each variable in the budget constraint (e.g., the return on net wealth, the saving rate, and so 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. 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 with decomposing the excess wealth of the top 0.1% owners relative to the median-wealth households aged 50–54 (Figure 1). As individuals age, the relevance of initial wealth declines, whereas higher saving rates and rates of return rise in importance in explaining the wealth gap. By around age 50, the majority of the wealth gap is accounted for in similar proportions by higher initial wealth (32.3%), higher saving rates (34.3%), and higher returns on wealth (26.7%).[3] The small remainder is a result of higher labor income (5.3%) and higher inheritances (1.3%) over the sample period. From this analysis, we conclude that higher labor income and higher returns on wealth, commonly

[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.

[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. The fact that the importance of initial wealth by the end of the sample period is similar (27.7%) for the youngest group, the top 0.1% households aged 45–49, supports this interpretation, as it is unlikely that vast fortunes in mid-20s can be attributed to other sources other than transfers from parents.

Figure 1 – Determinants of the Top 0.1% Wealth Accumulation



Notes: Figure 1 decomposes the excess wealth accumulation of the top 0.1% relative to the median households. Values are in multiples of the economy-wide average wealth (AW).

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%). Although the wealthiest, *on average,* start with much higher wealth than the rest of the population, a significant fraction, around a quarter of them, starts with negative wealth holdings of around $-0.5 \times$ AW and with little private equity. This group of households, the New Money, then experiences rapid wealth growth early in life, as they earn even higher returns and save at higher rates compared to the Old Money and increasingly shift their portfolio from housing to private equity. After 22 years, even though their portfolio allocation looks similar to that of the Old Money, their net worth falls short of reaching the levels of the Old Money.

Applying the Shapley-Owen decomposition, we find that by age 50, the wealth gap between the New Money and the middling households is primarily 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. Higher inheritances are only a minor factor (5.8%), and since they start out relatively poor, the initial wealth actually reduces

[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.

the wealth gap slightly (-1.4%). In contrast, the fortunes of the Old Money by age 50 are mostly due to higher starting wealth (42.6%), 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%) and higher inheritances over the sample period (0.8%). These results highlight that the group of wealthy households is heterogeneous, composed of both a group of successful self-made entrepreneurs that rise from the bottom and middle of the wealth distribution, and a group that can be thought of as rentiers, who start their lives with significant wealth.

Related Literature. Our paper contributes mainly 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 different 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. Black *et al.* (2020) and Black *et al.* (2020) document significant differences in income sources 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 and wealth inequality. Since we observe all components of the household budget constraint in our data, we can decompose wealth dynamics over the life cycle and across the wealth distribution empirically.

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 life cycle that can be used to further discipline quantitative models.

2 Data and Definitions

We use data from several administrative tax and income records, which contain detailed information on assets, income sources, taxes, transfers, and demographic information for the entire Norwegian population from 1993 to 2015. We also use detailed ownership information for all Norwegian companies combined with data on their balance sheet in the latter half of our sample period. Most information on households is third-party reported to the tax authorities.[5] Employers, banks, and other financial intermediaries are required to send information on labor earnings, the value of the assets owned by individuals, as well as information on the income earned on these assets.

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). Similar data are used by earlier work (e.g., Fagereng *et al.* (2020a, 2019)), so we relegate the details on the data sources to Appendix A. However, a couple of remarks are in order to explain the measurement of some of the variables. The value of real estate in each year is imputed from contemporaneous transactions data using a machine learning method developed by Fagereng *et al.* (2020b). 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 self-assessed values of the private firms. The market value of the assets and liabilities on firms' balance sheet is self-reported and is supposed to reflect the current sale value rather than their historical costs, as typically reported on accounting balance sheets.[6]

Labor income comprises wages and salaries from all jobs, including bonuses and other extraordinary payments as well as self-employment income. Our data also contain information on interest income from deposits, dividends from equity, and interest payments. We compute the unrealized capital gains for private businesses in the form of retained earnings using their balance sheets (see Alstadsæter *et al.* (2016)) and allocate them to households using the ownership register. Using the rental-equivalence approach, we impute annual income from owner-occupied housing that is equal to 2.2% of the house value. Data on inheritances are available from 1995 until 2014, a period during which the inheritance tax was imposed. This registry contains all inter vivos transfers and inheritances—including those below the tax threshold—with information on donors, re-

[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.

[6] Fagereng *et al.* (2020a) show that the self-assessed values of firms are highly correlated with their book values. 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.

cipients, and taxes paid. Figure 2 summarizes the main variables used in our analysis.

The data, although of high quality overall, also have a few limitations that are worth mentioning. First, 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. Second, 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. Third, our data exclude assets whose value is difficult to measure (e.g., art or jewelry).

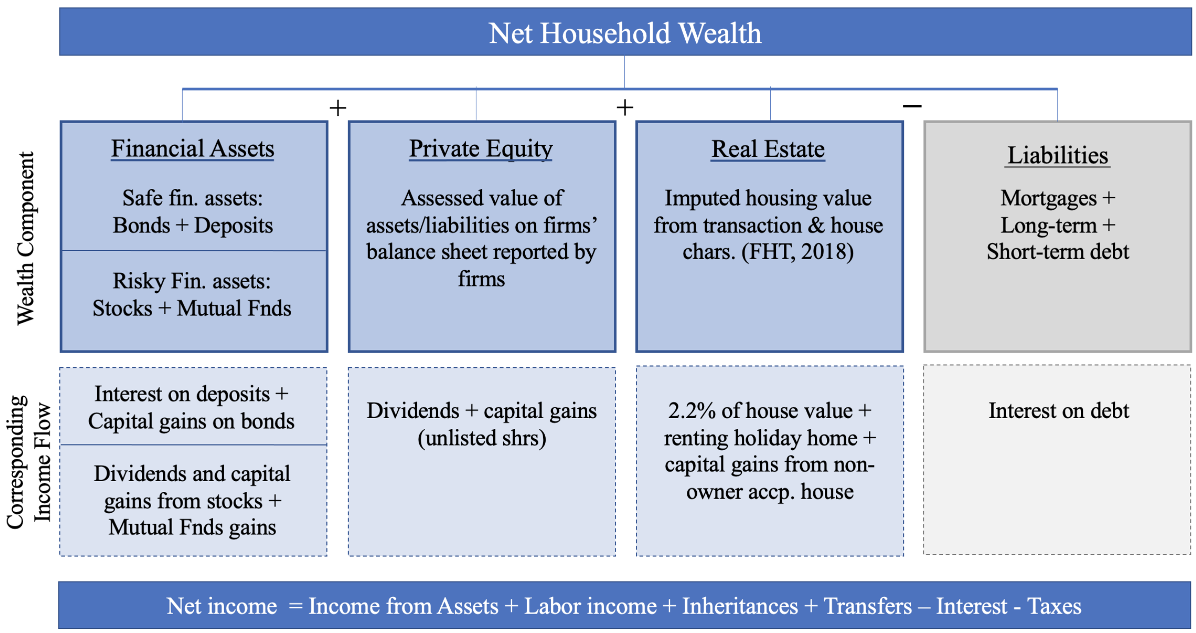
The main variable of interest in our analysis is net wealth, for which the natural decision-making unit is a household. Furthermore, the Norwegian government taxes the wealth of individuals in a household jointly. Therefore, for each individual we measure all variables—assets, liabilities, and income—at 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. Table C.1 shows summary statistics for our sample, and Table C.2 shows measures of concentration of income and wealth.

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

FIGURE 2 – SUMMARY OF VARIABLES



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

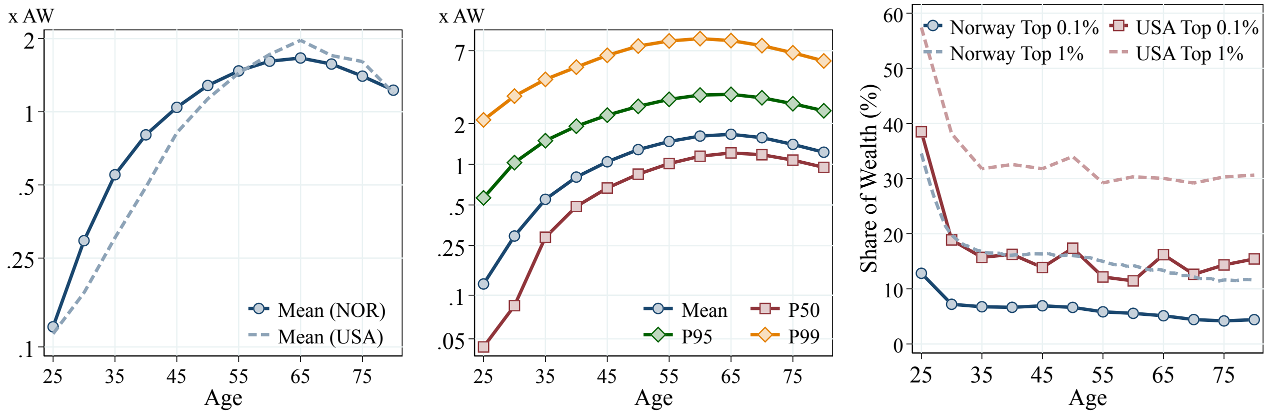
income for this sample). The hump-shaped profile of average wealth and the decline in wealth inequality over the life cycle are not specific to Norway. For instance, the average wealth in the US increases from $0.15 \times \text{AW}$ to $2 \times \text{AW}$ between ages 25 and 65 and declines afterward (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 wealth life-cycle 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

(a) Average Net Worth (b) Selected Percentiles for Norway (c) Wealth Concentration



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 life-cycle wealth dynamics over the wealth distribution by employing two complementary approaches. In our main set of 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 nonparametric 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 about 25 years old in 1993. Then, within each age group h, we rank individuals with respect to their average net wealth between τ and $\tau-1$, $\overline{W}_{i,\tau}^{h} = (W_{i,\tau} - W_{i,\tau-1})/2$, 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, $\overline{W}_{i,\tau}^{h} < 0$, into one bin and define a second group of those who end up with very small but positive wealth, $\overline{W}_{i,t}^{h} \in [0, W_t^{\min})$, where $W_t^{\min}$ 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: $\{[W_t^{\min}, P50), [P50, P75), [P75, P90), [P90, P95), [P95, P99), [P99, P99.9), \geq P99.9\}$, where $P50$ denotes the 50th percentile of the $\overline{W}_{i,\tau}^{h}$ distribution, $P75$ denotes its 75th percentile, 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] In particular, for each base year τ, for each wealth group j in each age interval h, we compute a set of moments $\mathbb{M}_{h,j}^{\tau}$ that are informative about the life cycle wealth dynamics (i.e., average wealth, average saving rate, and so on). In our figures, we then show the average of these moments across base years $\left(\overline{\mathbb{M}}_{h,j} = \frac{1}{6}\sum_{\tau=2010}^{2015} \mathbb{M}_{h,j}^{\tau}\right)$ by wealth and age group. We denote each such backward-looking wealth group by BW_j^h.

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 $\tau-1$, $\overline{W}_{i,\tau}^{h}$, 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_j^h. This approach allows us to uncover the heterogeneity in the wealth accumulation paths that different households expect to experience going forward.

[8] $W_t^{\min}$ 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 D.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.

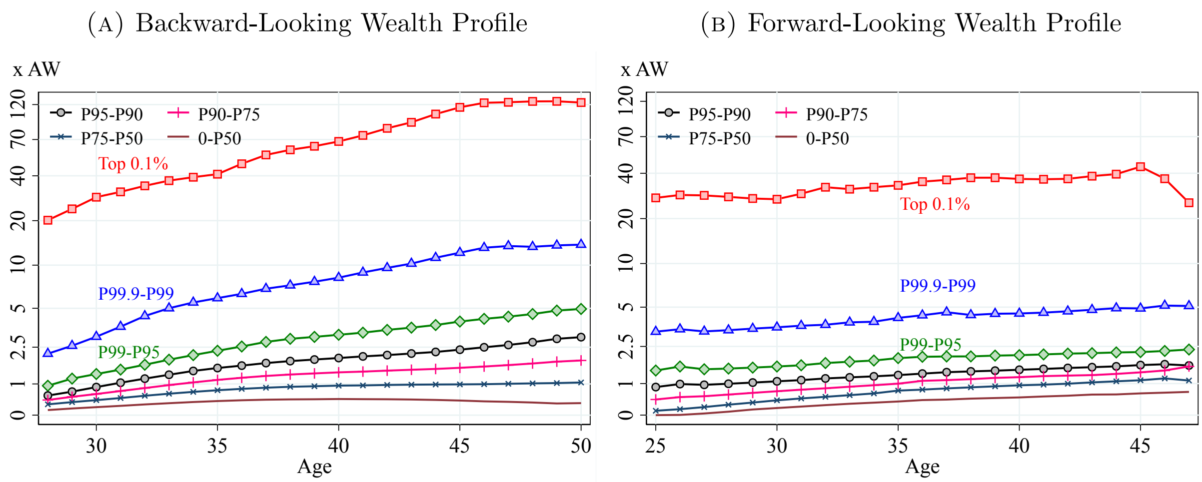
3.2 Dynamic Average Wealth Profiles

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



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 D.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.

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).[12] 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, we find that less than 2% of the households in the bottom 50% of the BW^{50-54}_{j} distribution (first row) come from the top 5% of the $\bar{W}_{i,1994}$ distribution and almost none from the top 0.1%. Similarly, only around 5% of the top 0.1% of the FW^{25-29}_{j} 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 Markov 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.40 for backward- and forward-looking transition matrices, respectively). For example, more

[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).

[12] Recently, Shiro *et al.* (2022) use the PSID to study intragenerational wealth mobility by documenting average rank-rank correlations. They find that a 10-point increase in an individual's wealth percentile in their early 30s leads to around a 6-point increase in their wealth percentile in their late 50s. In our data, the corresponding rank-rank slope coefficient is 0.43, indicating more intragenerational mobility in Norway.

Figure 5 – Long-term Intragenerational Transition Matrix

(a) Backward-Looking Transition

Initial Average Wealth Rank (columns); End-of-Period Wealth Rank, BW^h_j (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	63.2	23.2	9.4	2.3	1.6	0.2	0.0
(50-75]	41.9	29.8	19.2	5.3	3.4	0.4	0.0
(75-90]	34.6	26.1	23.1	9.0	6.2	1.0	0.0
(90-95]	30.1	22.8	22.4	11.7	10.7	2.3	0.1
(95-99]	25.7	18.7	19.4	12.2	17.0	6.6	0.3
(99-99.9]	20.5	14.5	15.6	9.0	18.9	17.5	3.9
Top 0.1%	15.4	6.0	7.4	5.9	13.0	23.2	29.2

(b) Forward-Looking Transition

Ending Average Wealth Rank (columns); Start-of-Period Wealth Rank, FW^h_j (rows)

	[0,50]	(50-75]	(75-90]	(90-95]	(95-99]	(99-99.9]	Top 0.1%
[0,50]	58.4	22.1	12.2	3.8	2.8	0.6	0.1
(50-75]	49.4	27.1	15.0	4.6	3.3	0.6	0.0
(75-90]	39.1	30.2	18.6	6.4	4.7	0.9	0.1
(90-95]	29.7	30.9	22.8	8.1	6.9	1.4	0.1
(95-99]	22.2	25.2	26.1	11.7	11.5	3.1	0.3
(99-99.9]	10.7	14.6	19.0	13.9	29.7	10.9	1.1
Top 0.1%	2.8	2.3	6.3	5.1	22.0	37.6	23.9

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).

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).

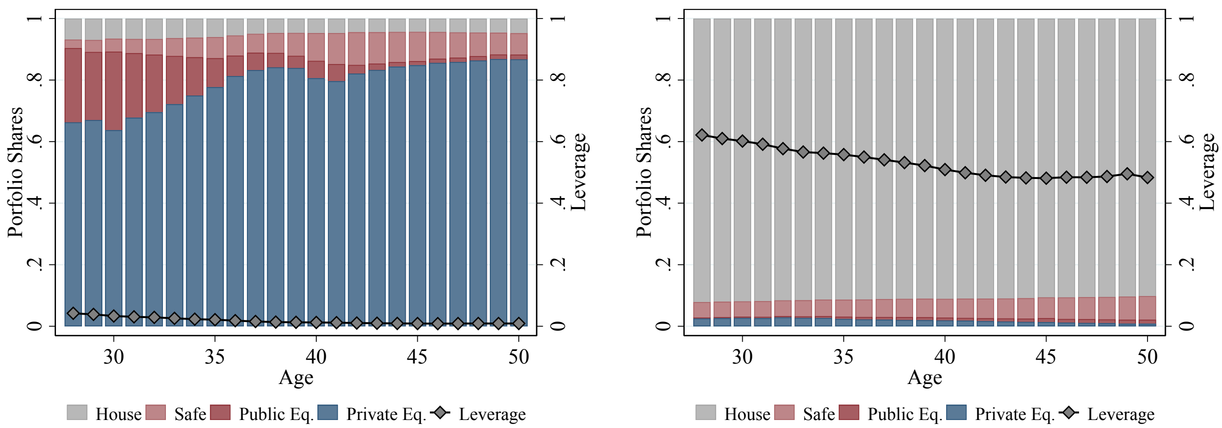
Given the similarities between the forward- and backward-looking transition matrices and our focus on those who reach the top ranks of the wealth distribution, in the rest of the paper, we concentrate on the results from the retrospective approach and discuss the differences with those from the forward-looking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

3.3 Life-Cycle 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.

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 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.

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 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 constitutes 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.[13] We find similar patterns for older cohorts (Figure D.12).

Have the current wealthiest invested in equity more heavily in the past compared

[13]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.41 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 (*** $p < 0.01$).

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 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.

Private businesses are also very important for wealth concentration in the US. Boar *et al.* (2022) document that the 12% of households that own a private business account for around 45% of aggregate wealth in the US. Most top earners in the US are business owners. In 2014, around 70% of the top 1% (85% of the top 0.1%) earn some private business income (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.[14]

[14] First, a tax reform in 2006 introduced taxation of dividends at the individual level, which induced

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.

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).[15] 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.[16] 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

many equity owners to reorganize their ownership into private holding companies, since in that case, dividends would be exempt from taxation. Second, wealth taxes on equity were lower until 2007, with a relatively larger discount for private businesses than for public equity until 2004. Finally, in the inheritance tax scheme, transfers of private equity were given a 70% discount on assessed values below NOK 10 million until 2009 and a 40% discount thereafter.

[15]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)).

[16]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.41 in Appendix D.5.

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

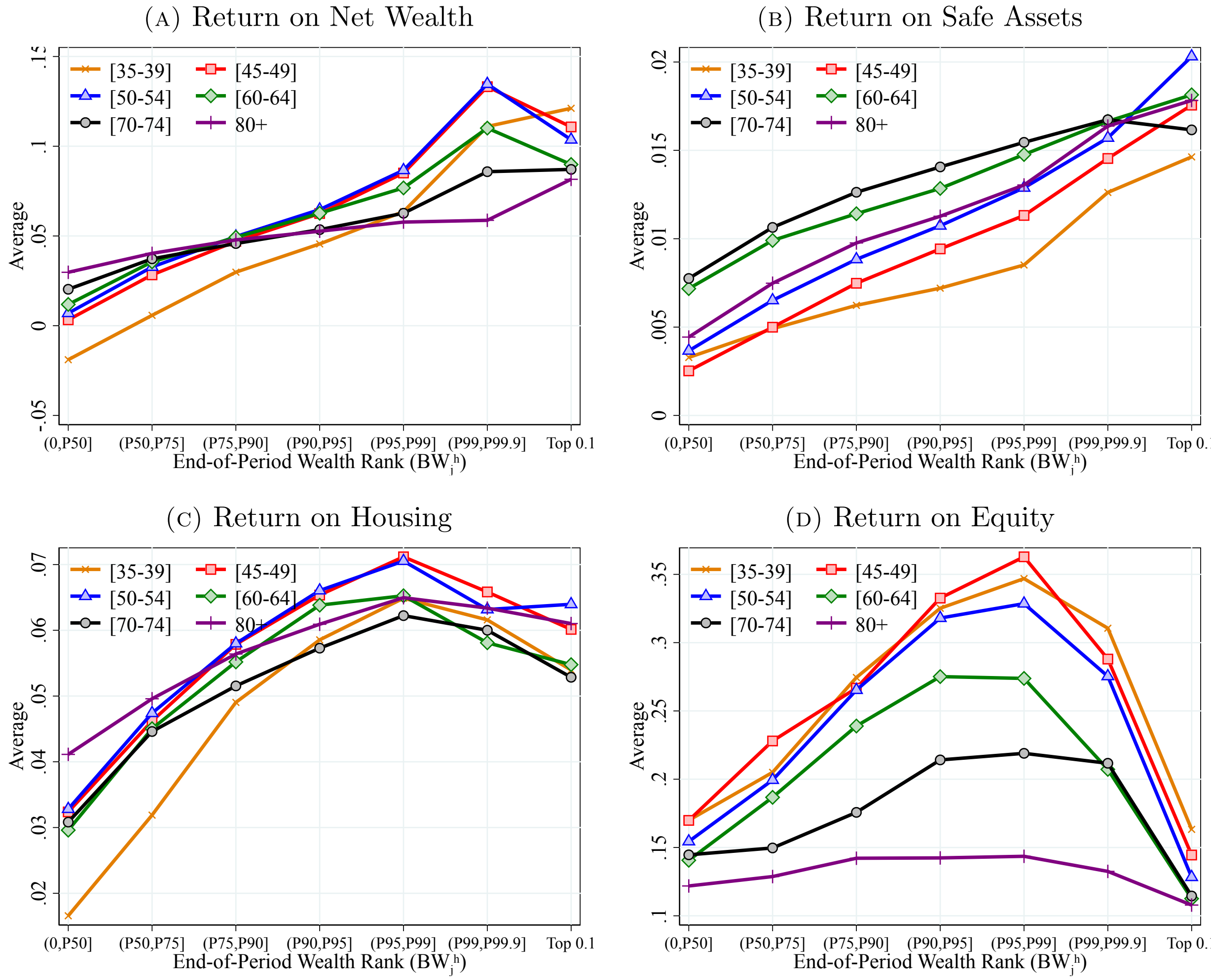
Large persistent return heterogeneity has been argued to be key for explaining the large wealth concentration at the top of the distribution (e.g., Benhabib *et al.* (2011)), and recent empirical evidence has found significant cross-sectional dispersion in returns (e.g., Fagereng *et al.* (2020a); Bach *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 different wealth and age groups.[17]

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. Similarly, we winsorize returns at the top and bottom 0.5 percentiles. 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

[17]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.

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.

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.[18]

[18]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

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 ($BW^{50-54}_{\geq P99.9}$) (Figure 7a). Interestingly, these differences are more pronounced among the younger cohorts. For example, there is almost 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 ($BW^h_{[W_t^{\min},P50)}$) 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_j^{50-54}), the long-term average annual return on housing increases monotonically from around 3% for the $BW^{50-54}_{[W_t^{\min},P50)}$ 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 contem-

to around 15% peak for those around the 90th percentile, and then declining to 6% for the top 0.1% 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).

poraneous 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, $BW^{50-54}_{[W_t^{\min},P50)}$, 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.[19] 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 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.[20]

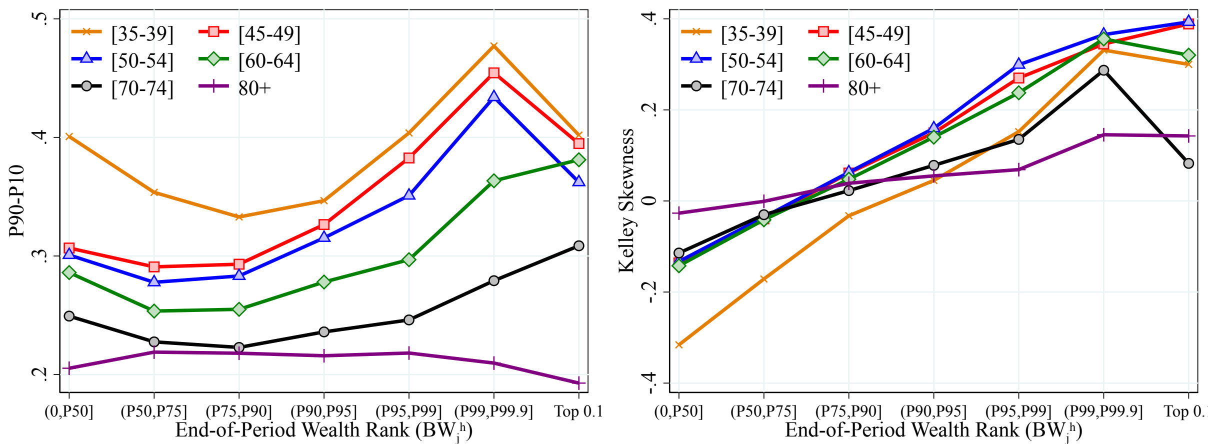
Do the wealthier earn higher returns because their investments are riskier? To answer this question, we now discuss differences in the higher-order moments of the distribution

[19]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 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.

[20]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%.

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.

of returns across wealth and age groups.[21] 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).

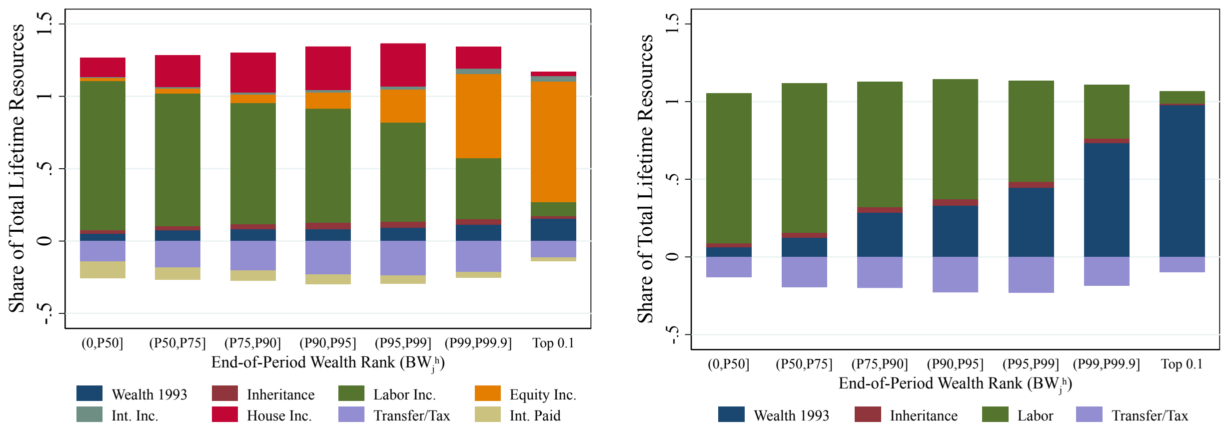
Do the wealthiest face higher disaster risk, which requires higher average returns to compensate? Figure D.15b shows the Kelley skewness (Kelley, 1947) measure, the share of total dispersion of returns on net wealth accounted for by the right tail relative to the left tail, $\mathcal{S}_{\mathcal{K}} = \frac{P90-P50}{P90-P10} - \frac{P50-P10}{P90-P10}$. 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%

[21] 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.

$\left(BW^{50-54}_{\geq P99.9}\right)$ 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.43 and D.44, we find similar results if we condition by initial wealth.

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.[22] Finally, $T_{i,t}$ and $I^L_{i,t}$ represent public transfers net of 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, $W_{i,\tau}$.[23]

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 $\sum_{t=1994}^{\tau} L_{it} / \left(W_{i,1993} + \bar{Y}_{i,\tau}\right)$. 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 $W_{i,1993}$

[22]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 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.

[23]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. As shown in Figure D.20, capital gains are as important as dividends in accounting for the lifetime resources of the wealthiest.

(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 seem to account for a minuscule share of total resources even for the wealthiest group (see also Black *et al.* (2022)). However, for some of the wealthiest households, inheritances (after 1994) constitute a substantial fraction of their total lifetime resources (Table C.7). 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]

[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

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 the wealthiest group is initial wealth in 1994.[25] 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.[26] 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, recall that not all the wealthiest start their working lives with a substantial amount of initial wealth; some were in the lower end of the wealth distribution when they were young (Section 3.2). We further investigate these differences within the top wealth group and also discuss the possible sources of high initial wealth in Section 4.

3.6 Lifecycle Saving Rate Heterogeneity

Cross-sectional evidence has 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),

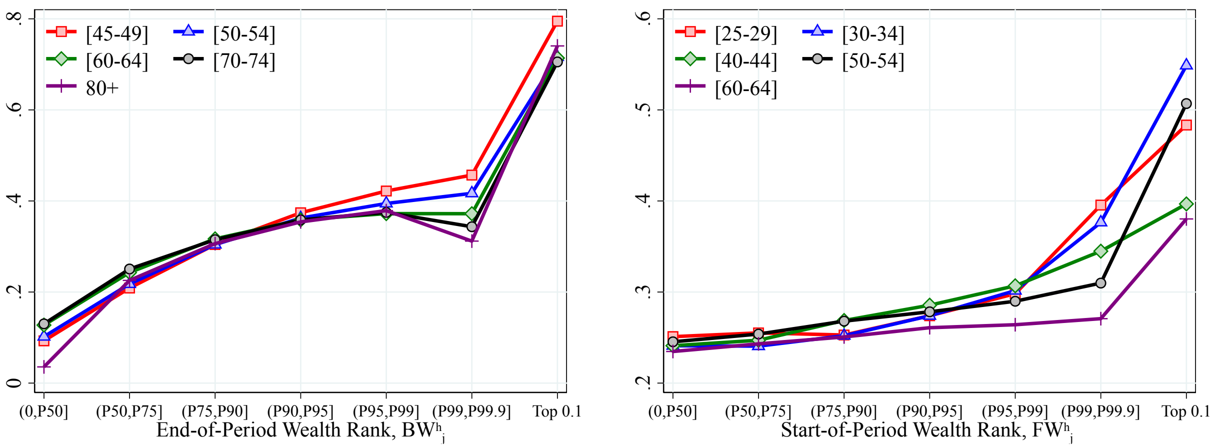
is, $\hat{W}_i^{94} = W_{i,93}$, $\hat{L}_i^{94} = L_{i,94}$, $\hat{H}_i^{94} = H_{i,94}$, $\hat{T}_i^{94} = T_{i,94}$. During the same year, household i also earns net capital income, given by $CI_{i,94} = \left(R^E_{i,94} + R^S_{i,94} + R^H_{i,94} - I^L_{i,94}\right)$. We then distribute the net capital 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.

[25] We interpret the large differences in initial wealth mainly as unobserved intergenerational transfers. Even the top 0.1% households aged 45–49 started with large fortunes in their mid-20s, which can unlikely be attributed to sources other than transfers from parents. Actually, we find that at least half of the wealthiest young household own shares in the companies owned by also their parents.

[26] 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.

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 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).[27] Obviously,

[27] 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 (excuding 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. Indeed, when we exclude capital gains from our saving rate calculation (i.e., we define the saving rate as $\left(W_{i,\tau} - W_{i,93} - \sum CG_{i.t}\right) / \left(\bar{Y}_i - \sum CG_{i.t}\right)$), we find that the net saving rate is increasing in wealth only conditional on end-of-period wealth (Figure D.23a), but flat until the 99th percentile conditional on initial wealth (Figure D.23b). We believe that the gross saving rate (which also includes capital gains) is the appropriate measure for our purposes in this paper: our focus is on the wealthiest, whose portfolios consist mostly of private equity. Since

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.

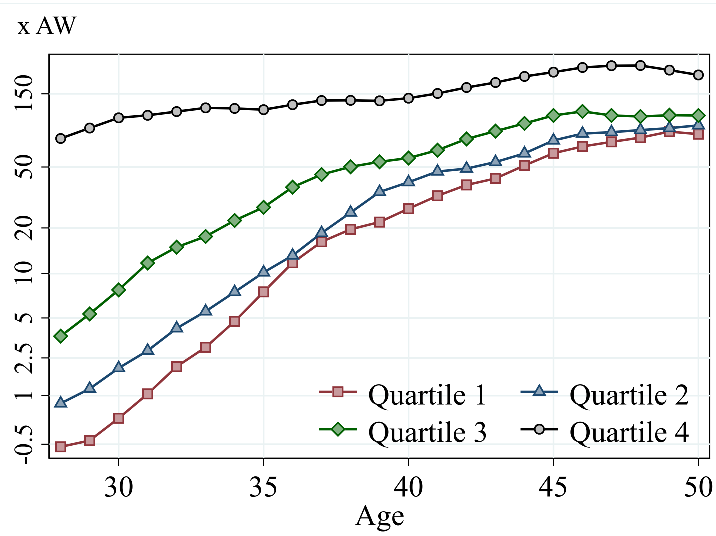
A potential concern is that the positive correlation between wealth and saving rates is mechanical, as higher saving rates move households up the wealth distribution. However, Figure 10b confirms that lifetime saving rates across the wealth distribution are also strongly increasing in wealth when ordering 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 homothetic 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.25 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

the associated capital gains represent retained earnings, the 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.

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 $(\overline{W}_{i,1994})$.

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.26). 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.24). These findings suggest that most New Money households are indeed self-made and come from modest backgrounds.

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

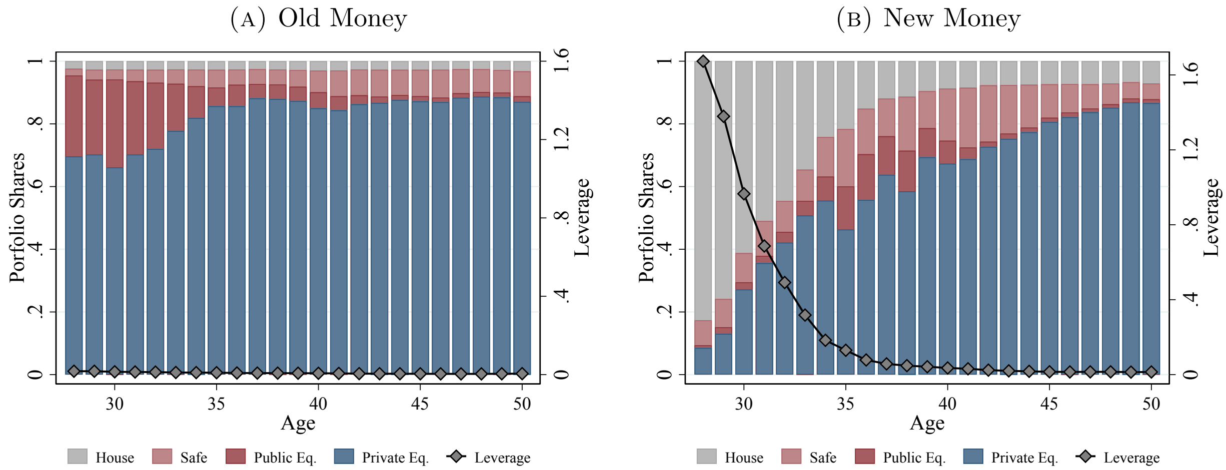
(Quartile 4) have, on average, a net worth of around 75 × AW in the economy in 1993 versus a negative 0.5 × AW for New Money (Quartile 1). The New Money then experience significant wealth growth during this period, and their wealth grows steeply in the first 10 years of their working lives, after which the growth rate slows down, generating a concave life-cycle 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.[28]

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.48, 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 × 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 D.5.

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

[28]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.

Figure 12 – Portfolio Shares: Old Money and 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 $\left(\overline{W}_{i,1994}\right)$.

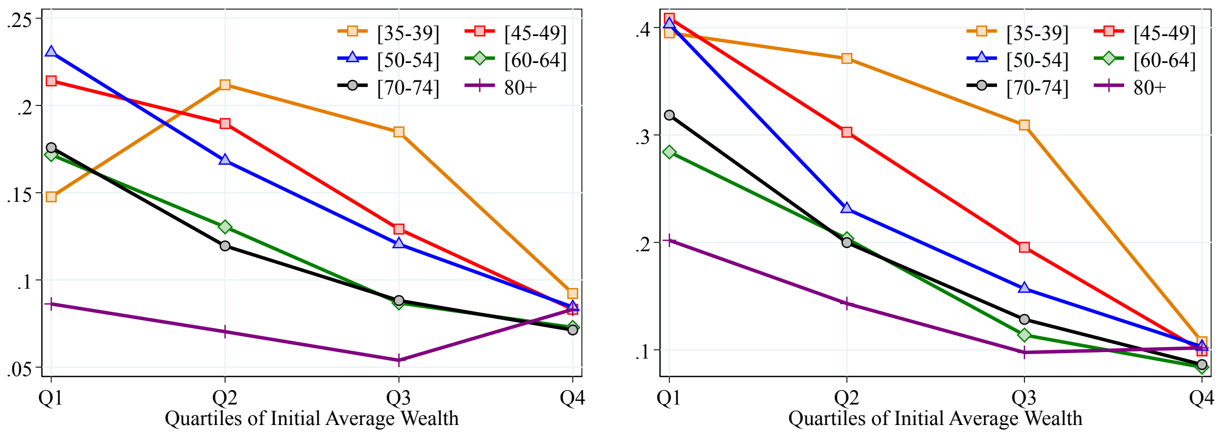
poor entrepreneurs leverage to invest in their firms.[29] Similar to our results for top wealth owners, we find that the Old Money have always been heavily invested in equity and, in particular, in private business. And they further alter the composition of their risky assets in favor of private businesses 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.29 and D.30 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

[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.27). 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.28). 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

(a) Average Returns on Net Wealth (b) Average Returns on Equity



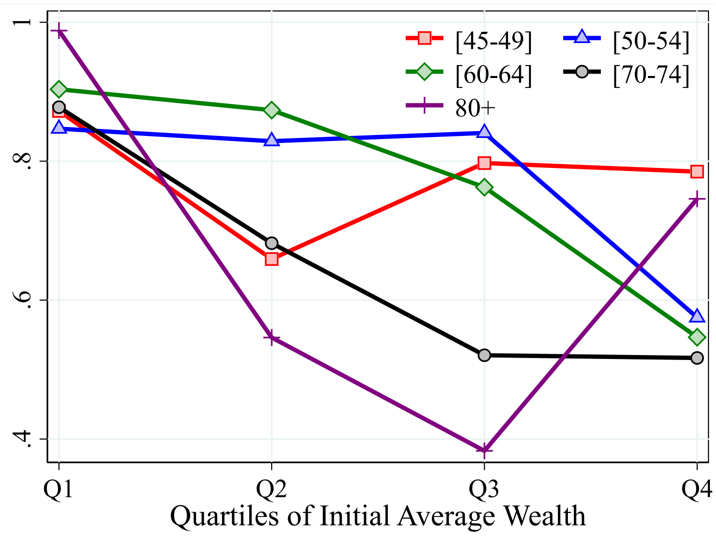
Notes: Figure 13 shows the 11-year mean of the value-weighted average returns for households in the $BW^h_{\geq P99.9}$ wealth group, which are in different quartiles of the initial average wealth distribution $(\overline{W}_{i,1994})$.

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.31b). Moreover, we do not find significant differences for returns from safe assets between these groups either (Figure D.31b). 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). 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.33). 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

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 3.6.

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.34). 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.

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 3.6—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

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

which is the per-period equivalent of the gross saving rate discussed in Section 3.6. 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):

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

[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.

We then use this function to reconstruct the evolution of wealth when counterfactually replacing these factors by the values of a reference group.[31] We use the middle 50% of 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, $f\left(W_{i,1993},\left\{\tilde{L}_{i,t},\tilde{H}_{i,t},\tilde{R}_{BW^{50-54}_{[P25,P75)}},S_{i,t}\right\}^{\tau}_{t=1994}\right)$.[32]

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 eco-

[31]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 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 $\bar{S}^{h,j}_t$.

[32]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.

nomic forces for wealth inequality. In an ongoing work (Halvorsen *et al.* (2023)), we estimate a structural lifecycle model by targeting these data moments.

5.1 Decomposing Top Wealth Inequality

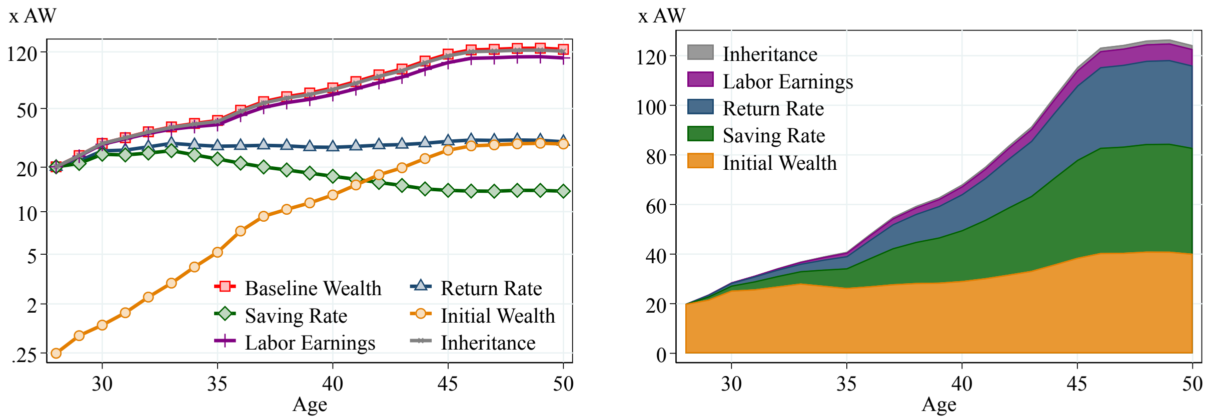
We start with the first counterfactual exercise in which we change only one factor at a time and keep the rest of the variables intact. Figure 15 displays our results for the top 0.1% group among households aged 50–54, $BW^{50-54}_{\geq P99.9}$. To fix ideas, the red line with squares shows the (retrospective) 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. 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.35): initial wealth and saving rates are the two

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.

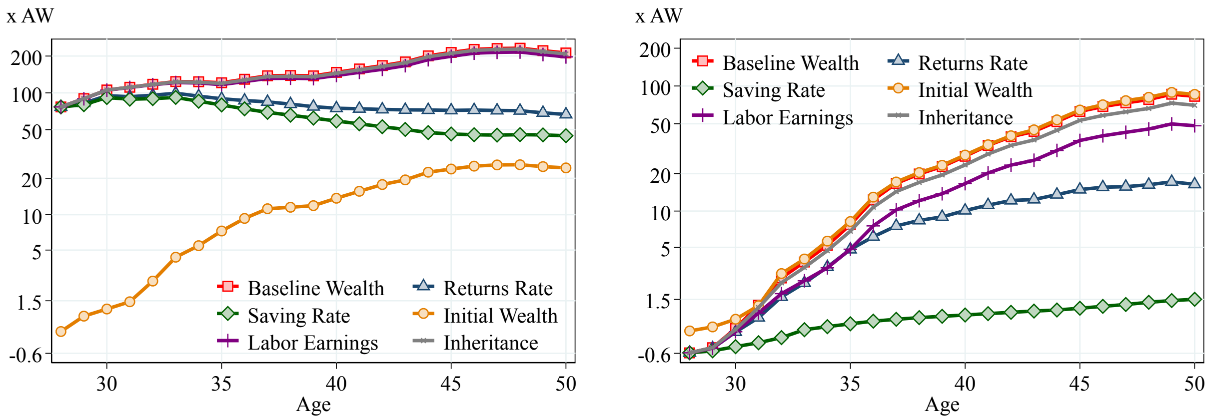
most important drivers of the lifecycle wealth dynamics of the wealthiest, whereas the importance of returns declines as the cohorts age.

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 B 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

(a) Old Money (b) New 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 aIHS 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 27.6% of the gap, respectively (or about 35 × 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.[33] 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.36, we draw similar qualitative conclusions if we consider other age groups, although naturally the importance of initial wealth increases for older 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 those presented in Figure 15 for the top 0.1% combined: labor income and (post-1994)

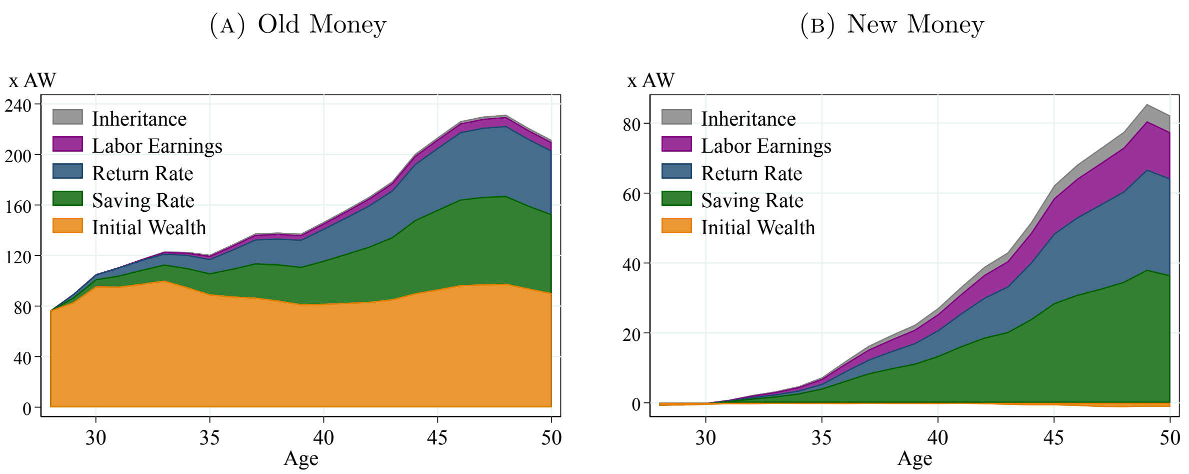
[33]Thus, after jointly accounting for all factors, we have come to a conclusion different from the saving rate being the most important factor explaining the wealth gap at age 50. This is because in the Shapley-Owen decomposition, we assign lower rates of return and initial wealth, which then lead to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

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 (3.2%), 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 provide empirical evidence on the quantitative importance of allowing for heterogeneous returns on wealth for lifetime wealth accumulation (as in, for example, in Benhabib *et al.* (2019) or Hubmer *et al.* (2021)), as well as the significant role for 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. Perhaps most striking in view of the focus of the recent literature (which has stressed the importance of rate of return heterogeneity), heterogeneity in saving rates is also a major driver of wealth inequality over the life cycle. This finding, however, 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, 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.

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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