From Saving Comes Having? Disentangling the Impact of Saving on Wealth Inequality

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ABSTRACT

This paper investigates the channels through which saving flows impact the dynamics of wealth inequality. The analysis relies on an administrative panel that reports the assets and income of every Swedish resident at the yearly frequency. We document that the saving rate, defined as saving from labor income divided by net worth, is on average a decreasing function of net worth itself. We also report that the saving rate is highly heterogeneous within net worth brackets. Heterogeneity across and within net worth brackets have conflicting effects on wealth inequality. As a result, saving flows are measured to have a strong impact on social mobility but only a weak impact on the distribution of net worth. Heterogeneity in wealth return is instead the main driver of the recent increase in top wealth shares.

Keywords: Household finance, inequality, saving, consumption, income-to-wealth ratio.

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Wealth inequality far exceeds income inequality and is growing rapidly in the United States and around the world (Piketty 2014, Saez and Zucman 2016). Among possible explanations of these phenomena, the heterogeneity of saving rates has emerged as a leading contender in the theoretical literature (de Nardi and Fella 2017). Diversity in saving behaviors can have multiple origins. Some individuals may be more patient and follow steeper accumulation paths than others (Krusell and Smith 1998), so that heterogeneity in saving rates may be type-dependent. Richer agents may derive little utility from additional consumption and prefer instead to accumulate capital at a faster pace than less wealthy agents (Carroll 2000), so that heterogeneity in saving rates may also be scale-dependent. These forms of saving heterogeneity parallel the type-dependent and scale-dependent heterogeneity of wealth returns, which have both been shown to be key potential drivers of wealth inequality (Benhabib et al., 2011) and its acceleration (Gabaix et al., 2016) in general equilibrium models.

In order to better understand the empirical mechanisms of wealth inequality, one needs to measure accurately the joint distribution of individual wealth, saving flows, and returns. While the properties of saving flows have long been at the center of the economics literature (Fisher 1930, Keynes 1936), the corresponding empirical evidence remains limited. Friedman (1957) and Venti and Wise (2000) estimate that consumption is a constant proportion of life-time income regardless of net worth, while Mayer (1972), Carroll (2000), and Dynan Skinner and Zeldes (2004) find that the consumption represent a smaller of fraction of life-time income in higher brackets. Saez and Zucman (2016) consider the link between saving flows and wealth in U.S. tax records. They impute household net worth from tax returns and report a positive correlation between saving rates and wealth under the assumptions of homogeneous returns within an asset class and no mobility of households between wealth fractiles. By contrast, recent research measures the link between wealth and returns on administrative data, excluding saving flows from consideration (Bach Calvet and Sodini 2017). The joint analysis of saving flows, returns, and wealth accumulation therefore remains an open empirical question.

Earlier empirical research on wealth inequality has long been hampered by the difficulty of obtaining detailed information on the finances of households, especially in the wealthiest brackets that control a large share of national wealth. Consumption surveys, such as the U.S. Survey of Consumer Finances (SCF), do not provide wealth returns and largely underreport consumption in top brackets (Koijen et al., 2015). Widely used panels, such as the U.S. Panel Study of Income Dynamics (PSID), do not oversample the wealthy and provide limited information on returns. For these reasons, the present paper uses a high-quality registry dataset that exhaustively measures the distribution of saving flows, returns, and wealth of individuals, which allows us to disentangle the main drivers of wealth inequality.

We construct an extensive administrative panel containing the wealth records of Swedish residents between 2000 and 2007 from the Swedish Income and Wealth Registry, one of the most comprehensive sources on individual finances (Bach Calvet and Sodini 2017, Calvet Campbell and Sodini 2007). The panel compiles the income, debt level and disaggregated holdings of every individual on December 31st of each year, reported at the level of each bank account, financial security, private firm, and real estate property. For each asset, we obtain a precise measure of the total return realized during the following year from financial databases. This allows us to construct a very accurate measure of the *active saving flow*, defined as labor income minus taxes net of transfers minus consumption, as well as *total saving flow*, defined as capital gains plus the active saving flow. We also use the income data contained in the panel to impute consumption, as in Koijen et al. (2015), and thereby obtain a better understanding of the drivers of saving rates.

Our main variables of investigation are measures of saving scaled by net worth. Specifically, the *active saving rate* is the ratio of the active saving flow to net worth, and the *total saving rate* is the ratio of the total saving flow to net worth. As the budget constraint implies, an individual's total saving rate is the sum of the active saving rate and the return on her net wealth. These two saving rates play a key role in the analysis of wealth inequality. Since current income is the appropriate scaling factor in other economic contexts, we also report the ratios of the (active and total) saving flow to income in selected sections.

This paper makes several contributions to the literature. First, we document that as net worth increases, the saving flow represents on average a declining proportion of net worth. Specifically, the active saving rate decreases from 8% for the median bracket to -7% for the top 0.01%, while the total saving rate correspondingly declines from 23% to 8%. However, while active saving rates continuously decrease with wealth, the total saving flow is approximately linear in wealth within the top 10% of the distribution.

These trends are primarily driven by the fact that low net-worth individuals hold relatively more human capital than wealth. For these individuals, even a small saving flow (in absolute terms) out of labor income imply a large proportional increase in wealth. The other contributing factor is that richer individuals derive a far bigger share of their income from wealth returns because they invest in high risk and high return securities. As a result, a larger share of active income is allocated to consumption in higher brackets of the wealth distribution.

Second, we measure considerable dispersion in saving behavior. Across all individuals with positive net worth, the standard deviation of the annual active saving rate is close to 60%, which is an order of magnitude higher than the dispersion of wealth returns. A very large component of this dispersion comes from the diversity of the saving rate conditional on net worth: the standard deviation of the active saving rate remains above 30% per year even within tightly-defined wealth groups. Idiosyncratic dispersion in the active saving rate is high among poor individuals because their net worth is low relative to their human capital. At the top of the distribution, idiosyncratic dispersion in active saving rates is lower but remains substantial, in part due to the variability of saving flows among entrepreneurs.

Third, we investigate the implications of the heterogeneity of active saving flows for the dynamics of wealth inequality. Based on insights from the empirical wealth inequality literature (Saez and Zucman 2016; Garbinti, Goupille-Lebret and Piketty, 2017; Gomez, 2017), we develop a decomposition of the growth of wealth shares based on three key factors: (i) systematic differences in the average saving rate between wealth groups, (ii) idiosyncratic dispersion in the saving rate within each wealth group, and (iii) differences in demographics (i.e. birth and death) across wealth groups.

Differences in average saving rates between wealth groups should have implied a decrease in inequality over the over the 2000 to 2007 period. Instead, inequality has risen due to the large dispersion in the active saving rates which we document. We decompose the change in inequality into a return component and an active saving component, and find that the return component dominates. Active saving behavior only has a limited impact on inequality due to the conflicting effects of high active saving rates at the bottom and large heterogeneity in the active saving rate at the top.

To the best of our knowledge, our paper is the first to consider heterogeneity in saving rates across the entire distribution of net worth at the individual level. In the absence of individual data, Saez and Zucman (2016) measure saving aggregated at the level of fractiles of the U.S. wealth distribution. They construct synthetic saving flows as the difference between the observed evolution of the wealth held by a particular fractile and the evolution predicted by the capital gain returns earned by that fractile. Under these assumptions, saving rates are reported to be an increasing function of net worth. The main issue with such an approach is that it considers each wealth fractile as a homogeneous group of individuals. In practice, individuals regularly move from one fractile to another, which naturally boosts synthetic saving flows for fractiles at the top of the distribution (Gomez 2017) and likely explains why we reach a very different conclusion on the link between saving and wealth.

The paper provides key inputs for the calibration of equilibrium models seeking to explain the level and dynamics of wealth inequality (Benhabib et al. 2017; Hubmer et al. 2017; Kaymak and Poschke 2016). In order to match the observed wealth distribution, the calibrations consider either scale-dependent or type-dependent saving rates in the population. We establish that there is strong type-dependence but only weak scale-dependence of saving rates in individual registry data.

More generally, our results inform the literature on consumption, saving, and wealth along multiple dimensions. Early work specifies the saving flow either as an increasing fraction of (lifetime) income (Fisher 1930, Keynes 1936) or as a constant proportion of lifetime income (Friedman 1957) as income increases. Subsequent research refines these specifications by developing more precise lifecycle models (e.g., Gourinchas and Parker 2002), which generate approximate linearity. A key aggregation result, due to Krusell and Smith (1998), shows that when agents have CRRA utility and an infinite horizon, aggregate demand is approximately independent of the wealth distribution because individual saving is approximately linear in current wealth in top brackets (see also Benhabib et al. (2015) and Achdou et al. 2017). We measure approximately constant saving rates out of wealth at the top and thereby confirm Krusell and Smith's (1998) insight. The approximate linearity in the data invalidates models implying that the saving flow is a strictly convex function of wealth (Carroll, 2000). Moreover, our paper confirms that the active saving rate of the wealthiest individuals exhibit very large heterogeneity, which is consistent micro theories based on the heterogeneity of discount rates, family characteristics, or old-age risk exposures (Browning and Lusardi 1996; Lusardi et al., 2017). Last but not least, the forms of saving heterogeneity documented in the paper have profound implications for the sensitivity of aggregate demand to distributional shocks, and therefore for the dynamics of macroeconomic activity, capital formation, and asset prices. The relationships between saving, income and wealth are also crucially important for the efficiency and distributional impact of the tax system. We leave these issues for further research.

The rest of the paper is organized as follows. Section I describes the data and main variables. Section II documents the average active and total saving rates and their main determinants across different brackets of net worth. Section III investigates the heterogeneity of saving rates within each wealth bracket and their possible origins. Section IV offers an analytical decomposition of wealth inequality dynamics and derives the implications of our empirical findings for the dynamics of wealth inequality. Section V concludes.

I. Data and Definition of Variables

A. *Registry Data and Sample Selection*

The holdings of Swedish residents are available from the Swedish Income and Wealth Registry, which is compiled by Statistics Sweden from tax returns. The data include the worldwide assets and debt of each resident at year-end from 2000 to 2007. Our unit of observation is the individual rather than the household because the measurement of household saving flows is made difficult by the frequent occurrence of changes in household composition.

We select all individuals aged 20 or more. The sample includes 5.7 million observations per year representing, through sampling weights, 7.2 million Swedish individuals per year. Bank account balances, stock and mutual fund investments, private equity and real estate holdings are observed at the level of each account, security, or property.[1] Most wealth items are reported by third parties, which ensures high accuracy. Earlier research describes the Swedish Income and Wealth Registry in greater detail.[2]

B. Asset Returns

Pricing data on Nordic stocks and mutual funds are available from FINBAS, a financial database maintained by the Swedish House of Finance. FINBAS provides monthly returns, market capitalizations, and book values of publicly traded companies for the 1983 to 2009 period. For securities not covered by FINBAS, we use pricing information from Datastream and Morningstar. We proxy the return on financial assets with less than two years of price and dividend data by the return on financial assets with more than two years of available data.[3]

Real estate prices are computed by Statistics Sweden from two main sources. First, tax authorities assess the value of each property every five to ten years using detailed information on its characteristics. Second, Statistics Sweden collects data on all transactions, which permit the construction of sales-to-tax-value multipliers for different geographic locations and property types. The Statistics Sweden price data allow us to compute yearly capital gains. As in Bach, Calvet and Sodini (2017), we impute the rental yield (net of depreciation) on each property using an user cost of capital formula. Because the Swedish property market is characterized by very small transaction costs and rental contracts that are very protective of renters, the user cost-of-capital formula equates the rental yield with the interest rate on Swedish T-Bills.

Household debt costs are computed as follows. For each individual, we observe total debt outstanding at year end and the interest paid during the year. We proxy the individual's debt cost

[1] Bank account balances are reported if the account yields more than 100 Swedish kronor during the year (1999 to 2005 period), or if the year-end bank account balance exceeds 10,000 Swedish kronor (2006 and 2007). We impute unreported cash balances by following the method developed in Calvet, Campbell, and Sodini (2007).

[2] See Bach, Calvet, and Sodini (2017) and Calvet, Campbell and Sodini (2007).

[3] Assets with missing return data consist primarily of capital insurance and represent about 10% of total financial wealth during the sample period with little variation across wealth groups.

by the average interest payment made in years t and $t+1$ divided by total debt at the end of year t, winsorized at the 5% right tail.

For unlisted business equity, the measurement of valuations and returns must overcome the lack of regular price information. We follow the same steps as in Bach, Calvet and Sodini (2017) and use a standard methodology based on valuation multiples of listed firms in the same industrial sector as the unlisted firm of interest, with a substantial discount to account for the illiquidity of the shares (Damodaran 2012). The total return on the share of a private firm is the increase in valuation between two accounting exercises plus the net payout over the same period.

C. *Wealth Variables*

We use the following definitions throughout the paper. We measure an individual's gross financial wealth as the value of her bank accounts, mutual funds, stocks, and other investment vehicles (bonds, derivatives, and capital insurance). Real estate wealth consists of residential properties (primary and secondary residences) providing housing services to the individual, and commercial properties (rental, industrial, and agricultural properties) serving primarily as investment vehicles. Private equity includes all the shares of unlisted companies. Household debt is the sum of mortgages and all other liabilities.

We define *total gross wealth* as the sum of financial wealth, real estate wealth, and private equity. *Net wealth* (or *net worth*) is the difference between gross wealth and household debt. The wealth variables used in the paper are consistent with national accounts, except for the fact that we exclude consumer durables and funded and unfunded pension wealth for lack of available micro data.

Unless stated otherwise, an individual's *rank* will always refer to her position in the distribution of net wealth at the end of each calendar year. In Figure 1, we display the share of aggregate net worth held by various fractiles of the Swedish population on average between 2000 and 2007. The numbers obtained are very close to what has been found in other studies on Sweden, such as Roine and Waldenström (2009) and Bach, Calvet and Sodini (2017), despite the fact that we focus in this paper on individuals rather than households. In particular, there is very substantial wealth concentration in Sweden. For instance, the top 1% and the top 0.01% of the distribution hold on average 28.7% and 7.5%, respectively, of aggregate wealth during the sample period.

D. *Total and Active Saving*

The saving flow is a residual measure, defined as the difference between income and consumption. As Dynan et al. (2004) explain, there are in fact several definitions of saving because some income sources are easier to consume than others. It has been shown in various contexts that the marginal propensity to consume capital gains is small, regardless of whether the capital gains are earned from real estate (Fagereng et al., 2016) or more liquid financial securities (Baker et al., 2007; Di Maggio et al., 2017). Moreover, from a macroeconomic perspective, capital gains are not a source of income that can be reinvested in the economy. In practice, however, it can be difficult to distinguish capital gains from interest and dividends, either because interest and dividends are automatically reinvested (as is often the case with mutual funds and capital insurance products) or because individuals have substantial control over the dividend policies of the companies they own (as is typically the case for owners of private equity). In addition, financial theory suggests that a firm's dividend payout choice should be irrelevant to investors (Miller and Modigliani, 1961).

For these reasons, we use two definitions of the saving flow based on different measures of income. The first definition is based on the Haig-Simons income (Haig 1921, Simons 1938), an extensive measure that incorporates total wealth changes, including capital gains. The second definition only considers "active" income, defined as labor and pension income minus taxes net of transfers, excluding capital income. In the rest of the paper, we will refer to the first definition as the "total" saving flow and to the second definition as the "active" saving flow.

The total saving flow of individual i between the end of years t and $t+1$ is defined by:

$$S_{i,t+1}^{tot} = W_{i,t+1} - W_{i,t}. \tag{1}$$

The measurement of $S_{i,t+1}^{tot}$ only requires information on the stock of net wealth held at the end of each year.

The active saving flow is defined by:

$$S_{i,t+1}^{act} = W_{i,t+1} - (1 + r_{i,t+1}) W_{i,t}, \tag{2}$$

where $r_{i,t+1}$ denotes the total pre-tax return to wealth. The budget constraint implies that the active saving flow also satisfies

$$S_{i,t+1}^{act} = Y_{i,t+1}^{l} - T_{i,t+1} - C_{i,t+1}, \tag{3}$$

where $Y_{i,t+1}^{l}$ denotes labor income (including public and private pension income), $T_{i,t+1}$ taxes net of transfers (including pension contributions), and $C_{i,t+1}$ private consumption. The total saving flow is the sum of a return component and the active saving flow. Traditionally, active saving is measured directly using information on active income ($Y_{i,t+1}^{l} - T_{i,t+1}$) and consumption from surveys. The quality of the measure crucially depends then on the quality of consumption measurement, which is known to be poor at the top of the income and wealth distribution. For this reason, we follow a budget constraint approach inspired by the recent literature on consumption measurement (Koijen et al., 2015) and estimate active the saving flow from (2).

In order to measure saving intensity, we consider the *total saving rate*

$$s_{i,t+1}^{tot} = \frac{S_{i,t+1}^{tot}}{W_{i,t}}, \tag{4}$$

and the *active saving rate*

$$s_{i,t+1}^{act} = \frac{S_{i,t+1}^{act}}{W_{i,t}}. \tag{5}$$

Individual i's total saving rate is the sum of her active saving rate and wealth return:

$$s_{i,t+1}^{tot} = s_{i,t+1}^{act} + r_{i,t+1}, \tag{6}$$

as definitions (1) and (2) imply.

Our baseline saving rates (4) and (5) take the initial level of net wealth $W_{i,t}$ as the denominator.

The main benefit is that the impact of the saving flow on capital accumulation is easily comparable to the impact of the return on wealth (as measured for example in Bach, Calvet and Sodini, 2017). Wealth is also a more stable and less noisy measure than current income, especially in top brackets that control the bulk of aggregate wealth. Since current income is a more appropriate dominator in other applications, we will also report estimates of active saving in proportion to active income and total saving in proportion to active income plus capital gains. In all cases, we winsorize all ratios at the 1% level in order to limit the influence of outliers and we filter out observations for which the denominator is either zero or negative.

E. *Income, Taxes, and Consumption*

Saving out of capital income is closely tied to individual portfolio choice, which is thoroughly analyzed in Bach, Calvet and Sodini (2017). By contrast, this paper focuses on the determinants of active saving flows as well as potential interactions with wealth returns.

The active saving flow can be decomposed by asset class. Let $A_{i,t}^{FIN}$, $A_{i,t}^{RE}$, $A_{i,t}^{PE}$, and $L_{i,t}$ respectively denote individual i's financial assets, real estate assets, private equity assets, and liability at the end of year t. By equation (2), the active saving flow between t and $t+1$ is

$$\begin{aligned} S_{i,t+1}^{act} &= [A_{i,t+1}^{FIN} - (1 + r_{i,t+1}^{FIN})A_{i,t}^{FIN}] + [A_{i,t+1}^{RE} - (1 + r_{i,t+1}^{RE})A_{i,t}^{RE}] \\ &\quad + [A_{i,t+1}^{PE} - (1 + r_{i,t+1}^{PE})A_{i,t}^{PE}] - [L_{i,t+1} - (1 + r_{i,t+1}^{L})L_{i,t}] \end{aligned} \tag{7}$$

where $r_{i,t+1}^{FIN}$, is the total return on financial assets, $r_{i,t+1}^{RE}$ is the total return on real estate, $r_{i,t+1}^{PE}$ is the total return on private equity, and $r_{i,t+1}^{L}$ is the average liability cost between years t and $t+1$. The decomposition (7) focuses on the destination of the active saving flow and quantifies if it is used to purchase financial assets or real estate, invest in a private business or reduce household debt.

The asset class decomposition (7) contrasts with the decomposition in (3), which focuses on the sources of the active saving flow: labor and pension income, taxes and consumption. Each item in (3) can be separately estimated for each individual using income tax data and information on holdings and asset returns. Because consumption is then estimated as a residual it also includes durables and inter vivos gifts to and from family members.[4] In the next section, we estimate both decompositions on our panel.

II. How Do Saving Rates Vary Across Wealth Brackets?

This section investigates how saving rates vary across brackets of net worth.

A. *Saving Rates*

In Figure 2 and Table I, we provide estimates of the shape of the relationship between saving rates and net worth. In each column, we regress (1) the active saving rate and (2) the total saving rate, respectively, on dummy variables for quantiles of net worth. The estimation is conducted on individuals in the 40th percentile and above.

For the median individual, the active saving flow represents on average 8.6% of initial net wealth, while the total saving flow is on average 23.4% of net wealth. The active and total saving rates both decline very strongly with net worth, until one enters the last decile of the distribution: the active and total saving rates are equal to -4.3% and 6.4%, respectively, for the top 10%-5%. A negative active saving rate indicates that capital income (including rents to owner-occupied housing) is consumed. This is on average the case starting with individuals in the seventh decile of the distribution.

Within the last decile, saving rates do not vary as strongly as in the rest of the distribution. The active saving rate slightly decreases, reaching -7.1% for the top 0.01%, while the total saving rate increases slightly to 7.7% for the top 0.01%. Overall, saving flows are almost linear in wealth within the top decile, where most of aggregate wealth lies, consistent with Krusell and Smith's (1998) seminal aggregation result.

[4] If received gifts are large enough, consumption may even sometimes turn out to be negative.

B. Sources of Individual Saving Flows

In Table II, we investigate the various sources of saving across net worth brackets. We consider (1) the consumption-to-net wealth ratio, (2) labor income (net of all taxes) divided by net wealth, (3) total income (net of all taxes) divided by net wealth, (4) the active saving flow divided by active income, (5) the total saving flow divided by total income, (6) taxes divided by net wealth, (7) taxes divided by active income, and (8) taxes divided by total income.

As columns 1 to 3 show, the median individual consumes in a given year about 190% of her wealth. She earns a labor income representing 200% of her wealth and a total (labor and capital) income representing 213% of her wealth (columns 1 to 3). These large numbers reflect the fact that the median individual owns very little wealth, in particular relative to human capital.

The consumption-to-wealth ratio declines monotonically with net worth (column 1). Individuals in the top 0.01% consume on average 7% of net worth. However, within the top 1% there are no distinguishable differences in the propensity to consume out of wealth. These results suggest that there is no absolute ceiling in the amount that can be consumed.

Labor income represents an ever smaller share of wealth in richer brackets of the population, reaching a low of -0.2% for the top 0.01% (column 2). By contrast, total income is on average 18% of net worth for the top 0.01% (column 3), a value that is approximately the same as the average computed for the entire top 5% of the wealth distribution. This stability is due to two opposite forces, which are of about equal strength within the top 5%. On the one hand, human capital becomes smaller relative to wealth as one considers richer individuals, so that labor income becomes relatively tiny. On the other hand, the rich invest in higher risk and higher return securities (Bach Calvet and Sodini, 2017), so that average wealth returns increase with net worth.

In columns 4 and 5, we report saving as a fraction of income (and exclude observations with a negative income). The median individual saves on average 9.3% of active income and 12.4% of total income. The total saving flow has strikingly different properties than consumption.

Columns 6 to 8 document the impact of personal taxes net of transfers, including capital income taxes and the wealth tax. The median individual pays on average 54.7% of her wealth in taxes; this represents -4.8% of her active income before taxes and -92.4% of her total income before taxes. Tax payments in proportion to wealth decline very quickly with net worth: the top 0.01% pay only 1.3% of their wealth in taxes every year. In other words, if wealth is considered an appropriate measure of ability to pay, the Swedish tax system is regressive, despite the presence of a substantial wealth tax. This is in large part due to the fact that active income is more taxed than capital income in Sweden. The top 0.01% pay 73.8% of their gross active income in taxes, far more than the median individual, but these payments represent only 10.5% of their gross total income (conditional on it being positive), which is a lower rate than for the upper middle brackets (around 18% for the 60th to 99.9th bracket).

C. *Allocation of Individual Saving Flows*

In Table III, we report the allocation of individual saving flows across brackets of net worth. For each individual, we compute the decomposition of saving into (1) financial asset investments, (2) real estate investments, (3) private equity investments, and (4) debt repayment, all expressed relative to initial net worth, as defined in equation (7). These quantities can of course be negative for individuals who disinvest from a particular class or increase their debt.

The median individual invests on average most of her active saving flow in real estate (8.8% of initial wealth). She borrows the equivalent of 4.3% of initial net wealth during the year, presumably to finance real estate purchases. Investments in financial assets and private equity are more marginal, amounting to, respectively, 1% and 1.7% of initial wealth.

Richer individuals invest a much lower fraction of active saving flows in real estate,[5] in part because the rents from owner-occupied housing are automatically consumed. They take on less debt as a result. To meet their consumption needs, the wealthy are also more likely to liquidate some of their financial wealth and divest some of their private equity holdings, possibly through the award of substantial dividends to themselves. The latter behavior is particularly prevalent among

[5] Individuals in the top 40% of the net worth distribution actually *divest* from real estate.

the top 0.1%, who divest on average 4% of their wealth away from the private firms they own.

Overall, there are systematic differences between the rich and poor in terms of how much they save, where their saving flows are coming from and where they are reinvested. If anything, these differences should lead to a gradual decrease in inequality over time, which is clearly counterfactual. In the next section, we investigate to what extent the division of the population between homogeneous wealth groups hides substantial idiosyncratic dispersion in saving that could further explain the dynamics of inequality we actually observe.

III. Heterogeneity of Individual Saving Flows

In this section, we investigate the heterogeneity of saving rates in the population, both unconditionally and conditional on net worth.

A. *Dispersion of Saving Rates*

Figure 3 and Table IV provide estimates of the cross-sectional standard deviation of saving rates across the population and within specific wealth brackets. Specifically, we report the cross-sectional standard deviation of (1) the active saving rate, (2) the total saving rate, and (3) the correlation coefficient between the active saving rate and the return to wealth.

The population of individuals with positive net worth exhibits considerable dispersion in saving rates. The standard deviation of the annual active saving rate is 58.5%, which is very large and barely below the standard deviation of total saving rates, which is equal to 61.7%.[6]

We also consider the "idiosyncratic" dispersion of saving rates, which we define as dispersion conditional on initial wealth. As the simulations in Bach, Calvet and Sodini (2017) and the theoretical discussion in Gomez (2017) show, the wealth inequality dynamics are primarily driven by the

[6]As column 3 of Table IV shows, the correlation between active saving rates and returns to wealth is close to zero. This means that the variance of total saving rates is approximately equal to the sum of the variance in returns and the variance in active saving rates.

idiosyncratic dispersion of accumulation rates. Table IV documents that the idiosyncratic dispersion in saving rates is also very large. Among households within the fifth decile of the distribution of wealth, the standard deviations of active and total saving rates are equal to 94% and 100.2%, respectively. This means that many members of the fifth decile will have left this fractile by the end of the year. Idiosyncratic dispersion in saving rates gradually declines as one considers upper fractiles, until one reaches the 98th centile of the distribution. The standard deviation of active and total saving rates is equal to 29.3% and 32.0%, respectively, for the fractile P95-P97.5. Comparing the volatility of active versus total saving rates, it appears that up until the 98th centile of wealth, a large part of the idiosyncratic dispersion in accumulation rates is due to dispersion in active saving rates rather than dispersion in returns.

An opposite trend emerges in the top 2% of the net worth distribution. The standard deviations of active and total saving rates goes up again and reaches the level of 36.8% and 48.2%, respectively, among the top 0.01% of the distribution. These high levels of dispersion imply that there is substantial wealth mobility within the very top of the distribution and that this may significantly accelerate the growth of inequality in that part of the distribution. Contrary to lower parts of the distribution, a substantial part of the dispersion in total saving rates comes from idiosyncratic dispersion in returns, whose origins are discussed at length in Bach, Calvet and Sodini (2017); yet, at the same time, dispersion in active saving rates remains very high and retains a key role for inequality at the very top.

B. *Dispersion of Saving Sources*

In Table V, we investigate the dispersion of saving sources, which sheds light on the determinants of the high dispersion of saving rates. We report the cross-sectional standard deviation of (1) consumption divided by net worth, (2) active income divided by net worth, (3) total income divided by net worth, (4) the correlation of consumption and active income, and (5) the correlation of consumption and total income.

The consumption-to-wealth ratio is very heterogeneous in the population, with a cross-sectional standard deviation of 94%. However, even though there is also substantial dispersion in the income-to-wealth ratio, the dispersion of saving is not much higher than the dispersion of consumption because income and consumption are very correlated.[7]

Within brackets of net worth, the dispersion of income and consumption remains high, especially among the lowest deciles. At the high end of the population, the consumption-to-wealth ratio is very dispersed, with a standard deviation always above 30%, which helps to understand why saving rates remain so volatile at the very top. The other reason is that the correlation between either active or total income and consumption becomes weaker and weaker as one considers higher ranks in the distribution of net wealth. This is a reflection of the well-known fact that the marginal propensity to consume declines with wealth. As a result, saving rates at the very top of the distribution inherit the volatility of both consumption and income in an almost additive way.

C. Dispersion of Saving Allocations

In Table VI, we report the cross-sectional standard deviation of the active saving flow allocated to (1) financial wealth, (2) real estate, (3) private equity, (4) debt repayment, all expressed as a proportion of net worth. Column 5 provides the correlation between the active saving flow to real estate and the active saving flow to debt repayment.

The four components of saving flows are highly dispersed across the entire population as well as within each net worth bracket. Real estate investments and debt repayments generate most of the heterogeneity in saving rates among the lowest deciles, but become less important in higher brackets. At the very top, the dispersion in active saving flows originates primarily from the diversity of private equity investments, consistent with the fact that dividend payouts and capital injections tend to be lumpy for private firms (Michaely and Roberts 2012).

Overall, the idiosyncratic dispersion of saving rates is very large and usually exceeds the idiosyncratic dispersion of wealth returns. Both forms of heterogeneity can generate extreme fortunes and can therefore thicken the right tail of the wealth distribution. By contrast, the negative

[7] The correlation coefficient is equal to 0.75.

correlation of active saving and net wealth documented in Section II has the potential to reduce inequality. In order to quantify the respective impact of these various mechanisms, we develop in the next section a decomposition of the wealth inequality dynamics.

IV. From Saving Flows to Wealth Inequality Dynamics

The previous sections thoroughly describe the moments of the distribution of saving rates. We now assess their respective contributions to the dynamics of wealth inequality.

A. *A Decomposition of Wealth Share Growth into Demographic, Saving, and Turnover Effects*

We develop a decomposition of the growth of the wealth share held by a fractile f of the distribution of net worth. The starting point is the wealth accumulation equation for individual i between year t and year $t+1$:

$$W_{i,t+1} = (1 + s^{tot}_{i,t+1})\, W_{i,t}, \tag{8}$$

which follows directly from the definition of the total saving rate, $s^{tot}_{i,t+1}$, in equation (4).

In order to analyze the growth of wealth share held by fractile f, we must take into account the turnover of individuals in the fractile. Some individuals drop out of the fractile in year $t+1$ because they pass away or migrate to a different fractile. Others enter fractile f in year $t+1$ because they join the adult population for the first time or migrate to f from a different fractile. For these reasons, it is useful to consider the following definitions:

- $W_{f,t+1}$: total net worth at the end of year $t+1$ held by individuals belonging to fractile f at the end of year $t+1$,
- $\widetilde{W}_{f,t+1}$: total net worth at $t+1$ held by individuals that belong to fractile f at t and are still alive at $t+1$,

- $W_{f,t}^{dead}$: wealth at t held by members of fractile f who pass away between t and $t+1$,
- $W_{f,t+1}^{born}$: wealth at the end of year $t+1$ held by members of fractile f who join the population during year $t+1$.

The individual accumulation equation (8) implies that

$$\widetilde{W}_{f,t+1} = \sum_{i \in f \text{ at } t} (1 + s_{i,t+1}^{tot}) \, W_{i,t} \, \mathbb{I}_{i \text{ alive at } t+1}, \tag{9}$$

where $\mathbb{I}_{i \text{ alive at } t+1}$ is a dummy variable equal to unity if individual i is alive at the end of year $t+1$. We infer from (9) that

$$\widetilde{W}_{f,t+1} = (W_{f,t} - W_{f,t}^{dead}) \, (1 + s_{f,t+1}^{tot}) \tag{10}$$

where $s_{f,t+1}^{tot} = \left(\sum_{i \in f \text{ at } t} s_{i,t+1}^{tot} \, W_{i,t} \, \mathbb{I}_{i \text{ alive at } t+1}\right) / \left(\sum_{i \in f \text{ at } t} W_{i,t} \, \mathbb{I}_{i \text{ alive at } t+1}\right)$ is the wealth-weighted average active saving rate of surviving members between t and $t+1$. As Gomez (2017) shows, $\widetilde{W}_{f,t+1}$ is close to $W_{f,t+1}$ if two sufficient conditions are fulfilled. First, members of a given fractile f at the end of year t who are still alive at the end of year $t+1$ must behave in sufficiently similar ways in terms of saving and the more so as the average wealth in each fractile is close to its lower and upper bounds. Second, there must be no arrival and departure of individuals to and from the overall population. In practice, there are many births and deaths and we have documented there is substantial heterogeneity in saving across members of the same wealth group. The distinction between $\widetilde{W}_{f,t+1}$ and $W_{f,t+1}$ is therefore important.

Following the terminology of Saez and Zucman (2016), we define the *synthetic saving flow* accumulated by fractile f between t and $t+1$ by

$$S_{f,t+1}^{synt} = W_{f,t+1} - W_{f,t+1}^{born} - \widetilde{W}_{f,t+1}. \tag{11}$$

The synthetic saving flow is zero if individuals stay in fractile f all their lives, as is the case if the fractile contains the entire population.[8] By contrast, the synthetic saving flow is positive if new entrants are wealthier on average than individuals who leave the fractile between t and $t+1$.

[8] The same condition implies that synthetic saving flows to top fractiles decrease in volume as inequality worsens.

Using these concepts, we can decompose the growth rate of the wealth held by individuals in the fractile. Consider the synthetic saving rate $s^{synt}_{f,t+1} = S^{synt}_{f,t+1}/(W_{f,t} - W^{dead}_{f,t})$, the wealth birth rate $b_{f,t+1} = W^{born}_{f,t+1}/W_{f,t+1}$, and the wealth death rate $d_{f,t+1} = W^{dead}_{f,t}/W_{f,t}$. By equations (10) and (11), the fractile's net wealth grows at the rate:

$$\frac{W_{f,t+1}}{W_{f,t}} = \frac{1-d_{f,t+1}}{1-b_{f,t+1}} \left(1 + s^{tot}_{f,t+1} + s^{synt}_{f,t+1}\right). \tag{12}$$

It is high if the death rate is low, the birth rate is high, individuals in the fractile at date t have high saving rates, and turnover contributes positively to the wealth of the fractile. At the national level, the synthetic saving flow is equal to 0, and aggregate wealth W_t grows at the rate:

$$\frac{W_{t+1}}{W_t} = \frac{1-d_{t+1}}{1-b_{t+1}} \left(1 + s^{tot}_{t+1}\right), \tag{13}$$

where b_{t+1}, d_{t+1} and s^{tot}_{t+1} are economy-wide wealth birth, wealth death and total saving rates.

The share of fractile f is $\text{Share}_{f,t} = W_{f,t}/W_t$. The growth rate of the share of fractile f,

$$1 + g_{f,t+1} = \frac{\text{Share}_{f,t+1}}{\text{Share}_{f,t}},$$

can be decomposed as

$$1 + g_{f,t+1} = \frac{1-d_{f,t+1}}{1-d_{t+1}} \frac{1-b_{t+1}}{1-b_{f,t+1}} \left(1 + \frac{s^{tot}_{f,t+1} - s^{tot}_{t+1}}{1+s^{tot}_{t+1}} + \frac{s^{synt}_{f,t+1}}{1+s^{tot}_{t+1}}\right),$$

as equations (12) and (13) imply. When birth rates and death rates are small, the growth rate of the share of fractile f is therefore approximately given by

$$g_{f,t+1} \approx \underbrace{NB_{f,t+1}}_{\text{Net Birth}} + \underbrace{\frac{s^{tot}_{f,t+1} - s^{tot}_{t+1}}{1+s^{tot}_{t+1}}}_{\substack{\text{Differences in} \\ \text{Saving Rates}}} + \underbrace{\frac{s^{synt}_{f,t+1}}{1+s^{tot}_{t+1}}}_{\text{Turnover}} \tag{14}$$

where $NB_{f,t+1} = (b_{f,t+1} - d_{f,t+1}) - (b_{t+1} - d_{t+1})$ denotes the impact of net birth.[9] The share of the fractile grows quickly if (i) the fractile has a higher birth rate and a lower death rate than the overall population, (ii) individuals in the fractile at t have higher saving rates than individuals in other fractiles, and (iii) turnover contributes positively to the wealth of the fractile. We will henceforth refer to channel (ii) as the systematic dispersion in saving rates and to channel (iii) as the idiosyncratic dispersion in saving rates.

In Table VII and Figure 4, we estimate the decomposition of wealth share growth rates, given by equation (14), on the full sample of Swedish residents (including those with negative wealth). Individuals are sorted into nine fractiles. For each fractile, we report the average wealth share (column 1) as well as the average and time series standard deviation of the wealth share growth rate (columns 2 and 3), saving rate differential (columns 4 and 5), turnover effect (columns 6 and 7), and net birth effect (columns 8 and 9).

Over the 2000 to 2007 period, the wealth share of the bottom 80% is close to 17% and grows by about 1.4% per year, albeit with substantial volatility (6% per year). The share of the top 20%-0.1% declines by about 1% per year, with a lower level of annual volatility. The shares of the top 0.1%-0.01% and the top 0.01%, which are on average 7.2% and 7.5% respectively, both grow during the 2000 to 2007 period. The increase is most pronounced for the top 0.01%, whose share grows at the average rate of 5.6% per year during the period. The time series standard deviation is also most pronounced for the top 0.01% (12.0% per year).

The decomposition allows us to understand the mechanisms driving the growth rate of wealth shares. Differences in birth rates and death rates across fractiles play a negligible role in explaining wealth share dynamics, as column 8 shows.

Systematic differences in total saving rates contribute to slow down wealth inequality (column 4). In the absence of other channels, individuals in the bottom 80% of the distribution of net wealth would have increased their share of aggregate wealth by a staggering 18% per year between 2000 and 2007 through higher total saving rates. The wealth share of the other fractiles (all in the

[9]In a recent paper, Gomez (2017) derives a similar decomposition in the context of a continuous-time model of wealth accumulation.

top quintile) would have declined by about 3% to 4% per year. These results provide a striking illustration of the equalizing impact of systematic differences in total saving rates.

The idiosyncratic dispersion of saving rates is large enough to generate extensive turnover between fractiles (column 6). Turnover reduces the growth rate of the wealth share held by the bottom four quintiles by 17% per year on average, which almost fully offsets the equalizing impact of high saving rates. As households from the bottom four quintiles get wealthier, they migrate to higher fractiles and thereby deplete the wealth held by the bottom 80%. Upwardly mobile individuals are replaced by individuals with slow or negative accumulation rates from upper fractiles.

Turnover has the opposite effect on higher fractiles. It boosts the share of the top 0.01% by over 9% per year, which largely dominates the negative impact of low total saving rates (-4%). Thus, the fast growth of top wealth shares is driven to a large extent by "new money," that is by individuals with fast growing wealth from lower fractiles. We now investigate the origins of this fast growth.

B. *Disentangling the Roles of Wealth Return and Active Saving*

The decomposition of wealth share growth in (14) provides useful intuition on the mechanics of saving and wealth inequality. The analysis is based on total saving and therefore does not distinguish between active saving decisions and portfolio choice. We now develop a refined decomposition of the wealth share growth that disentangles these channels.

The total saving rate of an individual is the sum of the active saving rate and wealth return (see equation (6)). The accumulation equation (8) can therefore be rewritten as

$$W_{i,t+1} = (1 + r_{i,t+1} + s^{act}_{i,t+1})\,W_{i,t}, \tag{15}$$

where $r_{i,t+1}$ is the wealth return between t and $t+1$ and $s^{act}_{i,t+1}$ is the active saving rate.

The average total saving rate of individuals belonging to the fractile at t and alive at $t+1$, which is one of the key components of the growth equation (14), can be decomposed as

$$s^{tot}_{f,t+1} = s^{act}_{f,t+1} + r_{f,t+1}$$

where $s^{act}_{f,t+1}$ is the average active saving rate, and $r_{f,t+1}$ is the average wealth return.[10] The impact of systematic saving rates in equation (14) can therefore be decomposed as:

$$\frac{s^{tot}_{f,t+1} - s^{tot}_{t+1}}{1+s^{tot}_{t+1}} = \frac{s^{act}_{f,t+1} - s^{act}_{t+1}}{1+s^{tot}_{t+1}} + \frac{r_{f,t+1} - r_{t+1}}{1+s^{tot}_{t+1}} \tag{16}$$

where s^{act}_{t+1} and r_{t+1} respectively denote the average saving rate and average return in the entire population.

We next decompose the synthetic saving defined by (11) into active saving and return components. We generate two virtual trajectories for the wealth at year $t+1$ of individuals in fractile f at t :

$$W^{r}_{i,t+1} = (1 + r_{i,t+1} + s^{act}_{f,t+1})\, W_{i,t},$$
$$W^{act}_{i,t+1} = (1 + r_{f,t+1} + s^{act}_{i,t+1})\, W_{i,t},$$

for every $i \in f$ at t. The definition of $W^{r}_{i,t+1}$ assumes that initial members of fractile f share the same active saving rate but earn their heterogeneous empirical individual returns. Conversely, the definition of $W^{act}_{i,t+1}$ assumes that the fractile's initial members share the same return but have their individual active saving rates.

Based on these two virtual levels of wealth at the end of year $t+1$, we rank all individuals and create two alternative wealth groupings f^r and f^{act} using as fractile bounds the same quantiles as for the f grouping. We can then define the two corresponding measures of synthetic saving flows:

$$S^{synt\_r}_{f,t+1} = \sum_{i \in f^r \text{ at } t+1} W^{r}_{i,t+1}\, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1} - \sum_{i \in f \text{ at } t} W_{i,t+1}\, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1}, \tag{17}$$

[10]The variables $s^{act}_{f,t+1}$ and $r_{f,t+1}$ are given by $s^{act}_{f,t+1} = (\sum_{i\in f \text{ at } t} s^{act}_{i,t+1} W_{i,t}\, \mathbb{I}_{i\text{alive at } t+1})/(\sum_{i\in f \text{ at } t} W_{i,t}\, \mathbb{I}_{i \text{ alive at } t+1})$ and $r_{f,t+1} = (\sum_{i\in f \text{ at } t} r_{i,t+1} W_{i,t}\, \mathbb{I}_{i\text{alive at } t+1})/(\sum_{i\in f \text{ at } t} W_{i,t}\, \mathbb{I}_{i \text{ alive at } t+1})$.

$$S_{f,t+1}^{synt\_act} = \sum_{i \in f^{act} \text{ at } t+1} W_{i,t+1}^{act} \, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1} - \sum_{i \in f \text{ at } t} W_{i,t+1} \, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1}. \tag{18}$$

The first measure, $S_{f,t+1}^{synt\_r}$, quantifies the impact of heterogeneous returns on turnover, while the second measure, $S_{f,t+1}^{synt\_act}$, quantifies the impact of heterogeneous active saving rates on turnover. We will refer to these two measures as "partial" synthetic saving flows, since each measure only takes into account a single form of heterogeneity.

A better understanding of partial synthetic saving flows can be achieved by observing that:

$$\begin{aligned}
\sum_{i \in f \text{ at } t} W_{i,t+1} \, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1} &= \sum_{i \in f \text{ at } t} (1 + r_{i,t+1} + s_{i,t+1}^{act}) \, W_{i,t} \, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1} \\
&= \sum_{i \in f \text{ at } t} W_{i,t+1}^{r} \, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1},
\end{aligned}$$

as the definition of $s_{f,t+1}^{act}$ implies. The partial synthetic flow $S_{f,t+1}^{synt\_r}$ can therefore be rewritten as:

$$S_{f,t+1}^{synt\_r} = \left(\sum_{i \in f^{r} \text{ at } t+1} - \sum_{i \in f \text{ at } t} \right) W_{i,t+1}^{r} \, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1}, \tag{19}$$

It is equal to zero if there is no turnover, that is if the set of individuals who belong to the fractile f at t and are alive at $t+1$ coincides with the set of individuals who are alive at t and belong to the fractile f^r at $t+1$. The absence of turnover holds for instance if the fractile f contains the entire population or if every individual in the population sets the active saving rate equal to $s_{f,t+1}^{act}$ and earns a return equal to $r_{f,t+1}$. By contrast, the synthetic saving rate $S_{f,t+1}^{synt\_r}$ corresponding to a top share (say the top 1%) is positive if new entrants have higher wealth at $t+1$ (due to higher returns or possibly the higher average saving rates of other fractiles) than households originally in the top 1%. Since saving rates are relatively flat at the top, the synthetic saving flow is nonnegative and primarily driven by the heterogeneity of returns. Similarly, the synthetic saving flow $S_{f,t+1}^{synt\_act}$ is driven by turnover and is generally positive at the top.

We now reconsider the synthetic saving flow generated by heterogeneity in active saving rates and returns (defined in equation (11)). Given (17), we can rewrite it as:

$$S_{f,t+1}^{synt} = S_{f,t+1}^{synt\_r} + \tilde{S}_{f,t+1}^{synt\_act},$$

where $S_{f,t+1}^{synt\_r}$ defined in equation (17) is the synthetic flow that only takes into account the heterogeneity of individual returns, and

$$\tilde{S}_{f,t+1}^{synt\_act} = \sum_{i \in f \text{ at } t+1} W_{i,t+1}\, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1} - \sum_{i \in f^r \text{ at } t+1} W_{i,t+1}^{r}\, \mathbb{I}_{i \text{ alive at } t \text{ and } t+1}$$

is the synthetic saving flow that also takes into account the heterogeneity of active saving rates. When returns are only weakly correlated, the flow $\tilde{S}_{f,t+1}^{synt\_act}$ is approximately equal to the partial flow $S_{f,t+1}^{synt\_act}$ previously defined in equation (18), which starts from individuals in the fractile at t and only takes the heterogeneity of saving rates into account. The synthetic saving flow then satisfies $S_{f,t+1}^{synt} \approx S_{f,t+1}^{synt\_r} + S_{f,t+1}^{synt\_act}$. In practice, the sum of $S_{f,t+1}^{synt\_r}$ and $S_{f,t+1}^{synt\_act}$ may differ from $S_{f,t+1}^{synt}$ because the possible nonzero correlation between active saving rates and returns.[11]

We define the *residual synthetic saving flow* $S_{f,t+1}^{synt\_res}$ as the difference between the total synthetic saving flow and the sum of the partial synthetic saving flows:

$$S_{f,t+1}^{synt\_res} = S_{f,t+1}^{synt} - S_{f,t+1}^{synt\_r} - S_{f,t+1}^{synt\_act}.$$

We denote by $s_{f,t+1}^{synt\_r}$, $s_{f,t+1}^{synt\_act}$, and $s_{f,t+1}^{synt\_res}$, the ratios of saving flow measures divided by the initial stock of wealth of fractile f.[12] They satisfy

$$s_{f,t+1}^{synt\_r} + s_{f,t+1}^{synt\_act} + s_{f,t+1}^{synt\_res} = s_{f,t+1}^{synt} \tag{20}$$

by construction.

We may then include those various saving flow measures in the inequality growth equation

[11] Column 3 of Table IV shows that this correlation is rather small, except in the bottom of the distribution where highly leveraged individuals draw high returns and at the same time have high active saving flows because they wish to reimburse their debt.

[12] That is, $s_{f,t+1}^{synt\_r} = S_{f,t+1}^{synt\_r} / W_{f,t}$.

(14). Equations (16) and (20) imply that

$$
\begin{aligned}
g_{f,t+1} \simeq \; & \underbrace{NB_{f,t+1}}_{\substack{\text{Net Birth}}} + \underbrace{\frac{r_{f,t+1}-r_{t+1}}{1+s^{tot}_{t+1}}}_{\substack{\text{Systematic} \\ \text{Return Dispersion}}} + \underbrace{\frac{s^{act}_{f,t+1}-s^{act}_{t+1}}{1+s^{tot}_{t+1}}}_{\substack{\text{Systematic Active} \\ \text{Saving Dispersion}}} \\
& \underbrace{\frac{s^{synt\,r}_{f,t+1}}{1+s^{tot}_{t+1}}}_{\substack{\text{Idiosyncratic} \\ \text{Return Dispersion}}} + \underbrace{\frac{s^{synt\,act}_{f,t+1}}{1+s^{tot}_{t+1}}}_{\substack{\text{Idiosyncratic Active} \\ \text{Saving Dispersion}}} + \underbrace{\frac{s^{synt\,res}_{f,t+1}}{1+s^{tot}_{t+1}}}_{\substack{\text{Residual Idiosyncratic} \\ \text{Saving Dispersion}}}
\end{aligned}
\tag{21}
$$

The six terms in equation (21) can be estimated on our panel.

In Table VIII and Figure 5, we report estimates of the decomposition (21) across brackets of net worth. Return and active saving play very different roles in explaining inequality. The correlation between returns and wealth (column 1) and the idiosyncratic dispersion in returns (column 5) increase the share going to the top 0.1% of the distribution but also the share going to the bottom 80%, as shown in Bach, Calvet and Sodini (2017). The correlation between active saving and wealth (column 3) strongly increases the share going to the bottom of the distribution and decreases the share going to the top 0.1% at a faster rate than for the rest of the top quintile. The idiosyncratic dispersion in active saving rates (column 7) has a symmetrically opposite effect, as it greatly reduces the growth in the share going to the bottom 80% and strongly increases the growth of top wealth shares. The residual mobility effect (column 13) slightly increases the share going to the bottom 80%, but has overall little effect on the shape of the distribution.

Summing up the effects of systematic and idiosyncratic dispersion, as is done in columns 9 and 11 respectively for returns and active saving rates, the dispersion in active saving rates contributes to the acceleration of inequality in all parts of the distribution of wealth, but the dispersion in returns has an effect of larger magnitude, especially at the bottom and at the top of the distribution, as was already described by Bach, Calvet and Sodini (2017). Finally, from a close look at the standard deviation of our estimates it turns out that with our seven years of data the only parameter that is imprecisely estimated is the systematic dispersion in returns. This is why in Bach, Calvet and Sodini (2017) we use an asset pricing model to provide more solid estimates of this component. Thankfully, the results from that approach are not very different from what we see in the data on historical returns from 2000 to 2007. We may therefore consider all our results to be precise and apply to other contexts and other periods.

V. Conclusion

This paper uses a high-quality administrative panel to analyze the saving flows of Swedish individuals and their impact on the dynamics of wealth concentration. We document that saving rates in proportion to wealth are negatively correlated with wealth in the lower parts of the distribution but roughly constant in the top decile, where most of the wealth is concentrated. However, active saving does not slow down inequality, due to its very high idiosyncratic dispersion.

These results suggest that the rich do not as a group seem to have a specific taste for wealth accumulation. At the same time, they provide backing for inequality models based on heterogeneity in either returns to wealth or preferences for saving. It is still to be assessed where this heterogeneity is coming from, preferences, bequests or chance, as this would be key in order to determine the tax implications of our results. Since saving is so heterogeneous even conditional on wealth, it may also have an impact on wealth mobility that is much stronger than previously thought.

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Table I
Saving Rates

This table reports the average individual saving intensity in different brackets of the net wealth distribution in Sweden between 2000 and 2007. We consider: (1) the ratio of active saving over net worth at the beginning of the year, and (2) the ratio of total saving over net worth at the beginning of the year. Active saving is defined as active income minus consumption. Active income is equal to labor and pension income minus taxes net of transfers. Total saving is defined as active saving flows plus capital income. Saving rates are winsorized at the 1% level. Each column is based on the regression of the explained characteristic on net worth bracket dummies and year fixed effects. The sample includes all Swedish individuals with positive net worth above the 40th percentile of the distribution of net wealth.

	Active Saving to Wealth (1)	Total Saving to Wealth (2)
Wealth Group		
P40-P50	8.6%	23.4%
P50-P60	3.1%	17.2%
P60-P70	-0.5%	12.2%
P70-P80	-2.6%	9.1%
P80-P90	-3.7%	7.3%
P90-P95	-4.3%	6.4%
P95-P97.5	-4.6%	6.0%
P97.5-P99	-4.8%	5.8%
P99-P99.5	-4.7%	5.9%
P99.5-P99.9	-5.0%	6.2%
P99.9-P99.99	-6.0%	6.7%
Top 0.01%	-7.1%	7.7%

Table II
Sources of Saving

This table reports the average consumption intensity and the average income-to-wealth ratio in different brackets of the net wealth distribution in Sweden between 2000 and 2007. We consider: (1) the ratio of consumption over net worth at the beginning of the year, (2) the ratio of active income over net worth at the beginning of the year, (3) the ratio of total income over net worth at the beginning of the year, (4) the ratio of active saving over active income, (5) the ratio of total saving over total income, (6) the ratio of personal taxes (net of transfers) over net worth at the beginning of the year, (7) the ratio of personal taxes (net of transfers) over gross active income, and (8) the ratio of personal taxes (net of transfers) over gross total income. Active saving is defined as active income minus consumption. Total saving is defined as active saving plus latent and realized capital gains. Active income is equal to labor and pension income minus taxes net of transfers. Total income is equal to active income plus capital income. Gross (active or total) income is equal to (active or total) income plus taxes. All ratios are winsorized at the 1% level and set as missing when the denominator is negative. Each column is based on the regression of the explained characteristic on net worth bracket dummies and year fixed effects. The sample includes all Swedish individuals with positive net worth above the 40th percentile of the distribution of net wealth.

	Consumption to Wealth	Active Income to Wealth	Total Income to Wealth	Active Saving to Income	Total Saving to Income	Taxes to Wealth	Taxes to Gross Active Income	Taxes to Gross Total Income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Wealth Group								
P40-P50	189.1%	199.4%	213.4%	2.5%	7.6%	54.0%	11.7%	12.4%
P50-P60	91.7%	93.7%	107.6%	-3.1%	9.4%	29.9%	17.3%	16.8%
P60-P70	52.0%	50.6%	63.2%	-12.8%	10.0%	17.7%	20.4%	18.5%
P70-P80	32.8%	29.8%	41.5%	-25.4%	11.2%	11.4%	22.3%	18.9%
P80-P90	21.4%	17.6%	28.6%	-42.7%	13.4%	7.5%	24.2%	18.9%
P90-P95	15.0%	10.7%	21.5%	-65.0%	17.0%	5.2%	26.0%	18.4%
P95-P97.5	11.9%	7.2%	18.0%	-95.7%	19.7%	4.2%	28.6%	18.2%
P97.5-P99	9.6%	4.9%	15.9%	-137.5%	21.8%	3.6%	34.4%	18.4%
P99-P99.5	7.9%	3.1%	14.7%	-197.3%	26.5%	3.2%	43.1%	18.1%
P99.5-P99.9	6.7%	1.8%	14.9%	-268.6%	31.0%	2.9%	55.6%	17.3%
P99.9-P99.99	6.3%	0.4%	16.4%	-395.8%	37.4%	2.1%	69.0%	12.9%
Top 0.01%	7.0%	-0.2%	18.0%	-661.9%	42.5%	1.3%	84.3%	8.8%

Table III
Allocation of Active Saving

This table reports the average destination of active saving in different brackets of the net wealth distribution in Sweden between 2000 and 2007. We consider: (1) the ratio of active saving into financial wealth over net worth at the beginning of the year, (2) the ratio of active saving into real estate over net worth at the beginning of the year, (3) the ratio of active saving into private equity over net worth at the beginning of the year, and (4) the ratio of active dissaving into household debt over net worth at the beginning of the year. For each wealth component, we define active saving as the difference between the value of the holdings at the end of the year and the fully capitalized value of holdings at the beginning of the year, using the total realized return for these beginning-of-the-year holdings. All ratios are winsorized at the 1% level except the ratio saving in private equity, which is winsorized at the 0.01% level. Each column is based on the regression of the explained characteristic on net worth bracket dummies and year fixed effects. The sample includes all Swedish individuals with positive net worth above the 40th percentile of the distribution of net wealth.

	Saving in Financial Wealth	Saving in Real Estate	Saving in Private Equity	Dissaving in Debt
	(1)	(2)	(3)	(4)
Wealth Group				
P40-P50	1.1%	10.9%	2.5%	6.0%
P50-P60	0.7%	4.6%	1.6%	3.0%
P60-P70	0.8%	-0.3%	1.0%	1.7%
P70-P80	0.7%	-2.7%	0.7%	1.1%
P80-P90	0.6%	-4.0%	0.5%	0.7%
P90-P95	0.4%	-4.4%	0.4%	0.5%
P95-P97.5	0.2%	-4.5%	0.2%	0.4%
P97.5-P99	-0.1%	-4.0%	-0.1%	0.3%
P99-P99.5	-0.4%	-3.0%	-0.2%	0.3%
P99.5-P99.9	-0.8%	-1.7%	-1.4%	0.2%
P99.9-P99.99	-0.9%	-0.8%	-4.0%	-0.1%
Top 0.01%	-1.1%	-1.1%	-4.1%	0.0%

Table IV
Dispersion of Saving Rate

This table reports the cross-sectional standard deviation of saving rates in the Swedish population and different brackets of the distribution of net wealth in Sweden between 2000 and 2007. We consider the following measures of dispersion: (1) the cross-sectional standard deviation of the ratio of active saving to net wealth, (2) the cross-sectional standard deviation of the ratio of total saving to net wealth, and (3) the coefficient of correlation between the return to wealth and the active saving rate. All moments are computed on a yearly basis and then averaged over the 2000 to 2007 period. All ratios are winsorized at the 1% level. The sample includes all Swedish individuals with positive net worth above the 40^{th} percentile of the distribution of net wealth, except for the top row which includes the entire Swedish population.

	Active Saving Rate Standard Deviation	Total Saving Rate Standard Deviation	Correlation of Wealth Return and Active Saving Rate
	(1)	(2)	(3)
Entire Population	58.5%	61.7%	0.02
Wealth Group			
P40-P50	94.4%	100.2%	0.09
P50-P60	70.9%	74.4%	0.11
P60-P70	54.4%	56.7%	0.12
P70-P80	43.8%	45.5%	0.09
P80-P90	35.9%	37.6%	0.05
P90-P95	31.2%	33.1%	-0.01
P95-P97.5	29.3%	32.0%	-0.03
P97.5-P99	29.1%	33.1%	-0.06
P99-P99.5	30.9%	36.2%	-0.08
P99.5-P99.9	33.2%	41.1%	-0.07
P99.9-P99.99	35.5%	45.8%	-0.10
Top 0.01%	36.8%	48.2%	-0.08

Table V
Dispersion of Sources of Saving

This table reports the cross-sectional standard deviation of the sources of saving in the Swedish population and different brackets of the distribution of net wealth in Sweden between 2000 and 2007. We consider the following measures of dispersion: (1) the cross-sectional standard deviation of the ratio of consumption to net wealth, (2) the cross-sectional standard deviation of the ratio of active income to net wealth, (3) the cross-sectional standard deviation of the ratio of total income to net wealth, (4) the coefficient of correlation between the ratio of active income to net wealth and the ratio of consumption to net wealth, and (5) the coefficient of correlation between the ratio of total income to net wealth and the ratio of consumption to net wealth. All moments are computed on a yearly basis and then averaged over the 2000 to 2007 period. All ratios are winsorized at the 1% level. The sample includes all Swedish individuals with positive net worth above the 40th percentile of the distribution of net wealth, except for the top row which includes the entire Swedish population.

	Dispersion Measures			Dependence Measures	
	Consumption-to-Wealth Standard Deviation	Active Income-to-Wealth Standard Deviation	Total Income-to-Wealth Standard Deviation	Consumption-Active Income Correlation	Consumption-Total Income Correlation
	(1)	(2)	(3)	(4)	(5)
Entire Population	94.0%	78.2%	83.3%	0.75	0.74
Wealth Group					
P40-P50	134.4%	96.4%	106.3%	0.67	0.66
P50-P60	87.0%	49.8%	59.3%	0.52	0.50
P60-P70	60.3%	27.4%	35.0%	0.41	0.39
P70-P80	45.7%	17.1%	24.0%	0.32	0.30
P80-P90	36.4%	11.2%	18.1%	0.26	0.24
P90-P95	31.1%	7.5%	15.8%	0.20	0.18
P95-P97.5	29.0%	5.9%	16.1%	0.18	0.16
P97.5-P99	28.6%	5.0%	18.0%	0.17	0.15
P99-P99.5	30.1%	4.6%	21.3%	0.15	0.17
P99.5-P99.9	32.0%	3.7%	25.1%	0.13	0.13
P99.9-P99.99	35.5%	2.0%	30.2%	0.10	0.17
Top 0.01%	35.8%	1.0%	29.8%	0.09	0.06

Table VI
Dispersion of the Allocation of Active Saving

This table reports the cross-sectional standard deviation of the destinations of active saving in the Swedish population and different brackets of the distribution of net wealth in Sweden between 2000 and 2007. We consider the following measures of dispersion: (1) the cross-sectional standard deviation of the ratio of active saving into financial wealth over net wealth, (2) the cross-sectional standard deviation of the ratio of active saving into real estate over net wealth, (3) the cross-sectional standard deviation of the ratio of active saving into private equity over net wealth, (4) the cross-sectional standard deviation of the ratio of active dissaving into household debt over net wealth, and (5) the coefficient of correlation between the ratio of active saving into real estate over net wealth and the ratio of active dissaving into household debt over net wealth. All moments are computed on a yearly basis and then averaged over the 2000 to 2007 period. All ratios are winsorized at the 1% level except the ratio saving in private equity, which is winsorized at the 0.01% level. The sample includes all Swedish individuals with positive net worth above the 40^{th} percentile of the distribution of net wealth, except for the top row which includes the entire Swedish population.

	Standard Deviation of Active Saving Allocated to:				Debt Repayment-Real Estate Saving
	Financial Wealth	Real Estate	Private Equity	Debt Reduction	Correlation
	(1)	(2)	(3)	(4)	(5)
Entire Population	25.5%	56.4%	71.4%	36.5%	0.40
Wealth Group					
P40-P50	41.5%	86.1%	117.9%	61.3%	0.41
P50-P60	29.9%	71.6%	80.7%	46.6%	0.44
P60-P70	22.8%	54.2%	57.2%	33.4%	0.41
P70-P80	18.5%	41.9%	46.1%	23.6%	0.35
P80-P90	15.6%	32.9%	45.2%	16.3%	0.29
P90-P95	13.3%	27.4%	47.4%	11.8%	0.24
P95-P97.5	12.7%	24.5%	49.2%	10.0%	0.21
P97.5-P99	12.7%	22.1%	39.5%	9.2%	0.21
P99-P99.5	13.4%	20.2%	96.3%	9.1%	0.22
P99.5-P99.9	14.6%	17.3%	81.8%	9.2%	0.24
P99.9-P99.99	15.1%	14.3%	51.8%	8.1%	0.34
Top 0.01%	13.7%	14.2%	46.3%	5.1%	0.21

Table VII
Decomposition of Wealth Share Growth

This table reports the average and the time-series dispersion of the key parameters driving the growth of the share of aggregate wealth accruing to various fractiles of the distribution of net wealth in Sweden between 2000 and 2007. We consider the following characteristics: (1) the average of the share of aggregate wealth accruing to each wealth fractile, (2) and (3) the average and the time-series standard deviation of the annual growth of these wealth shares, (4) and (5) the average and the time-series standard deviation of the contribution to each wealth share's growth of the differences in total saving rates between wealth groups, (6) and (7) the average and the time-series standard deviation of the contribution to each wealth share's growth of the idiosyncratic dispersion in total saving rates, and (8) and (9) the average and the time-series standard deviation of the contribution to each wealth share's growth of the entry and exit of individuals into the Swedish population. The sum of the terms in (4), (6) and (8) equals (2). The sample includes all Swedish individuals.

				Decomposition of Wealth Share Growth					
	Wealth Share Level	Wealth Share Growth		Systematic Saving Effect		Idiosyncratic Saving Effect		Net Birth Effect	
	Mean	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Wealth Group									
P0-P80	16.6%	1.4%	5.8%	18.3%	6.4%	-17.3%	3.4%	0.4%	0.1%
P80-P90	18.1%	-1.1%	3.4%	-2.6%	2.7%	1.6%	1.4%	0.0%	0.1%
P90-P95	15.0%	-1.1%	3.2%	-3.8%	2.6%	2.7%	1.0%	-0.1%	0.2%
P95-P97.5	11.3%	-1.1%	2.7%	-3.9%	2.3%	2.8%	1.4%	0.0%	0.2%
P97.5-P99	10.3%	-1.1%	1.9%	-4.4%	1.8%	3.4%	1.3%	-0.1%	0.2%
P99-P99.5	5.4%	-0.8%	2.5%	-2.8%	2.7%	2.2%	2.7%	-0.2%	0.3%
P99.5-P99.9	8.5%	-0.2%	5.4%	-3.2%	5.3%	3.2%	1.2%	-0.1%	0.2%
P99.9-P99.99	7.2%	2.2%	8.5%	-3.8%	8.7%	5.9%	2.0%	0.1%	0.5%
Top 0.01%	7.5%	5.6%	12.0%	-3.6%	10.7%	9.3%	3.8%	-0.2%	1.1%

Table VIII
The Roles of Wealth Returns and Active Saving in Wealth Share Growth

This table reports the average and the time-series dispersion of the return to wealth and active saving parameters driving the growth of the share of aggregate wealth accruing to various fractiles of the distribution of net wealth in Sweden between 2000 and 2007. We consider the following characteristics: (1) and (2) the average and the time-series standard deviation of the contribution to each wealth share's growth of the differences in return to wealth between wealth groups, (3) and (4) the average and the time-series standard deviation of the contribution to each wealth share's growth of the differences in active saving rates between wealth groups, (5) and (6) the average and the time-series standard deviation of the contribution to each wealth share's growth of the idiosyncratic dispersion in returns to wealth, (7) and (8) the average and the time-series standard deviation of the contribution to each wealth share's growth of the idiosyncratic dispersion in active saving rates, (9) and (10) the average and the time-series standard deviation of the total contribution to each wealth share's growth of the dispersion in returns to wealth, (11) and (12) the average and the time-series standard deviation of the total contribution to each wealth share's growth of the dispersion in active saving rates, and (13) and (14) the average and the time-series standard deviation of the contribution to each wealth share's growth of the idiosyncratic correlation between returns to wealth and active saving rates. The sum of the terms in (1) and (5) equals (9), the sum of the terms in (3) and (7) equals (11), the sum of the terms in (5), (7) and (13) equals column (6) in table VIII, and the sum of the terms in (1) and (3) equals column (4) in table VIII. The sample includes all Swedish individuals.

	Systematic Return		Systematic Active Saving		Idiosyncratic Return		Idiosyncratic Active Saving		Sum of Return Effects		Sum of Active Saving Effects		Active Saving-Return Correlation	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Wealth Group														
P0-P80	4.5%	3.1%	13.9%	4.9%	-1.1%	3.7%	-17.8%	3.5%	3.3%	6.3%	-3.8%	4.5%	1.3%	3.7%
P80-P90	-0.8%	4.1%	-1.8%	2.0%	-0.5%	0.5%	2.0%	1.3%	-1.3%	4.1%	0.2%	1.4%	0.0%	0.4%
P90-P95	-1.2%	3.7%	-2.6%	2.0%	-0.1%	0.7%	3.0%	1.0%	-1.3%	3.4%	0.5%	1.6%	-0.2%	0.7%
P95-P97.5	-1.3%	2.7%	-2.6%	1.8%	-0.2%	1.0%	3.1%	1.3%	-1.6%	2.5%	0.5%	1.6%	-0.1%	1.0%
P97.5-P99	-1.5%	1.1%	-3.0%	1.5%	0.0%	1.0%	3.7%	1.2%	-1.4%	0.9%	0.8%	1.5%	-0.3%	1.0%
P99-P99.5	-1.6%	1.7%	-1.3%	2.3%	-0.1%	1.1%	2.2%	2.7%	-1.6%	2.3%	1.0%	1.6%	-0.1%	1.0%
P99.5-P99.9	-1.0%	6.0%	-2.2%	1.2%	0.7%	1.0%	3.2%	1.0%	-0.3%	6.2%	1.0%	1.6%	-0.6%	0.9%
P99.9-P99.99	0.4%	10.2%	-4.3%	2.8%	1.4%	0.6%	5.3%	2.2%	1.8%	10.3%	1.0%	2.6%	-0.8%	0.9%
Top 0.01%	2.1%	11.9%	-5.6%	1.6%	2.6%	1.6%	7.7%	3.9%	4.7%	12.9%	2.1%	4.5%	-0.8%	0.8%

Figure 1
Wealth Concentration in Sweden

This figure illustrates the average shares of aggregate net wealth held by individuals in various brackets of net wealth in Sweden between 2000 and 2007. P0-P80 refers to households ranked between the 0^{th} and 80^{th} percentiles of the net wealth distribution, and so on.

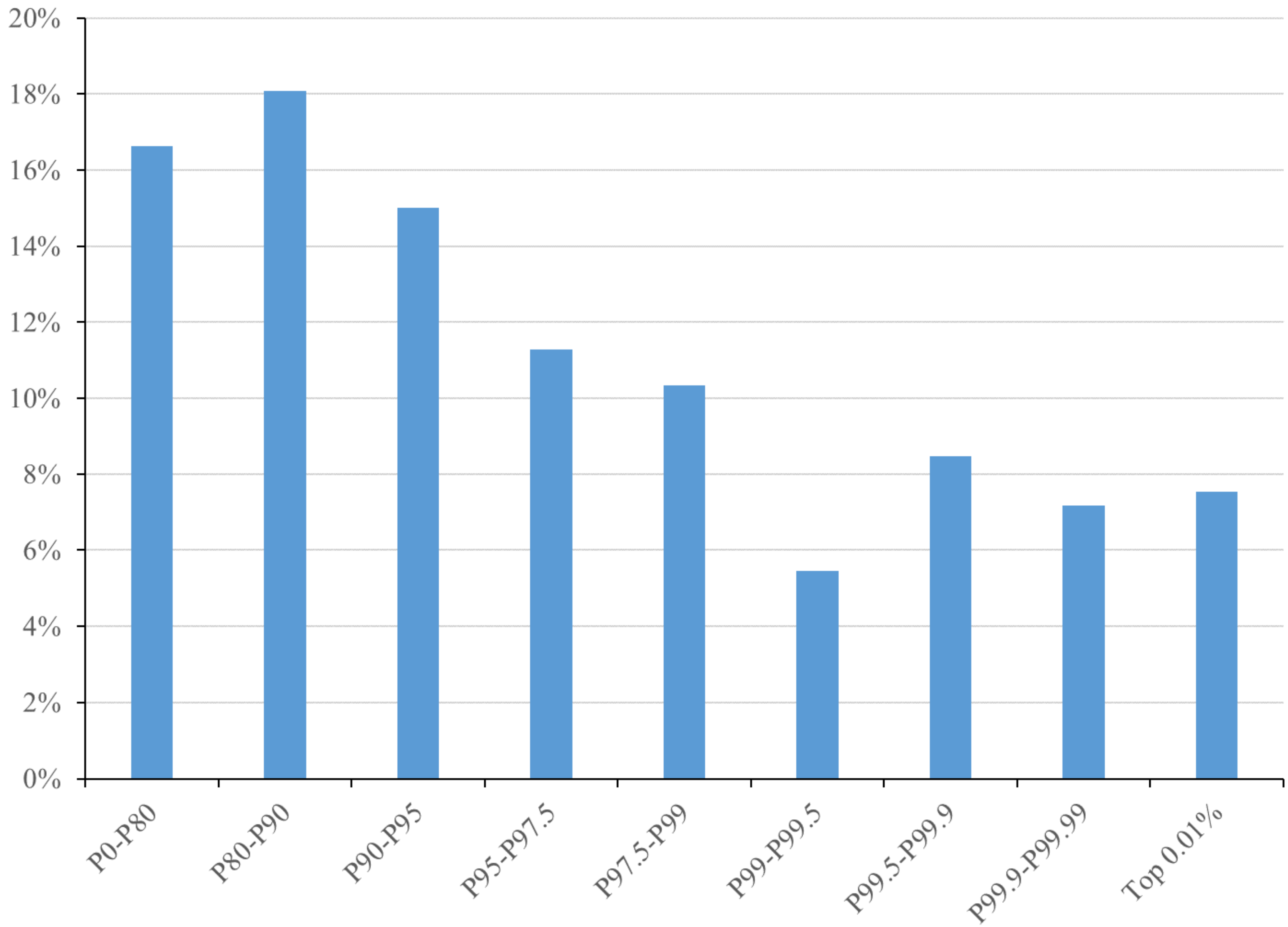

Figure 2
Average Saving Rates Across the Wealth Distribution

This figure illustrates the average saving rates (in proportion to net worth) across various brackets of the distribution of net wealth in Sweden between 2000 and 2007. The dotted line plots total saving rates and the solid line plots active saving rates, where active saving is equal to labor income minus taxes minus consumption and total saving is equal to active saving plus returns to wealth.

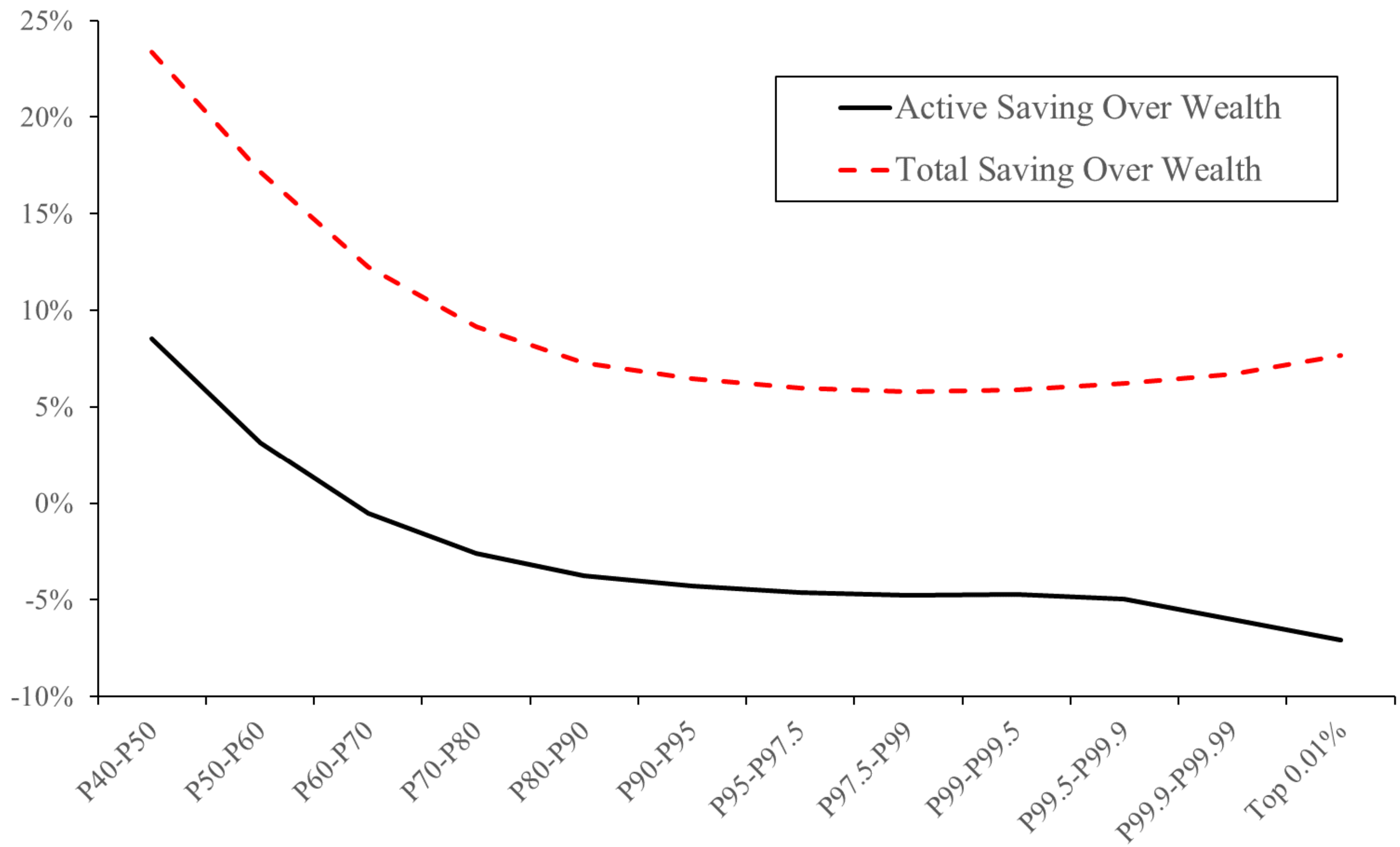

Figure 3
The Dispersion of Saving Rates Across the Wealth Distribution

This figure illustrates the cross-sectional standard deviation of saving rates (in proportion to net worth) across various brackets of the distribution of net wealth in Sweden between 2000 and 2007. The dotted line plots total saving rates and the solid line plots active saving rates, where active saving is equal to labor income minus taxes minus consumption and total saving is equal to active saving plus returns to wealth.

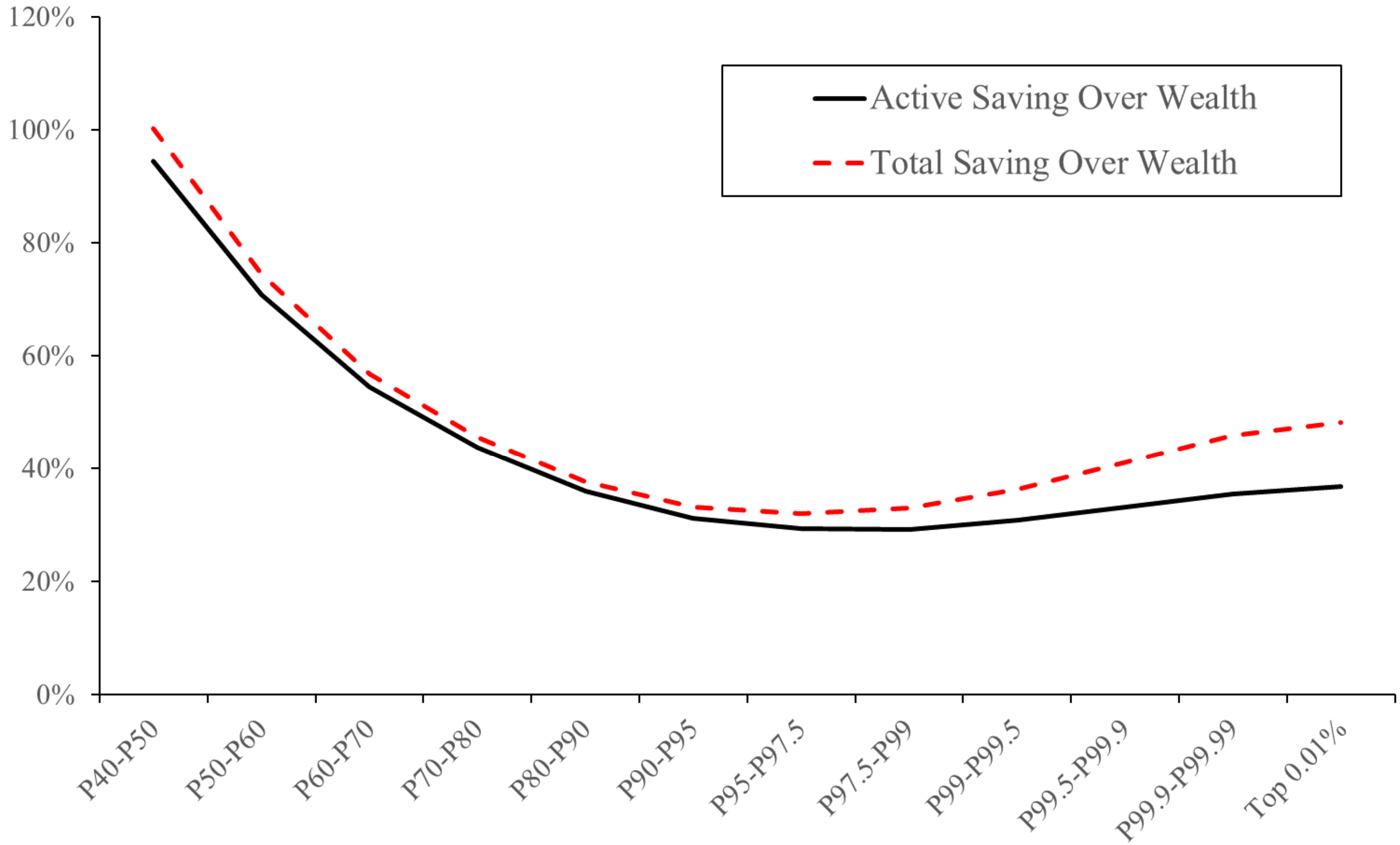

Figure 4

The Relative Roles of Wealth Effects, Wealth Mobility and Demographics in the Dynamics of Inequality

This figure illustrates the main determinants of the growth of aggregate wealth shares for various fractiles of the distribution of net wealth in Sweden between 2000 and 2007. The solid line plots the average annual growth of wealth shares observed from 2000 to 2007, the red, blue and green dotted lines plot the respective contributions to each wealth share's growth of the correlation between wealth and total saving, the idiosyncratic dispersion of total saving rates and the movements of individuals in and out of the Swedish population.

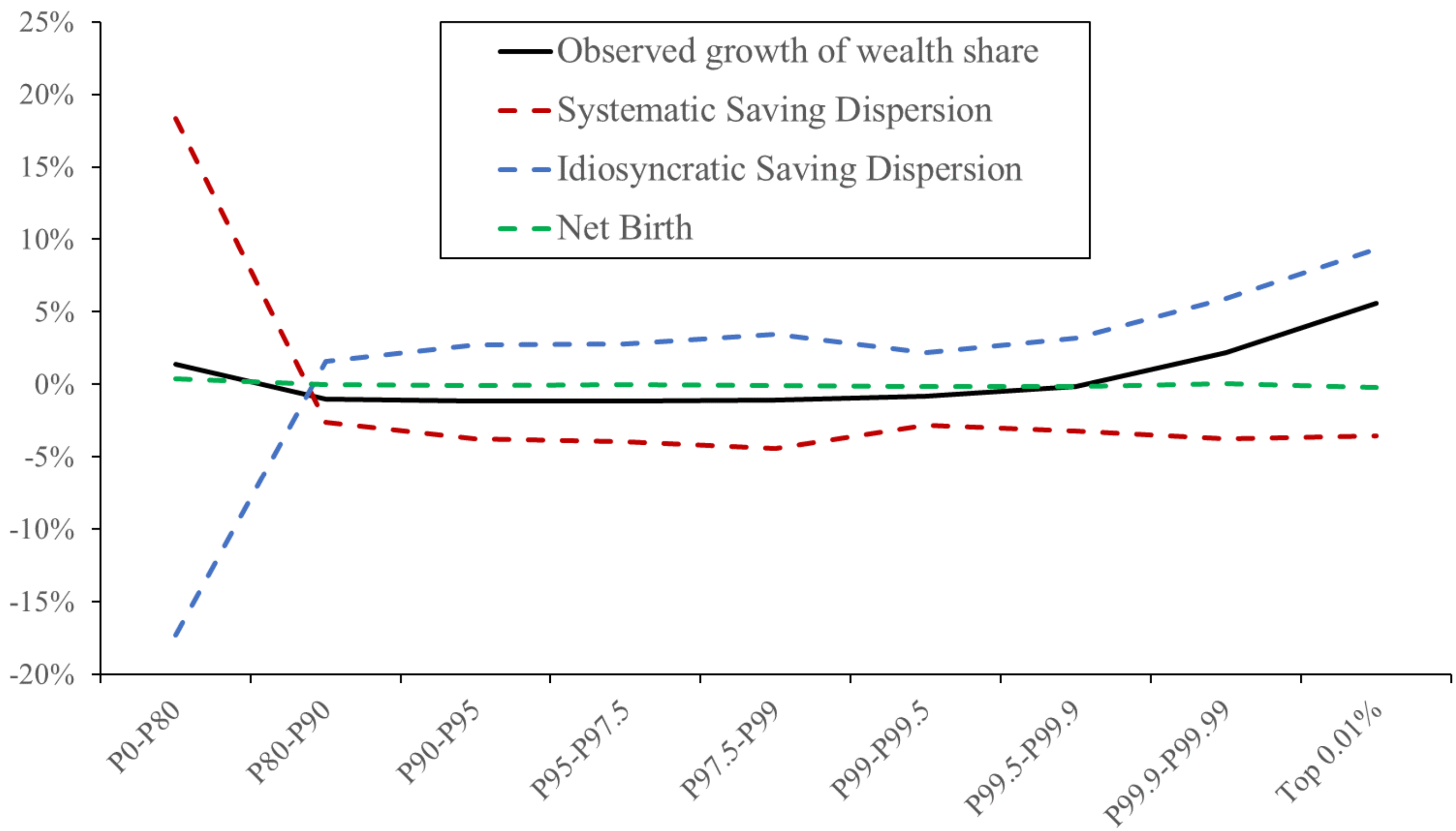

Figure 5
The Relative Roles of Wealth Returns and Active Saving in the Dynamics of Inequality

This figure illustrates the relative roles of returns to wealth and active saving rates in the growth of aggregate wealth shares for various fractiles of the distribution of net wealth in Sweden between 2000 and 2007. The solid line plots the average annual growth of wealth shares observed from 2000 to 2007, the red, blue and green dotted lines plot the respective contributions to each wealth share's growth of the heterogeneity in returns to wealth, the heterogeneity in active saving rates and the correlation between returns to wealth and active saving rates.