Saving Rate Heterogeneity across the Wealth Distribution in the United States

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Abstract

Existing studies on saving rate heterogeneity across the U.S. wealth distribution rely on the synthetic method, which ignores wealth rank mobility. This paper formalizes two mobility-consistent estimators and applies them to Panel Study of Income Dynamics data. The synthetic method underestimates saving rates by more than 100% across most of the wealth distribution and overstates saving rate inequality. The mobility contribution to estimated saving rates is positive throughout and declines with wealth, from over 100% in the middle to 15–32% for the top wealth decile. The mobility-consistent estimates show that saving rates out of labor income and new resources rise strongly with wealth, while saving rates out of wealth and available resources are stable or increase only moderately. The positive relationship between saving rates and wealth is driven predominantly by passive saving: for the top wealth decile, over 80% of total saving consists of capital gains. The paper provides several empirical moments that are of interest to the heterogeneous agent macro literature.

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1 Introduction

Saving rate heterogeneity is a fundamental driver of wealth inequality (De Nardi & Fella, 2017; Hubmer et al., 2021). Yet empirical evidence on saving behavior across the U.S. wealth distribution remains scarce. Existing work relies on the synthetic method, which fails to account for wealth rank mobility and produces biased estimates (Saez & Zucman, 2016, and indirectly in e.g., Kuhn et al., 2020; Mian et al., 2020; Smith et al., 2023).

Lacking reliable evidence, heterogeneous agent models for the U.S. have turned to saving rate data across the income distribution (e.g., Hubmer et al., 2021) or data from Nordic countries (e.g., Fernández-Villaverde & Levintal, 2024) for calibration. This paper uses household-level data from the Panel Study of Income Dynamics (PSID) to provide mobility-consistent estimates of saving rate heterogeneity across the U.S. wealth distribution.

Research questions First, how do total saving rates vary across the wealth distribution? Flow-based saving rates (out of labor income and new resources) rise strongly with wealth, while stock-based saving rates (out of wealth and available resources) are stable or increase only moderately. These total saving rate patterns are stable over time periods and robust to conditioning on labor income, age, and business ownership.

Second, does the composition of total saving into active saving (income minus consumption) and passive saving (capital gains and inter-generational transfers) vary with wealth? Households' reliance on passive saving rises sharply with wealth: for the top wealth decile, over 80% of total saving reflects asset appreciation. The positive relationship between total saving rates and wealth is therefore driven predominantly by passive saving.

Methodological contributions First, I formalize two saving rate estimators that incorporate wealth rank mobility: a household-level method and an aggregate method. These estimators have been used in the Nordic literature but not formally defined. The two methods differ in their treatment of mobility: the household-level method weights households equally, while the aggregate method places greater weight on downwardly mobile households. I contrast these mobility-consistent estimators with the synthetic method used when panel data is unavailable.

Second, I quantify the bias of the synthetic method relative to the mobility-consistent aggregate method. The bias is consistently negative: the synthetic method underestimates saving rates by more than 100% across most of the wealth distribution. Because the bias declines in absolute value with wealth, the synthetic method overstates saving rate inequality. Heterogeneous agent models calibrated to synthetic method estimates may therefore over-attribute wealth concentration to saving rate heterogeneity.

Third, I quantify the contribution of wealth rank mobility to observed saving rate patterns. The mobility contribution is positive across all wealth deciles and declines monotonically with wealth, from over 100% in the middle of the distribution to 15–32% for the top decile. It is larger under the aggregate method than under the household-level method in the middle of the wealth distribution but smaller at the top. I derive conditions on household type shares and saving rate distributions that characterize these patterns.

Related literature This paper relates to several strands of literature. First, I contribute to the empirical work on saving behavior across the wealth distribution. Bach et al. (2018) and Fagereng et al. (2025)[1] document saving rate heterogeneity in Sweden and Norway using administrative panel data. I provide the first comparable evidence for the United States, where research has previously relied on the biased synthetic method[2]. I also provide the first empirical evidence on the importance of active saving versus passive saving across the U.S. wealth distribution.

Second, this paper speaks to heterogeneous agent models of wealth inequality. These models generate saving rate heterogeneity through bequest motives (De Nardi, 2004), earnings inequality (Benhabib et al., 2017; Hubmer et al., 2021), non-homothetic preferences (Jacobs, 2025; Straub, 2019; Van Langenhove, 2025a), preference heterogeneity (Azzalini et al., 2023; Fernández-Villaverde & Levintal, 2024; Toda, 2019), or return heterogeneity (Benhabib et al., 2019; Benhabib et al., 2022; Benhabib et al., 2024; Brendler et al., 2024; Cioffi, 2021; Gaillard & Wangner, 2023; Xavier, 2021). The mobility-consistent estimates provided here offer calibration targets for the stationary saving rate distributions in these models. In addition, the finding that capital gains dominate saving among the wealthy favors models emphasizing return heterogeneity.

[1] Fagereng et al. (2025) represents an updated version of Fagereng et al. (2019). I reference the 2025 version throughout this paper.

[2] A literature exists that quantifies U.S. saving behavior across the income rank or lifetime income rank distribution using PSID panel data (e.g., Dynan et al., 2004).

Third, the importance of passive saving relates to the literature on capital gains and wealth accumulation. Capital gains are highly concentrated at the top of the wealth distribution (Armour et al., 2013; Campbell et al., 2025; Larrimore et al., 2021; Saez & Zucman, 2016; Smith et al., 2023)[3]. Moreover, capital gains also drive lifecycle wealth accumulation (Bauluz & Meyer, 2024; Feiveson & Sabelhaus, 2019; Jäger & Schacht, 2023) and fluctuations in U.S. wealth inequality (Kuhn et al., 2020; Blanchet & Martínez-Toledano, 2023). I complement this work by quantifying capital gains as a share of total saving across the wealth distribution.

Roadmap Section 2 defines saving concepts and four saving rates. Section 3 formalizes two mobility-consistent estimators: the household-level and aggregate methods. Section 4 describes the PSID data and empirical strategy. Section 5 presents empirical results on total saving rates across the wealth distribution and decomposes total saving into active and passive components. Section 6 quantifies the bias of the synthetic method, while Section 7 computes the contribution of wealth rank mobility. Section 8 concludes.

2 Saving concepts and saving rates

In this Section, I define three saving concepts (total saving, active saving and passive saving) and four saving rates (saving rates out of labor income, new resources, wealth and available resources).

2.1 A budget constraint

Let us start with a household budget constraint. For a household i, the change in its wealth $\Delta w_i(t)$ is provided by:

$$\Delta w_i(t) = y_i(t) + g_i(t) + \left[r_i^i(t) + r_i^c(t)\right] \cdot w_i(t-1) - \tau_i(t) - c_i(t) + m_i(t) + \eta_i(t) \qquad (1)$$

where w denotes wealth, y labor income, g government transfer and social security income, r^i returns from dividend and interest, r^c returns from capital gains, τ taxes, c consumption, m inter-generational transfers, and η a residual capturing household composition changes[4]. It holds that: $E[\eta_i(t)] = 0$.

[3] Splinter (2025) raises concerns regarding Campbell et al. (2025).

[4] This primarily involves children moving into or out of the household. I correct for this term in the definition of total saving (Equation 4).

The budget constraint defines two forms of household resources. First, new resources denote total inflows net of taxes:

$$\Lambda_i^N(t) = y_i(t) + g_i(t) + \left[r_i^i(t) + r_i^c(t)\right] \cdot w_i(t-1) - \tau_i(t) + m_i(t) \tag{2}$$

Second, available resources add households' initial wealth to their new resources. Specifically, we have:

$$\Lambda_i^C(t) = w_i(t-1) + \Lambda_i^N(t) \tag{3}$$

2.2 Three saving concepts

I define three saving concepts: total saving T, active saving A and passive saving P. Total saving equals the change in a household's wealth Δw_i over period t, corrected for the residual η_i:

$$s_i^T(t) = \Delta w_i(t) - \eta_i(t) \tag{4}$$

where total saving $s_i^T(t)$ can be decomposed into active saving $s_i^A(t)$ and passive saving $s_i^P(t)$. That is:

$$\underbrace{s_i^T(t)}_{\text{Total}} = \underbrace{s_i^A(t)}_{\text{Active}} + \underbrace{s_i^P(t)}_{\text{Passive}} \tag{5}$$

Active saving $s_i^A(t)$ equals disposable income (labor income, capital income, net government receipts) minus consumption. Mathematically:

$$s_i^A(t) = y_i(t) + g_i(t) + r_i^i(t) \cdot w_i(t-1) - \tau_i(t) - c_i(t) \tag{6}$$

Passive saving $s_i^P(t)$ equals the sum of (realized and unrealized) capital gains and net intergenerational transfers. Algebraically:

$$s_i^P(t) = r_i^c(t) \cdot w_i(t-1) + m_i(t) \tag{7}$$

The literature disagrees on whether capital income belongs to active or passive saving. Dynan et al. (2004) and Fagereng et al. (2025) interpret capital income as a component of active saving. In contrast, Bach et al. (2018) attribute it to passive saving. In this paper, I follow Dynan et al. (2004) and Fagereng et al. (2025).

2.3 Flow- and stock-based saving rates

I define two flow-based saving rates (normalizing by flows) and two stock-based saving rates (normalizing by stocks or stock-derived variables). I use total saving s^T as an illustration.

Flow-based saving rates I distinguish between two flow-based saving rates. First, the saving rate out of labor income is given by (e.g., Fagereng et al., 2025):

$$\zeta_i^T(t) = \frac{s_i^T(t)}{y_i(t) + g_i(t)} \tag{8}$$

where the denominator also includes government transfers. However, for simplicity, I refer to this saving rate as the saving rate out of labor income throughout. This saving rate varies with the composition of new resources: a household deriving resources primarily from capital income displays a higher ζ^T than one with identical total saving but higher labor income. Second, instead, the saving rate out of new resources eliminates this composition dependence[5]:

$$\phi_i^T(t) = \frac{s_i^T(t)}{\Lambda_i^N(t)} \tag{9}$$

Stock-based saving rates The flow-based saving rates normalize a household's savings flow based on the financial flows a household receives. However, in addition to its inflows at t, a household could draw down its wealth stock to finance consumption expenditures. As a third saving rate, I therefore define the saving rate out of wealth (e.g., Bach et al., 2018):

$$\gamma_i^T(t) = \frac{s_i^T(t)}{w_i(t-1)} \tag{10}$$

[5] The saving rate out of new resources is methodologically close to the saving rate out of total income. However, new resources also include capital gains and inter-generational transfers (Equation 3), while income does not.

which equals the growth rate of a household's wealth. This measure abstracts from income or transfers received at t. Fourth, the saving rate out of available resources is defined as:

$$\theta_i^T(t) = \frac{s_i^T(t)}{\Lambda_i^C(t)} \tag{11}$$

which measures total saving relative to a household's maximum possible consumption at time t[6].

Saving ratios Flow-based and stock-based saving rates consider saving flows in the numerator. Some heterogeneous agent models work instead with the saving ratio ξ:

$$\xi_i(t) = \frac{w_i(t)}{\Lambda_i^C(t)} \tag{12}$$

which has wealth w in the numerator. This has as a drawback that a decomposition into active and passive components is infeasible. I therefore do not report saving ratio outcomes in the main text of this paper. However, Appendix A provides empirical evidence on saving ratios ξ across the wealth rank distribution in the United States.

3 Mobility-consistent saving rate estimators

Quantifying saving rate heterogeneity requires estimating saving rates for discrete wealth brackets, such as wealth deciles. Two questions arise: (1) what method should be used to estimate the saving rate of a given wealth decile, and (2) how does wealth rank mobility affect these estimates?

I formalize two mobility-consistent estimators: the household-level method and the aggregate method. Both account for wealth rank mobility but differ in their weighting of households: the household-level method weights households equally, while the aggregate method weights them by initial wealth.

[6]This interpretation holds under a zero borrowing constraint ($w \geq 0$). Terminology varies: Ordoñez & Piguillem (2022) denote the saving rate out of available resources the 'saving rate out of wealth' or 'saving ratio.'

3.1 Composition of a wealth decile

Notation Define P_t^d as the set of households belonging to wealth decile d at time t. The composition of a wealth decile changes over time: heterogeneity in household saving rates generates turnover across deciles, so that $P_t^d \neq P_{t-1}^d$. This mobility implies the presence of exit and entrant households.

Exiters consist of two sets: O_t^d (households that remain in the sample but move to a different decile) and N_t^d (households that exit the sample due to death or non-response). Entrants similarly consist of two sets: I_t^d (households already in the sample at $t-1$) and B_t^d (households entering the sample at t).

Entrant households I_t^d for any interior decile[7] consist of upward entrants and downward entrants:

$$I_t^d = U_t^d \sqcup D_t^d \tag{13}$$

where U_t^d denotes households entering decile d from a lower decile and D_t^d households entering from a higher decile. For the bottom decile, it holds that $U_t^d = \emptyset$. For the top decile, it holds that $D_t^d = \emptyset$.

Wealth decile composition & wealth mobility types Using the exit and entrant households definitions, P_t^d can be expressed as:

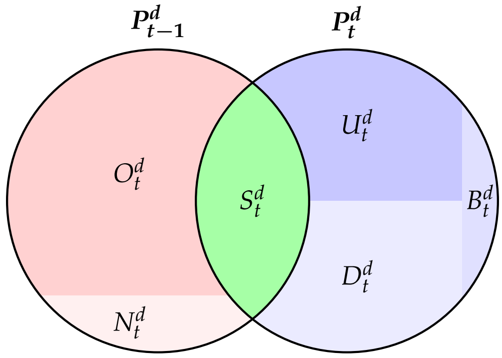
$$P_t^d = P_{t-1}^d \setminus (O_t^d \sqcup N_t^d) \sqcup (I_t^d \sqcup B_t^d) \tag{14}$$

where $P_{t-1}^d \setminus (O_t^d \sqcup N_t^d)$ represents the immobile households that remained in the same wealth decile d over two consecutive time periods. Let us define these immobile households as:

$$S_t^d = P_{t-1}^d \setminus (O_t^d \sqcup N_t^d) \tag{15}$$

[7] Wealth deciles 11–20 through 81–90.

Figure 1: Composition of the households in a wealth decile d at time t (i.e. P_t^d).



so that the set of households in a decile d at any t (P_t^d) can be written as the union of immobile households and entrant households:

$$P_t^d = S_t^d \sqcup I_t^d \sqcup B_t^d \tag{16}$$

which allows to distinguish between two types of wealth mobility. First, endogenous wealth rank mobility arises when households move into decile d as a result of changes in their relative wealth positions ($I_t^d \neq \emptyset$). Second, sample-related wealth rank mobility occurs when households that were previously not part of the sample enter the sample directly into decile d ($B_t^d \neq \emptyset$).

In panel datasets, the saving rates of sample-related entrants B_t^d are unobserved: these entrant households do not have information available for $t-1$. In practice, we are therefore interested in the saving rates of endogenous households, i.e. the households in decile d at t except for sample-related entrants:

$$P_t^d \setminus B_t^d = S_t^d \sqcup I_t^d \tag{17}$$

3.2 Two estimators

I formalize two methods to estimate a saving rate of wealth decile d: the household-level method and the aggregate method. Both approaches explicitly account for endogenous wealth rank mobility and are therefore mobility-consistent. I outline these estimators for the total saving rate out of wealth γ, dropping the superscript T for convenience. The estimators can be generalized to other saving rates.

3.2.1 *Household-level method*

The household-level method estimates the total saving rate out of wealth for a wealth decile d from the empirical distribution of household-level saving rates within that decile. Let $F_{P_t^d \setminus B_t^d}(m,t)$ denote the empirical cumulative distribution function (CDF) of saving rates among endogenous households belonging to wealth decile d at time t:

$$F_{P_t^d \setminus B_t^d}(m,t) = \frac{1}{|P_t^d \setminus B_t^d|} \sum_{i \in P_t^d \setminus B_t^d} \mathbf{1}(\gamma_i(t) \leq m) \tag{18}$$

where $|P_t^d \setminus B_t^d|$ is the number of endogenous households in that decile. The household-level method takes moments or quantiles of this empirical distribution, such as the mean (e.g., Bach et al., 2018) or the median (e.g., Fagereng et al., 2025). In this paper, I use the median as a baseline and the mean as a robustness. Using the median, the estimated saving rate out of wealth for decile d according to the household-level method is:

$$\gamma_C^d(t) = Q_{0.5}[F_{P_t^d \setminus B_t^d}(m,t)] \quad \text{such that} \quad F_{P_t^d \setminus B_t^d}\left(\gamma_C^d(t), t\right) = 0.5 \tag{19}$$

which calculates the median saving rate across the endogenous households in decile d at time period t. As the set $P_t^d \setminus B_t^d$ contains both immobile households and endogenous entrant households, it takes into account endogenous wealth rank mobility. Section 7 provides approaches to quantify this mobility effect and outlines its determinants.

3.2.2 *Aggregate method*

The household-level method takes as input the empirical CDF of household-level saving rates in a wealth decile d. In contrast, the aggregate method estimates saving rates per decile d using aggregated variables for that decile. Let $\bar{w}_{\mathcal{P}}(t)$ denote the average wealth of households in set $\mathcal{P}$ at time t. The aggregate method estimate for the total saving rate out of wealth for decile d

is:

$$\gamma_A^d(t) = \frac{\bar{w}_{P_t^d \setminus B_t^d}(t) - \bar{w}_{P_t^d \setminus B_t^d}(t-1)}{\bar{w}_{P_t^d \setminus B_t^d}(t-1)} = \frac{\Delta \bar{w}_{P_t^d \setminus B_t^d}(t)}{\bar{w}_{P_t^d \setminus B_t^d}(t-1)} \tag{20}$$

which generalizes to other saving rates by replacing the numerator with the appropriate saving flow and the denominator with the corresponding base variable. Equation 20 shows that the aggregate method traces the same group of households backward in time, meaning that it requires panel data. Because the composition of decile d at t may differ from that at $t-1$, the estimate in Equation 20 incorporates the effect of endogenous wealth rank mobility on the aggregate wealth of that decile. Section 7 develops a framework to quantify this mobility contribution and derives conditions under which it is positive.

3.3 Weighting differences

Both the household-level and the aggregate method estimate the total saving rate out of wealth $\gamma^d(t)$ while incorporating endogenous wealth rank mobility. These estimators are therefore complementary. However, they differ in their implicit weighting of households: the household-level method attaches equal weight to all households, while the aggregate method weights them in proportion to their initial wealth.

To formalize this point, recall the decomposition of endogenous households from Equation 17. It can be extended further using the definition of endogenous entrants I_t^d in Equation 13:

$$\underbrace{P_t^d \setminus B_t^d}_{\text{Endogenous Households}} = \underbrace{S_t^d}_{\text{Immobile}} \sqcup \underbrace{U_t^d}_{\text{Upward}} \sqcup \underbrace{D_t^d}_{\text{Downward}} \tag{21}$$

which partitions endogenous households in decile d at time t into three types: immobile households S_t^d, upward entrants U_t^d and downward entrants D_t^d. I define these household types as $g \in \{S_t^d, U_t^d, D_t^d\}$.

The household-level method computes a moment of the empirical saving rate distribution of endogenous households in $P_t^d \setminus B_t^d$. It therefore assigns equal weight to each household:

$$\alpha_i^C(t) = \frac{1}{|P_t^d \setminus B_t^d|}, \qquad i \in P_t^d \setminus B_t^d \tag{22}$$

meaning that the weight attached to each household type g is equivalent to its population share:

$$s_g^d(t) = \frac{|g|}{|P_t^d \setminus B_t^d|}, \qquad g \in \{S_t^d, U_t^d, D_t^d\} \tag{23}$$

In contrast, the aggregate method estimates saving rates of a wealth decile d while weighting households by their initial wealth:

$$\alpha_i^{\mathrm{A}}(t) = \frac{w_i(t-1)}{\sum_{j \in P_t^d \setminus B_t^d} w_j(t-1)}, \qquad i \in P_t^d \setminus B_t^d \tag{24}$$

meaning that households with higher initial wealth $w_i(t-1)$ receive a larger weight. As a result, the wealth-weighted share for a household type g is:

$$\hat{s}_g^d(t) = \frac{\sum_{i \in g} w_i(t-1)}{\sum_{j \in P_t^d \setminus B_t^d} w_j(t-1)}, \qquad g \in \{S_t^d, U_t^d, D_t^d\} \tag{25}$$

which differ from population shares whenever average initial wealth varies across types. The following proposition characterizes this relationship.

Proposition 3.1 (Weighting Differences across Methods). *Let $\bar{w}_g(t-1)$ denote the average initial wealth of household type g. If $\bar{w}_{D_t^d}(t-1) > \bar{w}_{S_t^d}(t-1) > \bar{w}_{U_t^d}(t-1)$, it holds that:*

(a) $\hat{s}_D^d(t) > s_D^d(t)$*: downward entrants receive higher weight under the aggregate method*

(b) $\hat{s}_U^d(t) < s_U^d(t)$*: upward entrants receive lower weight under the aggregate method*

Proof. Wealth-weighted shares can be written as $\hat{s}_g^d(t) = s_g^d(t) \cdot \bar{w}_g(t-1)/\bar{w}_{P_t^d \setminus B_t^d}(t-1)$. A household type receives weight above its population share if and only if its average wealth exceeds the wealth decile average. Under the stated ordering, downward entrants satisfy this condition while upward entrants do not. □

4 Data and empirical strategy

This Section describes the dataset and key methodological choices. Appendix B provides full details on variable imputation and sample construction.

4.1 Data

The empirical analysis uses household-level data from the Panel Study of Income Dynamics (PSID), a representative panel of U.S. households. I use the SRC subsample, as is standard in macroeconomic research (e.g., Cooper et al., 2019; Heathcote et al., 2010; Straub, 2019). The PSID underrepresents the top of the wealth distribution (Insolera et al., 2021; Pfeffer et al., 2016; Van Langenhove, 2025b). I therefore use the top 10% to represent the wealthiest households rather than finer wealth percentiles.

The PSID contains sufficiently rich information to construct all budget constraint variables from Equation 1, with two exceptions. First, tax payments are not reported and must be imputed using the NBER TAXSIM program. Second, consumption is measured accurately only from 2005 onward (Andreski et al., 2014; Li et al., 2010). I therefore use two samples: a 2001–2021 sample for total and passive saving, and a 2005–2021 sample that additionally measures active saving.

4.2 Saving rate imputation and estimation

I compute the four saving rates defined in Section 2: saving rates out of labor income, new resources, wealth, and available resources. For labor income and wealth, imputation is straightforward. For new resources and available resources, I use an inflow-based approach that imputes these variables directly from the budget constraint. Online Supplement, Appendix D presents an alternative expenditure-based approach that relies on fewer input variables. It yields nearly identical results. Appendix C provides a detailed overview of budget constraint variable imputation.

The panel structure of the PSID permits application of the mobility-consistent estimators developed in Section 3. For the household-level method, I pool all waves to construct an empirical saving rate distribution for each wealth decile, and then report the median. For the aggregate method, I compute annual estimates and average across waves. The analysis also allows to quantify the bias of the synthetic method and the contribution of wealth rank mobility to saving rate estimates, as outlined in Sections 6 and 7 of the paper.

Four notes on the samples. First, some households display zero or negative values in the denominator of a saving rate, which distorts estimation. These edge cases predominantly affect the bottom of the wealth distribution: saving rates are therefore ill-defined for wealth percentiles 35 and below. Second, I restrict the sample to households with a reference person older than 20 and trim the most extreme 0.5% of saving rate observations in each tail. Third, sample sizes range from 30,000 to 40,000 observations depending on the saving rate. Fourth, results are robust to alternative trimming parameters, sample definitions, and interpolation methods.

5 Saving behavior across the wealth distribution

In this Section, I provide empirical evidence on the relationship between total saving rates and wealth ranks according to the household-level and aggregate method. In addition, I decompose total saving rate patterns across the wealth rank distribution into active saving and passive saving.

5.1 Total saving across the wealth rank distribution

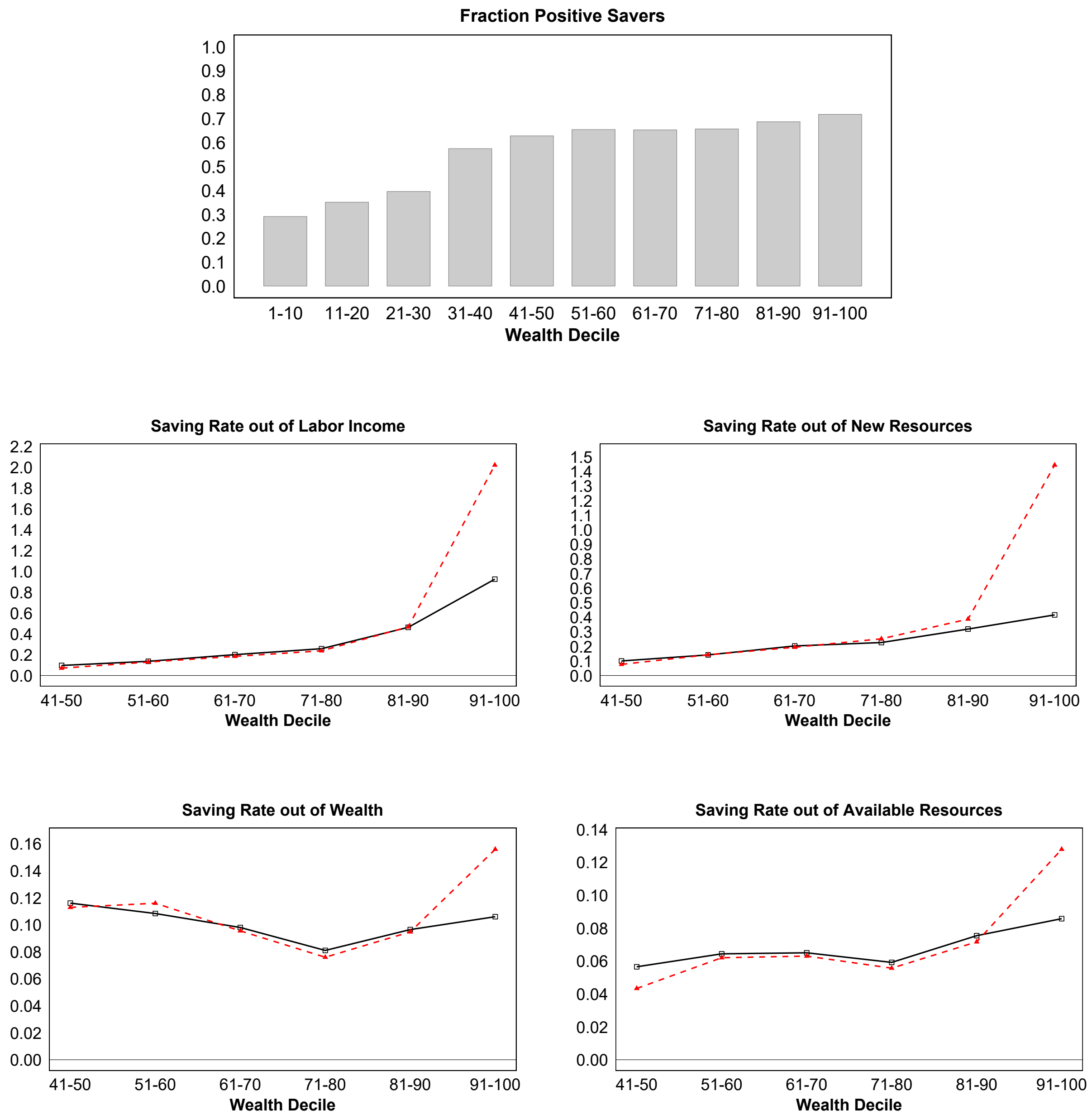
Baseline results How do total flow-based and stock-based saving rates vary with wealth ranks?

First, at the extensive margin, the share of households with positive total saving increases monotonically across the wealth distribution (Figure 2, top row). Among the bottom 30% wealthiest households, only 28–40% display positive total saving. This fraction rises above 50% from the 30th wealth percentile onward and peaks at approximately 70% for the top 20%. Conversely, nearly 30% of the wealthiest households display negative total saving in a given period.

Second, at the intensive margin, flow-based saving rates increase monotonically with wealth ranks (Figure 2, middle row). The two flow-based saving rates follow similar trajectories in the middle of the distribution but diverge at the top: saving rates out of labor income exceed saving rates out of new resources for the top 20% wealthiest. This divergence reflects the declining importance of labor income relative to capital income for the wealthiest households.

Third, at the intensive margin, stock-based saving rates increase moderately with wealth ranks (Figure 2, bottom row). Saving rates out of wealth display a U-shaped pattern: they decline slightly from the 40th to the 80th wealth percentile before rising for the wealthiest households,

Figure 2: Total saving rates across the wealth distribution.



Note: the top row displays the fraction of households with positive total saving. The middle row displays flow-based saving rates: out of labor income (left) and out of new resources (right). The bottom row displays stock-based saving rates: out of wealth (left) and out of available resources (right). Black lines denote household-level method estimates, red lines denote aggregate method estimates. The 2001–2021 PSID sample is used. For deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported.

so that saving rates of the top 10% are similar to (household-level method) or higher than (aggregate method) those in the middle of the distribution. Saving rates out of available resources increase monotonically from the middle of the distribution onward.

Fourth, the household-level and aggregate methods yield similar patterns: for both estimators, flow-based saving rates increase strongly with wealth ranks (Figure 2, middle row), while saving rates out of wealth and available resources display a U-shaped pattern and moderate increase respectively (Figure 2, bottom row). However, the methods differ in levels: the aggregate method generally predicts higher saving rates at the top and slightly lower saving rates in the middle. Section 7 shows that this discrepancy stems primarily from each method's treatment of wealth rank mobility.

Literature comparison How do the observed total saving rate patterns compare to existing research? I compare these patterns to studies of (1) the Nordic countries and (2) the United States. The former rely on mobility-consistent estimators, while the latter use the biased synthetic method.

Using Swedish administrative data, Bach et al. (2018) document that the total saving rate out of wealth declines with wealth ranks: the saving rate declines from 11.4% at decile 41–50 to below 7.4% from the 90th percentile onward under the household-level method. In contrast, I obtain saving rates out of wealth that are higher and only minorly declining (from 12% to 8% from wealth percentile 41 onward) before rising again to approximately 10–11% for the top 20% (Figure 2, bottom row). Three factors may explain this divergence. First, Bach et al. (2018) compute saving rates at the individual level, while I do so at the household level. Second, my sample covers 2001–2021, while theirs covers 2000–2007. Third, the divergence may reflect genuine differences in saving behavior: saving rate inequality in the United States may exceed that in Sweden.

Fagereng et al. (2025) use Norwegian administrative data to study total saving rates out of labor income and wealth at the household level using the household-level method. These authors find that the total saving rate out of labor income rises strongly with wealth ranks, consistent with my results for the U.S. (Figure 2, middle row). However, the functional form differs: I find a convex relationship from the 41st percentile onward, while Fagereng et al. (2025) obtain a concave pattern. Moreover, the total saving rate out of labor income of the top 10% is substantially higher in my analysis (over 80%) compared to Fagereng et al. (2025) (at most 50%). Consistent with Bach et al. (2018), Fagereng et al. (2025) also find that the total saving rate out of wealth declines strongly with wealth ranks and is lower for the top 50% than in the U.S. While part of this difference may reflect diverging sample periods (2001–2021 versus 2005–2015), these results suggest greater saving rate inequality in the U.S. than in Norway.

For the United States, Saez & Zucman (2016) rely on the synthetic method to compute the total saving rate out of income. They find that this saving rate rises with wealth ranks, both over their full sample (1917–2012) and over the period overlapping with mine (2001–2012). This pattern aligns with my results for the total saving rate out of new resources (Figure 2, middle row), which is methodologically closest to Saez & Zucman's saving rate out of income. However, for 2001–2012, Saez & Zucman (2016) obtain a total saving rate out of income of 7–15% for the top 10% to 1%, and 35–38% for the top 1%. In contrast, my aggregate method estimate for the top 10% yields a substantially higher total saving rate out of new resources at 53%. Section 6 shows that this divergence most likely stems from the negative bias inherent in the synthetic estimation method.

Robustness The baseline results are robust along two dimensions. First, the relationship between total saving rates and wealth ranks is stable over time: flow-based saving rates rise monotonically with wealth, while stock-based saving rates display a U-shaped pattern (saving rates out of wealth) or moderate increase (saving rates out of available resources) across all sub periods (Online Supplement, Appendix E). However, the level of saving rates varies considerably: saving was elevated during 2019–2021 and depressed during 2007–2011, driven primarily by variation in passive saving. Second, the baseline patterns persist when conditioning on labor income, age, and business ownership. The relationship between saving rates and wealth ranks is largely unaffected by these variables, although level effects again emerge: saving rates are higher for younger households throughout the wealth distribution, and entrepreneurs display both higher saving rates and a steeper positive relationship between stock-based saving rates and wealth.

5.2 Active and passive saving: a decomposition

This subsection decomposes total saving across the wealth distribution into active saving (disposable income minus consumption) and passive saving (capital gains and inter-generational transfers). The decompositions use the household-level method.

Active versus passive saving How does the composition of total saving vary across the wealth distribution (Figure 3)?

First, the composition of total saving shifts from active toward passive saving at higher wealth ranks. In the middle of the wealth distribution, passive saving accounts for 40–60% of total saving. This fraction rises to over 80% for the top wealth decile. Second, the relationship between saving rates and wealth ranks differs markedly between active and passive components. Active flow-based saving rates rise only modestly with wealth (out of labor income) or are approximately stable before declining at the top (out of new resources). Active stock-based saving rates decline across the wealth distribution. Passive saving rates, both flow-based and stock-based, increase strongly with wealth ranks. The finding that active flow-based saving rates are stable or declining relates to Fagereng et al. (2025), who document similar patterns in Norway. Similarly, the decline in the active saving rate out of wealth aligns with results for Sweden in Bach et al. (2018).

Composition of passive saving Passive saving dominates total saving for the wealthiest households, but does it consist primarily of capital gains or inter-generational transfers? Figure 4 reports passive saving rates out of wealth separately for each passive saving component. Results for other saving rates yield identical findings (Online Supplement, Appendix H).

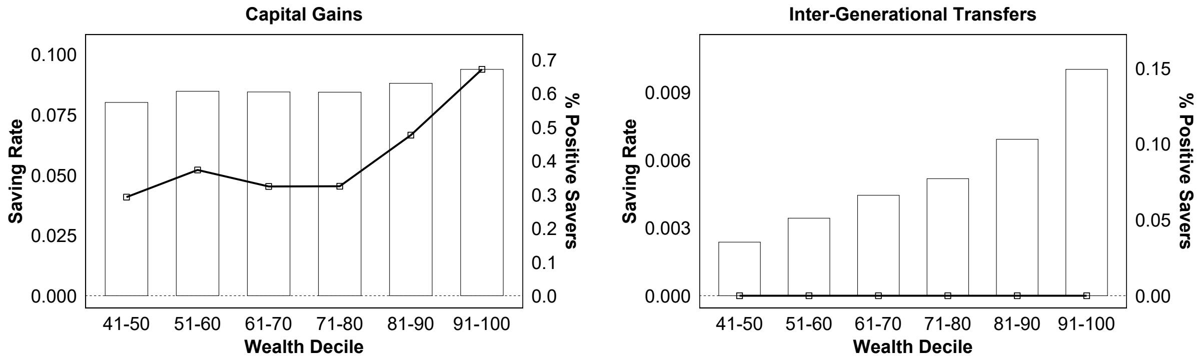
First, capital gains account for nearly all passive saving among the wealthy. Capital gains as a share of wealth rise from approximately 10% at the 51st wealth percentile to over 40% for the top wealth decile (Figure 4, left panel). In contrast, the fraction of households with positive capital gains stabilizes around 60% from wealth decile 51–60 onward (Figure 4, left panel). As a result, the intensive margin drives the increase in capital gains saving.

Second, the contribution of inter-generational transfers to passive saving is more limited. Only 15% of households in the top wealth decile receive positive transfers in a given time period (Figure 4, right panel), and the conditional median transfer rate is flat or declining across the

Figure 3: Decomposition of total saving rates into active and passive components.

Note: bars display active and passive saving rates (left axis). The red line displays the ratio of passive to total saving (right axis). Saving rates are computed using the household-level method. The top row shows flow-based saving rates (out of labor income and new resources), the bottom row shows stock-based saving rates (out of wealth and available resources). The 2005–2021 PSID sample is used. For deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported. The sum of median active and passive saving rates may exceed the total saving rate in Figure 2 because the median households for each component may differ.

Figure 4: Decomposition of passive saving into capital gains and inter-generational transfers.



Note: bars display the fraction of households with positive capital gains (left panel) or positive inter-generational transfers (right panel) on the left axis. Lines display passive saving rates out of wealth on the right axis. Saving rates are computed using the household-level method. The 2001–2021 PSID sample is used. For deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported.

wealth distribution (Online Supplement, Appendix H). The unconditional median passive saving rate from transfers therefore equals zero throughout the wealth distribution (Figure 4, right panel).

6 The synthetic method and its bias

When panel data is unavailable, researchers have resorted to the synthetic method to estimate saving rates across the wealth distribution (e.g., Saez & Zucman, 2016, and indirectly in e.g., Kuhn et al., 2020; Mian et al., 2020; Smith et al., 2023). This section defines the synthetic method, contrasts it with the mobility-consistent aggregate method, and quantifies its bias. I focus on the total saving rate out of wealth γ, dropping the superscript T for convenience. Online Supplement, Appendix I reports results for the other saving rates.

6.1 Definition

The synthetic method computes the total saving rate out of wealth for a decile d as:

$$\gamma_{SY}^{d}(t) = \frac{\bar{w}_{P_t^d \setminus B_t^d}(t) - \bar{w}_{P_{t-1}^d \setminus B_{t-1}^d}(t-1)}{\bar{w}_{P_{t-1}^d \setminus B_{t-1}^d}(t-1)} \tag{26}$$

where, for other saving rates, the numerator is replaced with the appropriate average saving flow for households in decile d at t, and the denominator with the average base variable for households in decile d at $t-1$. Equation 26 coincides with the aggregate method in Equation 20 only when:

$$P_t^d \setminus B_t^d = P_{t-1}^d \setminus B_{t-1}^d \tag{27}$$

i.e., when there is no wealth rank mobility. When wealth mobility is present, the synthetic method compares two different groups of households across time periods. This introduces a bias relative to the mobility-consistent aggregate method (see also Bach et al., 2018).

6.2 Magnitude of the bias

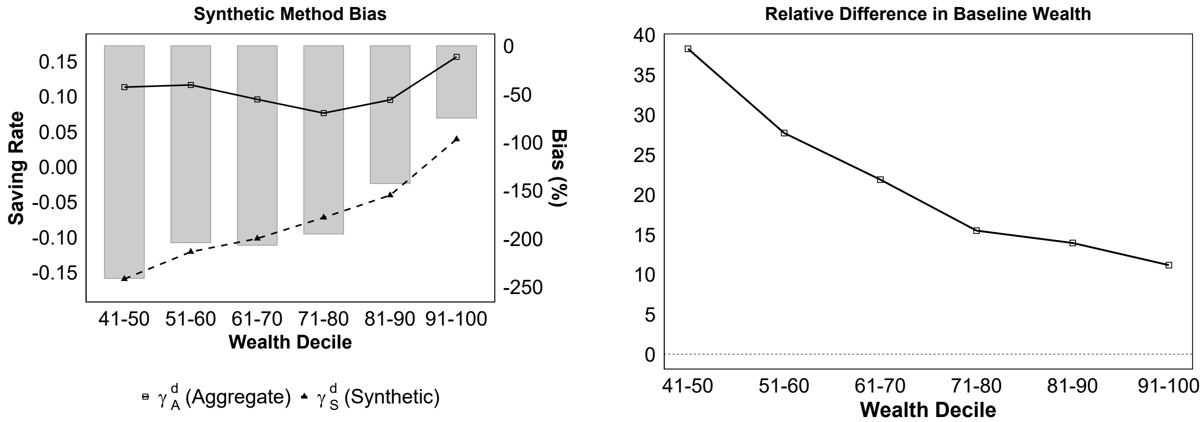
The bias of the synthetic method relative to the mobility-consistent aggregate method is defined as:

$$B^d(t) = \frac{\gamma_{SY}^d(t) - \gamma_A^d(t)}{\gamma_A^d(t)} \tag{28}$$

where $B^d(t)$ equals the relative difference between the synthetic method estimate $\gamma_{SY}^d(t)$ and the aggregate method estimate $\gamma_A^d(t)$. Substituting the definitions from Equations 20 and 26 shows that the bias arises from the different baselines used by the two methods: the synthetic method uses $\bar{w}_{P_{t-1}^d \setminus B_{t-1}^d}(t-1)$ as its baseline (all households in decile d at $t-1$), while the aggregate method traces current decile members backward to obtain $\bar{w}_{P_t^d \setminus B_t^d}(t-1)$. These baselines differ whenever wealth rank mobility occurs.

How large is the bias of the synthetic method for the saving rate out of wealth? The empirical results reveal two patterns (Figure 5, left panel). First, the synthetic method underestimates saving rates throughout the wealth distribution: $B^d(t) < 0$ for all deciles where saving rates are defined. The synthetic method yields negative saving rate estimates up to wealth decile 81–90, while the aggregate method produces positive estimates throughout. Second, the absolute bias declines monotonically with wealth: in the middle of the distribution (wealth percentiles 41–70), the bias exceeds 200% in absolute value, but falls to approximately 75% for the top decile. As a result, the synthetic method overstates saving rate inequality. Heterogeneous agent models calibrated to synthetic method estimates may therefore over-attribute wealth

Figure 5: Synthetic method bias for the total saving rate out of wealth (left panel) and relative difference between the synthetic and aggregate method baselines (right panel).



Note: the left panel plots the synthetic method bias $B^d(t)$ from Equation 28 across wealth deciles. The right panel plots the relative difference between the synthetic method and aggregate method baselines from Equation 29. A positive relative difference indicates that the synthetic method's baseline exceeds the aggregate method's baseline, which generates a negative bias. The 2001–2021 PSID sample is used. Edge cases are handled as specified in Section 4. For wealth deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported.

concentration to saving rate heterogeneity. Online Supplement, Appendix I shows that the same two findings hold for flow-based saving rates and the other stock-based saving rate.

6.3 Determinants of the bias

The following proposition characterizes when and why the synthetic method underestimates saving rates.

Proposition 6.1 (Determinants of Synthetic Bias)**.** *Assume* $\gamma^d_A(t) > 0$, $\bar{w}_{P^d_t \setminus B^d_t}(t-1) > 0$, *and* $\bar{w}_{P^d_{t-1} \setminus B^d_{t-1}}(t-1) > 0$. *The sign of the synthetic bias is determined by:*

$$\text{sign}(B^d(t)) = -\text{sign}\left(\frac{\bar{w}_{P^d_{t-1} \setminus B^d_{t-1}}(t-1) - \bar{w}_{P^d_t \setminus B^d_t}(t-1)}{\bar{w}_{P^d_t \setminus B^d_t}(t-1)}\right) \tag{29}$$

The synthetic method underestimates saving rates ($B^d(t) < 0$) if and only if the average wealth of households in decile d at $t-1$ (synthetic baseline) exceeds the average initial wealth of households currently in decile d (aggregate baseline). The magnitude of $|B^d(t)|$ is increasing in this relative difference.

Proof. Let $a = \bar{w}_{P_t^d \setminus B_t^d}(t)$, $b = \bar{w}_{P_t^d \setminus B_t^d}(t-1)$, and $c = \bar{w}_{P_{t-1}^d \setminus B_{t-1}^d}(t-1)$. Substituting the definitions from Equations 20 and 26 into Equation 28 leads to: $B^d(t) = \frac{a(b-c)}{c(a-b)}$. Under the stated assumptions, $a > b > 0$ and $c > 0$, meaning that $sign(B^d(t)) = sign(b-c) = -sign\left(\frac{c-b}{b}\right)$. $\square$

What explains the observed synthetic method bias patterns? First, the relative difference in baseline wealth from Equation 29 is consistently positive throughout the wealth distribution (Figure 5, right panel), which generates the negative bias. The synthetic method's baseline includes households who were in decile d at $t-1$, while the aggregate method's baseline includes households currently in decile d traced back to $t-1$. The former exceeds the latter because exiters from decile d had higher initial wealth than entrants into decile d. Second, the relative difference in baseline wealth declines monotonically with wealth: it peaks at approximately 40% in the middle of the distribution and falls to around 10% for the top decile. This explains the declining absolute bias across the wealth distribution.

The synthetic method's bias arises because it ignores wealth rank mobility. Section 7 analyzes the contribution of mobility to the mobility-consistent estimators.

7 Wealth rank mobility contribution

Section 6 showed that the synthetic method's bias arises from ignoring wealth rank mobility. This section quantifies the contribution of mobility to the baseline saving rate estimates from Section 5. I focus on the total saving rate out of wealth γ, dropping the superscript T for convenience. Online Supplement, Appendix J reports results for the other saving rates.

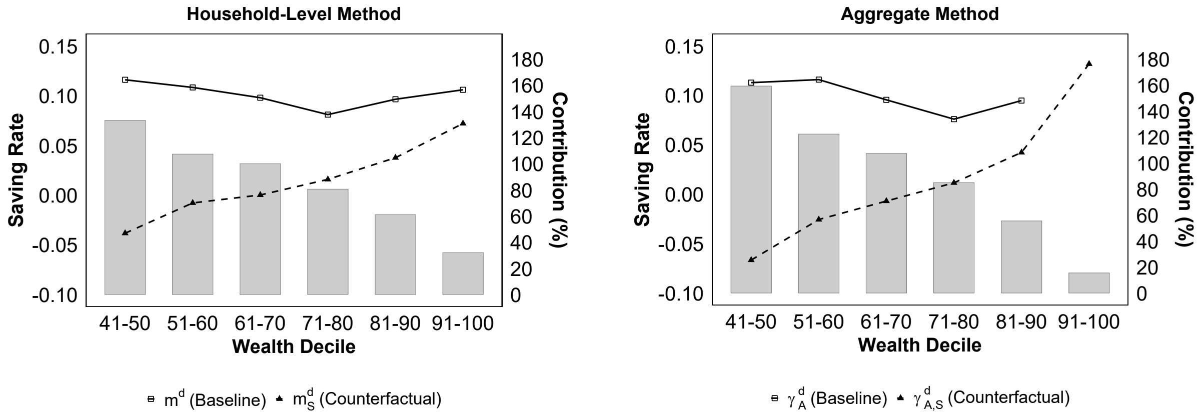
7.1 Magnitude of the contribution

The mobility contribution measures how much wealth rank mobility raises saving rate estimates relative to a counterfactual using only immobile households.

For the household-level method, let $\gamma_{C,S}^d(t) = Q_{0.5}[F_{S_t^d}(m,t)]$ denote the median saving rate computed over immobile households only. The contribution of endogenous wealth rank mobility to the total saving rate out of wealth estimates is:

$$v_C^d(t) = \frac{|\gamma_C^d(t) - \gamma_{C,S}^d(t)|}{\gamma_C^d(t)} \tag{30}$$

Figure 6: Baseline and counterfactual total saving rates out of wealth under the household-level method (left panel) and aggregate method (right panel).



Note: the lines (left axes) display the saving rate estimates: the baseline saving rate is computed over all endogenous households in decile d at time t, while the counterfactual saving rate is computed using only immobile households. The bars (right axes) display the mobility contribution from Equations 30 and 31, representing the relative difference between baseline and counterfactual. The 2001–2021 PSID sample is used. Edge cases are handled as specified in Section 4. For wealth deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported.

which measures the relative difference between the median saving rate computed from the empirical CDF of endogenous households (Equation 19) and the median saving rate restricted to immobile households.

For the aggregate method, let $\gamma^d_{A,S}(t) = \frac{\varpi_{S^d_t}(t) - \varpi_{S^d_t}(t-1)}{\varpi_{S^d_t}(t-1)}$ denote the saving rate computed over immobile households only. The contribution of endogenous wealth rank mobility to the estimated total saving rates out of wealth is:

$$v^d_A(t) = \frac{|\gamma^d_A(t) - \gamma^d_{A,S}(t)|}{\gamma^d_A(t)} \tag{31}$$

which represents the relative difference between the saving rate estimate computed over endogenous households (Equation 20) and the saving rate computed using immobile households only.

Figure 6 applies these measures to the PSID data. Three patterns emerge. First, the contribution of wealth rank mobility is positive throughout the wealth distribution: counterfactual saving rates that exclude mobility are consistently lower than baseline estimates. Second, the mobility contribution declines monotonically with wealth: while wealth mobility accounts for over 100% of observed saving rates in the middle of the distribution (wealth percentiles 41–80), this contribution falls to 15–32% for the top decile. In the absence of wealth rank mobility, saving rate inequality across the wealth distribution would therefore be higher. Third, both estimation methods produce positive mobility contributions throughout, but the aggregate method yields stronger effects in the middle of the distribution and weaker effects at the top. Online Supplement, Appendix J reports results for the other saving rates, which yield the same three patterns.

7.2 Determinants of the contribution: a decomposition

Why is the mobility contribution positive and declining with wealth? Both methods express the mobility contribution in terms of two components: (i) household type shares and (ii) saving rate differentials relative to immobile households.

Household-level method I rewrite the mobility contribution to the household-level method estimates (Equation 30) in two steps. First, express the empirical CDF of endogenous households as a mixture over household types:

$$F_{P_t^d \setminus B_t^d}(m,t) = s_S^d(t) \cdot F_S^d(m,t) + s_U^d(t) \cdot F_U^d(m,t) + s_D^d(t) \cdot F_D^d(m,t) \tag{32}$$

where $F_g^d(m,t)$ denotes the empirical CDF of saving rates for household type $g \in \{S_t^d, U_t^d, D_t^d\}$ in decile d at time t. When the saving rate distributions of the three household types have limited overlap, the median of this mixture distribution can be approximated as[8]:

$$Q_{0.5}[F_{P_t^d \setminus B_t^d}(m,t)] \approx s_S^d(t) \cdot m_S^d(t) + s_U^d(t) \cdot m_U^d(t) + s_D^d(t) \cdot m_D^d(t) \tag{33}$$

where $m_g^d(t) = Q_{0.5}[F_g^d(m,t)]$ denotes the median saving rate of household type $g \in \{S_t^d, U_t^d, D_t^d\}$. Second, using the approximation in Equation 33, the mobility contribution in Equation 30 can

[8] This approximation treats the mixture median as approximately equal to the weighted average of component medians. It holds exactly when the distributions are non-overlapping and $s_S^d(t) > 0.5$. It remains a reasonable approximation when the distributions are sufficiently separated. In the PSID data, the empirical CDFs of the three household types display limited overlap (Online Supplement, Appendix K).

be written as:

$$v_C^d(t) \approx \frac{\left|s_U^d(t) \cdot \left[m_U^d(t) - m_S^d(t)\right] + s_D^d(t) \cdot \left[m_D^d(t) - m_S^d(t)\right]\right|}{\gamma_C^d(t)} \tag{34}$$

Proposition 7.1 (Determinants of Mobility Contribution: Household-Level Method)**.** *Under the approximation in Equation 33, the wealth mobility contribution $v_C^d(t)$ to the household-level method estimates is determined by:*

(i) Household type shares: $s_U^d(t)$, $s_D^d(t)$

(ii) Median saving rate differentials: $m_U^d(t) - m_S^d(t)$, $m_D^d(t) - m_S^d(t)$

(iii) Baseline saving rate: $\gamma_C^d(t)$

Proof. Substitute Equation 33 into Equation 30 and use $\gamma_{C,S}^d(t) = m_S^d(t)$. Since $s_S^d(t) + s_U^d(t) + s_D^d(t) = 1$, rearranging yields Equation 34. This Equation depends only on (i)–(iii). □

Proposition 7.2 (Sign and Monotonicity: Household-Level Method)**.** *Assume the saving rate distributions satisfy first-order stochastic dominance: $F_D^d(m,t) \geq F_S^d(m,t) \geq F_U^d(m,t)$ for all m, which implies $m_U^d(t) > m_S^d(t) > m_D^d(t)$. Define $\Delta_d x^d \equiv x^{d+1} - x^d$. In that case:*

(a) $\gamma_C^d(t) > \gamma_{C,S}^d(t) \iff s_U^d(t) \cdot \left[m_U^d(t) - m_S^d(t)\right] > s_D^d(t) \cdot |m_D^d(t) - m_S^d(t)|$

(b) When (a) holds: $\Delta_d v_C^d(t) < 0 \impliedby \Delta_d s_U^d(t) < 0 \vee \Delta_d s_D^d(t) > 0 \vee \Delta_d[m_U^d(t) - m_S^d(t)] < 0 \vee \Delta_d|m_D^d(t) - m_S^d(t)| > 0$

Proof. (a) From Equation 34, it follows that: $\gamma_C^d(t) - \gamma_{C,S}^d(t) \approx s_U^d(t) \cdot [m_U^d(t) - m_S^d(t)] + s_D^d(t) \cdot [m_D^d(t) - m_S^d(t)]$. Under FOSD, $m_D^d(t) - m_S^d(t) < 0$. As a result, the mobility contribution is positive if and only if the upward entrant term exceeds the absolute value of the downward entrant term.

(b) From Equation 34, it follows that $v_C^d(t)$ increases in $s_U^d(t)$ and $[m_U^d(t) - m_S^d(t)]$, and that it decreases in $s_D^d(t)$ and $|m_D^d(t) - m_S^d(t)|$. As a result, any of the stated conditions implies that $\Delta_d v_C^d(t) < 0$. □

Aggregate method To rewrite the mobility contribution for the aggregate method, I again proceed in two steps. First, the aggregate method implicitly weights household types by their initial wealth shares (Equation 25). The aggregate method estimate can therefore be written as:

$$\gamma_A^d(t) = \hat{s}_S^d(t) \cdot \gamma_{A,S}^d(t) + \hat{s}_U^d(t) \cdot \gamma_{A,U}^d(t) + \hat{s}_D^d(t) \cdot \gamma_{A,D}^d(t) \tag{35}$$

where $\gamma_{A,g}^d(t)$ denotes the saving rate of household type $g \in \{S_t^d, U_t^d, D_t^d\}$ in decile d at time t computed according to the aggregate method. In addition, $\hat{s}_g^d(t)$ reflect the household type wealth-weighted shares. Second, the mobility contribution under the aggregate method (Equation 31) equals:

$$v_A^d(t) = \frac{\left| \hat{s}_U^d(t) \cdot \left[\gamma_{A,U}^d(t) - \gamma_{A,S}^d(t)\right] + \hat{s}_D^d(t) \cdot \left[\gamma_{A,D}^d(t) - \gamma_{A,S}^d(t)\right] \right|}{\gamma_A^d(t)} \tag{36}$$

Proposition 7.3 (Determinants of Mobility Contribution: Aggregate Method)**.** *The mobility contribution $v_A^d(t)$ in Equation 36 is determined by:*

(i) Wealth-weighted household type shares: $\hat{s}_U^d(t)$, $\hat{s}_D^d(t)$

(ii) Average saving rate differentials: $\gamma_{A,U}^d(t) - \gamma_{A,S}^d(t)$, $\gamma_{A,D}^d(t) - \gamma_{A,S}^d(t)$

(iii) Baseline saving rate: $\gamma_A^d(t)$

The mobility contribution is increasing in (i) and in the absolute value of (ii), and decreasing in (iii).

Proof. Equation 36 expresses $v_A^d(t)$ as a function of (i)–(iii) only. The comparative statics follow mechanically from this Equation. $\square$

Proposition 7.4 (Sign and Monotonicity: Aggregate Method)**.** *Assume $\gamma_{A,U}^d(t) > \gamma_{A,S}^d(t) > \gamma_{A,D}^d(t)$. Define $\Delta_d x^d \equiv x^{d+1} - x^d$. In that case:*

(a) $\gamma_A^d(t) > \gamma_{A,S}^d(t) \iff \hat{s}_U^d(t) \cdot \left[\gamma_{A,U}^d(t) - \gamma_{A,S}^d(t)\right] > \hat{s}_D^d(t) \cdot |\gamma_{A,D}^d(t) - \gamma_{A,S}^d(t)|$

(b) When (a) holds: $\Delta_d v_A^d(t) < 0 \impliedby \Delta_d \hat{s}_U^d(t) < 0 \lor \Delta_d \hat{s}_D^d(t) > 0 \lor \Delta_d[\gamma_{A,U}^d(t) - \gamma_{A,S}^d(t)] < 0 \lor \Delta_d|\gamma_{A,D}^d(t) - \gamma_{A,S}^d(t)| > 0$

Proof. (a) From Equation 36, it follows that: $\gamma^d_A(t) - \gamma^d_{A,S}(t) = \hat{s}^d_U(t) \cdot [\gamma^d_{A,U}(t) - \gamma^d_{A,S}(t)] + \hat{s}^d_D(t) \cdot [\gamma^d_{A,D}(t) - \gamma^d_{A,S}(t)]$. Under the stated assumption, $\gamma^d_{A,D}(t) - \gamma^d_{A,S}(t) < 0$. As a result, the mobility contribution is positive if and only if the upward entrant term exceeds the absolute value of the downward entrant term.

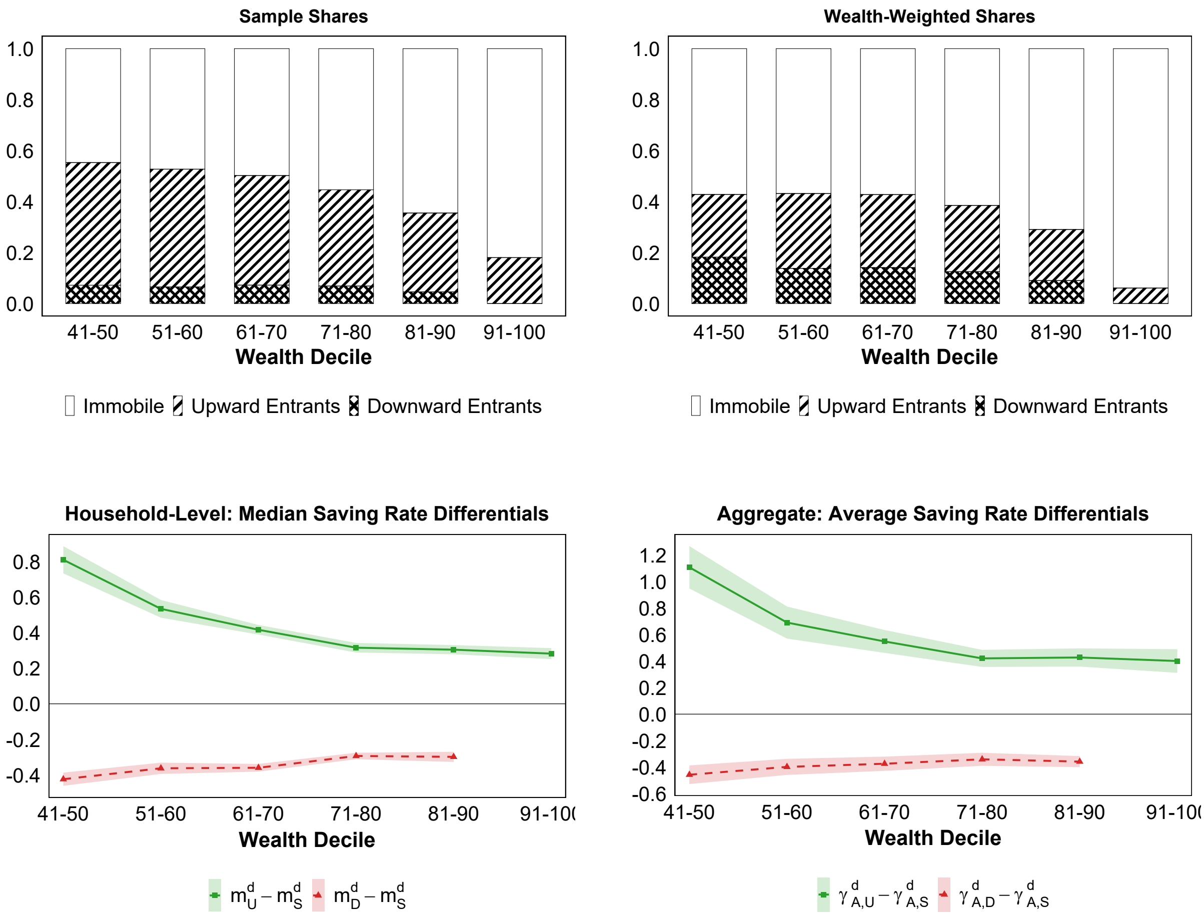
(b) From Equation 36, it follows that $v^d_A(t)$ increases in $\hat{s}^d_U(t)$ and $[\gamma^d_{A,U}(t) - \gamma^d_{A,S}(t)]$, and that it decreases in $\hat{s}^d_D(t)$ and $|\gamma^d_{A,D}(t) - \gamma^d_{A,S}(t)|$. Any of the stated conditions therefore implies that $\Delta_d v^d_A(t) < 0$. $\square$

7.3 Empirical verification

Propositions 7.2 and 7.4 identify the determinants of the mobility contribution. What explains the positive but monotonically declining wealth mobility contribution patterns in the data? First, upward entrants outnumber downward entrants throughout the wealth distribution under both population shares and wealth-weighted shares (Figure 7, top row). Second, saving rates are strictly ordered by household type: upward entrants display the highest saving rates, followed by immobile households, followed by downward entrants (Figure 7, bottom row). Third, the share of upward entrants falls from nearly 50% in the middle of the distribution to approximately 20% at the top (Figure 7, top row). Fourth, the saving rate differential between upward entrants and immobile households narrows at higher wealth levels (Figure 7, bottom row).

Why does the aggregate method yield larger mobility contributions than the household-level method in the middle of the distribution but smaller contributions at the top? Two forces explain this pattern. First, in the middle of the distribution, upward entrants' saving rate distributions are right-skewed, so average differentials exceed median differentials (Figure 7, bottom row). This raises the aggregate method's contribution. Second, the aggregate method assigns lower weight to upward entrants (who have low initial wealth) and higher weight to downward entrants (who have high initial wealth): $\hat{s}^d_U(t) < s^d_U(t)$ and $\hat{s}^d_D(t) > s^d_D(t)$ (Proposition 3.1). This mechanically reduces the aggregate method's contribution. At the top of the distribution, where skewness diminishes, the weighting effect dominates.

Figure 7: Determinants of the mobility contribution under the household-level method (left column) and aggregate method (right column).



Note: the top row displays household type shares across wealth deciles: population shares for the household-level method (top left) and wealth-weighted shares for the aggregate method (top right). The bottom row displays saving rate differentials relative to immobile households: median differentials for the household-level method (bottom left) and average differentials for the aggregate method (bottom right). These quantities correspond to the determinants identified in Propositions 7.1 and 7.3. The 2001–2021 PSID sample is used. For wealth deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported.

8 Conclusion

This paper develops two mobility-consistent estimators for saving rates across the wealth distribution and applies them to the Panel Study of Income Dynamics (PSID). I find that flow-based saving rates rise strongly with wealth, while stock-based saving rates remain stable or increase only moderately. Passive saving dominates among wealthy households, accounting for over 80% of total saving in the top decile.

The mobility-consistent estimators extend beyond saving rates: they apply to any variable measured across the wealth distribution when panel data is available. This includes among other portfolio returns, inter-generational transfer receipts, or income growth. In addition, the mobility-consistent estimators are generalizable to any distribution where rank mobility occurs, including the income distribution.

In addition, this paper quantifies the bias of the synthetic method and the contribution of wealth rank mobility to saving rate estimates. The synthetic method bias is substantial throughout the distribution but declines with wealth, meaning that the synthetic method overstates saving rate inequality. The wealth rank mobility contribution is similarly large in the middle of the distribution but more modest at the top.

Several questions remain open. Does the synthetic method bias exhibit similar patterns in administrative data or in other countries? The bias depends on the relationship between wealth rank mobility and baseline wealth differences, which may vary across institutional contexts. And how does the contribution of wealth mobility differ in countries with different wealth distributions or transfer systems?

The findings have implications for heterogeneous agent models. First, the dominance of passive saving among wealthy households suggests that return heterogeneity is critical in accounting for wealth inequality. Second, the downward bias of the synthetic method implies that models calibrated to such estimates may over-attribute wealth inequality to differential saving rates. Quantitative work incorporating mobility-consistent moments could therefore yield different conclusions about the mechanisms driving wealth dynamics.

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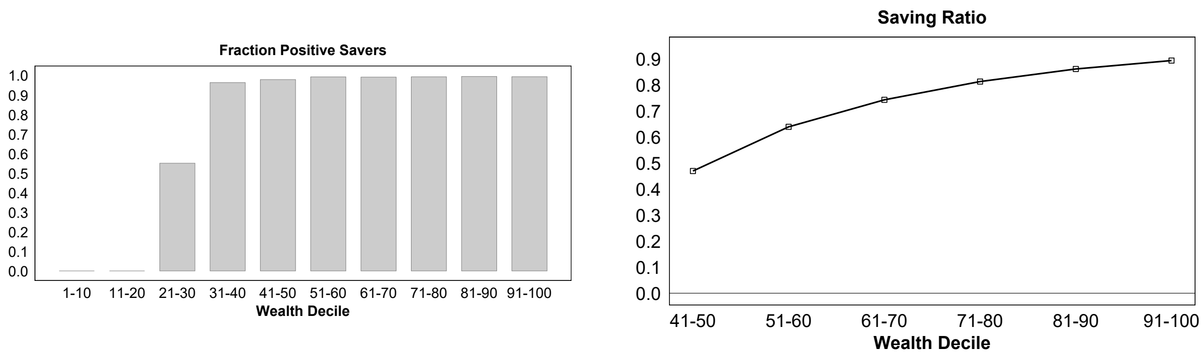
A Saving ratios

Heterogeneous agent models often use the saving ratio ξ as a policy variable rather than the saving rates in the main text. The saving ratio (Equation 12) represents the fraction of available resources Λ^C transferred to the next period as wealth w. Figure 8 reports saving ratio outcomes across the wealth distribution using the household-level method.

Two patterns emerge. First, the fraction of households with positive saving ratios equals zero for the bottom 20% (where wealth is negative) and rises to approximately one from wealth decile 31–40 onward. Second, for households with non-negative wealth, saving ratios rise monotonically with wealth: from approximately 0.50 in the middle of the wealth distribution to 0.90 for the top wealth decile.

Figure 8: Saving ratios across the wealth distribution.



Note: the left panel displays the fraction of households with positive saving ratios across wealth deciles. The right panel displays median saving ratios computed using the household-level method. The 2001–2021 PSID sample is used. Edge cases are handled as detailed in Section 4. For deciles 1–10 through 31–40, saving rates are generally ill-defined and values are not reported.

B Data and empirical strategy

This Appendix provides additional detail on the dataset and empirical strategy summarized in Section 4.

B.1 The PSID

I use the SRC subsample of the Panel Study of Income Dynamics (PSID), standard in macroeconomic research (e.g., Cooper et al., 2019; Heathcote et al., 2010; Straub, 2019). This representative sample underrepresents the top of the wealth distribution (Insolera et al., 2021; Pfeffer et al., 2016; Van Langenhove, 2025b), although the bias is constant over time (Van Langenhove, 2025b). I therefore use the top 10% to represent wealthy households.

The PSID contains sufficient information to construct all budget constraint variables from Equation 1, with two exceptions. First, tax payments are imputed using NBER TAXSIM (v35). Second, consumption is measured accurately only from 2005 onward (Andreski et al., 2014; Li et al., 2010). I therefore use two samples: 2001–2021 for total and passive saving, and 2005–2021 for active saving.

B.2 Computation household-level saving rates

Saving concepts Total saving, active saving, and passive saving for household i are computed in the PSID as:

$$\tilde{s}_i^T(t) = \Delta\tilde{w}_i(t) - \tilde{\eta}_i(t) \tag{37}$$

$$\tilde{s}_i^A(t) = \tilde{y}_i(t) + \tilde{g}_i(t) + \tilde{r}_i^i(t) \cdot \tilde{w}_i(t) - \tilde{\tau}_i(t) - \tilde{c}_i(t) \tag{38}$$

$$\tilde{s}_i^P(t) = \tilde{r}_i^c(t) \cdot \tilde{w}_i(t) + \tilde{m}_i(t) \tag{39}$$

where $\tilde{x}$ denotes the PSID measure of variable x. Active saving requires consumption $\tilde{c}$ and is available only for 2005–2021. Total and passive saving are available for both samples.

Saving rates To compute saving rates, the total, active and passive saving flows are normalized by labor income, new resources, wealth, and available resources. Labor income $\tilde{y}$ and wealth $\tilde{w}$ are directly observed. New resources $\tilde{\Lambda}^N$ and available resources $\tilde{\Lambda}^C$ are imputed from the budget constraint:

$$\tilde{\Lambda}_i^N(t) = \tilde{y}_i(t) + \tilde{g}_i(t) + \tilde{r}_i^i(t) \cdot \tilde{w}_i(t) + \tilde{r}_i^c(t) \cdot \tilde{w}_i(t) - \tilde{\tau}_i(t) + \tilde{m}_i(t) \tag{40}$$

$$\tilde{\Lambda}_i^C(t) = \tilde{w}_i(t) + \tilde{\Lambda}_i^N(t) \tag{41}$$

Alternatively, one could impute new resources $\tilde{\Lambda}^N$ and available resources $\tilde{\Lambda}^C$ using the imputed consumption variable $\tilde{c}$. Online Supplement, Appendix D presents the results from this expenditure-based approach. It yields nearly identical results to the approach in Equations 40 and 41.

B.3 Sample restrictions and technical choices

Some households display zero or negative denominators in saving rate calculations. For zero denominators, I set the saving rate to zero. For negative denominators, I set the saving rate to 0.05 if saving is positive and -0.05 if negative. These edge cases predominantly affect wealth percentile 35 and below, where saving rates are ill-defined.

I restrict the sample to households with a reference person older than 20 (as in Bach et al. (2018) and the wealth inequality literature), and trim the most extreme 0.5% of saving rate observations in each tail, which is standard in PSID research (e.g., Gaillard & Wangner, 2023; Straub, 2019). Sample sizes range from 30,000 to 40,000 observations.

In addition, I made three technical choices. First, I adjust saving for household composition changes (children or relatives entering or leaving with assets). Second, since the PSID collects wealth bi-annually from 1999, I interpolate between waves using geometric interpolation (or linear interpolation when wealth changes sign). Third, I address item non-response in wealth data using the procedures from Van Langenhove (2025b).

The results of this paper are robust to alternative trimming parameters, and alternative interpolation and non-response procedures.

B.4 Estimation

The analysis pools data over 2001–2021 (inflow-based) and 2005–2021 (expenditure-based). For the household-level method, following Fagereng et al. (2025), I pool all waves to construct an empirical CDF F^d for each wealth decile d and report the median:

$$\gamma_C^d = Q_{0.5}[F^d], \quad \text{where } F^d(\gamma_C^d) = 0.5 \tag{42}$$

For the aggregate method, I compute annual estimates $\gamma_A^d(t)$ and average across waves:

$$\gamma_A^d = \frac{1}{|T|} \sum_{t \in T} \gamma_A^d(t) \tag{43}$$

C Budget constraint variables in the PSID

This Appendix describes how I construct budget constraint variables from the PSID. I denote PSID measures with a tilde ($\tilde{x}$), in line with Appendix B. The PSID includes wealth questions only in 1984, 1989, 1994, and bi-annually from 1999. I restrict the data to 1999–2021, with survey waves $s \in \{1999, 2001, \ldots, 2019, 2021\}$. When respondents cannot report exact values, I apply the bracketing procedure from Van Langenhove (2025b). The results of this paper are robust to this choice.

C.1 Wealth

Wealth $\tilde{w}$ equals total assets minus total liabilities. Assets include gross main housing, business holdings, equity holdings, fixed-income holdings, pension wealth (DC plans, IRAs, private annuities), and gross other housing. Liabilities consist of main mortgages, other housing debt, and non-mortgage debt (consumer debt, medical debt, student debt, debt to relatives, etc.). I follow Van Langenhove (2025b, Appendix A) for detailed definitions.

C.2 Income and capital gains

Income Labor income $\tilde{y}$ is reported separately for the reference person, spouse and (from 2005 onward) other household members. I sum across all individuals to obtain a household-level measure. Labor income includes wages and salaries, as well as tips and bonuses. It does not include business income.

In line with Gaillard & Wangner (2023), capital income $\tilde{r}^i$ includes farm income, business income, rental income, dividend income, interest income, and trust/royalty income. I attribute farm and business income entirely to capital income. The results of this paper are robust to this choice (e.g., to a 60-40 division).

Capital gains Capital gains $\tilde{r}^c$ equal the change in asset value not explained by net inflows, as in Gaillard & Wangner (2023). I allocate bi-annual capital gains across years using geometric interpolation (or linear interpolation when capital gains change sign) and sum across asset categories to obtain a total.

Three notes on the capital gains imputation. First, farm and business holdings are reported net of debt through 2011, while from 2013 onward assets and debts are reported separately. I compute capital gains from net values over the entire sample period. Second, for main housing, I define unrealized gains as the change in reported value net of 2% depreciation. Realized gains equal the housing selling price minus the prior value. For other housing, capital gains equal the change in net value corrected for inflows. I subtract expenditures on housing improvements. Third, for pension wealth (DC plans and IRAs), net inflows are reported only for IRAs. For DC plans, I assume net inflows equal total employee and employer contributions.

C.3 Government and inter-generational transfers

Government transfers $\tilde{g}$ include social security income and transfer income. Prior to 2005, social security income is reported at the family level. From 2005 onward, it is reported separately for the reference person, spouse, and other members. I sum across individuals to obtain a household-level measure.

Inter-generational transfers $\tilde{m}$ consist primarily of inter-vivos gifts and inheritances received since the previous survey wave, plus net financial help from relatives. I also include lump-sum receipts (insurance payouts, lottery winnings) under this component. However, the contribution of lump-sum receipts to the total is minimal.

C.4 Consumption and taxes

The PSID asks detailed consumption questions from 1999, but coverage before 2005 captures only about 70% of CEX and NIPA expenditures. From 2005, coverage is nearly complete (Andreski et al., 2014; Li et al., 2010). A reliable imputation of consumption $\tilde{c}$ is therefore available only from 2005[9].

I include mortgage and consumer debt interest payments as part of consumption. Main mortgage interest payments are reported directly, while second mortgage and consumer debt interest need to be estimated. I do so using FRED interest rates applied to prior-period mortgage or consumer debt. I exclude from the consumption measure mortgage principal payments (treating them as saving), and include rental payments for non-homeowners.

[9] One could use the less precise pre-2005 consumption measure or impute consumption from the Consumption Expenditure Survey (Blundell et al., 2008; Fisher & Johnson, 2022). I avoid these approaches to minimize measurement error.

The PSID reports only property taxes. I estimate total taxes $\tilde{\tau}$ in four steps: (1) income, payroll, and capital gains taxes via NBER TAXSIM (v35), following Kimberlin et al. (2015), (2) estate taxes on inter-generational transfers (given the high exemptions, few observations are affected), (3) reported property and motor vehicle taxes, (4) sum all components to obtain total taxes.

When using the NBER TAXSIM program, I make two assumptions. First, I presume that realized capital gains equal 20% of total gains. These are attributed entirely to long-term gains. I also account for housing capital gains exemptions. Second, I use PSID-reported deductions for charitable contributions, childcare and medical expenses rather than the NBER TAXSIM computations for these components.

C.5 Household composition

A PSID family unit consists of a reference person and possibly a partner. Other individuals (children, siblings, elderly relatives) may enter or exit the household, creating an inflow or outflow of assets and debt. The PSID reports these inflows and outflows. I therefore define $\tilde{\eta}$ as the net wealth change due to household composition changes. I then adjust total saving accordingly.