How Do Inheritances Shape Wealth Inequality? Theory and Evidence from Sweden*

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Abstract

This paper aims to measure and understand the role of inheritances in shaping wealth inequality. We use a quasi-experimental design and Swedish administrative data to document that the average heir depletes her inheritance within a decade while the inheritances of wealthy heirs remain intact. These different depletion rates are not due to different consumption or labor supply responses but due to different rates of return on inherited wealth. Upon their receipt, inheritances reduce relative measures of wealth inequality, such as top shares or percentile ratios. Theoretically, this reduction in inequality could be due to either a compressed inheritance distribution or similar chances of having wealthy parents (high intergenerational mobility). Empirically, the first force is more significant in Sweden. Within a decade, however, the effect is reversed: inheritances increase wealth inequality since the different depletion rates widen the inequality in inherited wealth over time. This implies that inheritance taxation can reduce long-run wealth inequality only through the taxation of wealthy heirs.

The high concentration of wealth has always been one of the most salient aspects of inequality. Today, wealth inequality is the highest among all measures of inequality, and there are concerns about its impact on our democracies.[1] High wealth inequality stems from inequality in either inherited wealth or self-made wealth. The relative contribution of these two factors determines the ability of labor income versus inheritance taxes to curb wealth inequality. It also shapes the level of support for

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[1] In all countries with reliable data, the top 1% share of wealth is larger than the corresponding share of income (Alvaredo et al. 2016). For studies of wealth inequality's impact on political influence, see Phillips (2003), Bartels (2018), Saez and Zucman (2019) and the references therein.

wealth taxation among policymakers and citizens, who generally favor taxing inherited over self-made wealth (Harbury et al. 1977 and Fisman et al. 2020).

This paper aims to measure and understand the role of inheritances in shaping wealth inequality. We begin by developing a theoretical framework to understand how inheritances can affect the wealth distribution both in the short run (upon their receipt) and in the long run (accounting for heirs' behavioral responses). We then provide a comprehensive analysis of the effect of inheritances on wealth inequality using unique population-wide data from Sweden including detailed information on inheritances, inter vivos transfers, and third-party reported wealth.[2] Our research design exploits exogenous variation in the timing of inheritances by comparing similar individuals from the same birth cohort who lose a parent at different ages. We find that inheritances reduce relative measures of wealth inequality in the short-run, but this effect is completely reversed within a decade, because behavioral responses differ in critical ways between the average heir and those at the top of the wealth distribution.

Wealth Inequality To understand the mechanisms behind the inheritance effect on wealth inequality, we develop a theoretical framework. This framework shows that inheritances unambiguously increase absolute measures of wealth inequality in the short run. In contrast, the immediate effect of inheritances on relative measures of wealth inequality, such as top wealth shares, is ambiguous. However, we show that three well-studied moments — intergenerational wealth mobility, pre-inheritance wealth inequality, and inheritance inequality — are sufficient for predicting the inheritance effect on such inequality measures. The share of wealth among wealthy heirs increases in the share of wealthy heirs with wealthy parents (intergenerational mobility) and in the share of total inheritances bequeathed by wealthy parents (inheritance inequality). In addition, the higher the level of intergenerational mobility is, the larger the change in the composition of wealthy heirs.

For countries where these aggregate statistics are available — the U.S. and Sweden — the framework predicts that inheritances reduce short-run wealth inequality, as measured by the wealth share of the top 1%. These predictions are made without microdata but are consistent with the recent empirical evidence based on such data.[3]

Taking the theoretical framework to the microdata, we find direct evidence of a reduction of wealth inequality at the time of inheritance receipt in Sweden. This equalizing effect occurs despite wealthier heirs receive larger inheritances in absolute terms but because they receive smaller inheritances relative to their own wealth. It is mainly driven by a low level of inheritance inequality, rather than by high intergenerational wealth mobility. Furthermore, taking inter vivos transfers into account as well barely changes this conclusion.

The Evolution of Inheritances and Its Roots Over time, the effect of inheritances on wealth inequality depends on behavioral responses. The immediate effect may both attenuate and exacerbate depending on whether inheritances get depleted and consumed or are invested and grow. We find that while most heirs deplete their inheritances within a decade, wealthy heirs — those starting with

[2]We build on a literature that investigates the role of intergenerational transfers at death, i.e. inheritances. We extend this focus by providing evidence on inter vivos transfers with the caveat that such transfers observed in the tax records are potentially under-reported.

[3]See Wolff (2002) for the U.S. and Elinder et al. (2018) for Sweden.

a high level of wealth or receiving large inheritances — keep their inherited wealth practically intact. To understand the behavioral responses that underlie the heterogeneous depletion of inheritances, we develop a two-step method that can be applicable to any wealth shock. The first step estimates the effect of a wealth gain on unearned income (non-labor income) in each subsequent period. It captures how agents allocate extra resources across time. The second step estimates how the extra resources in each period are both financed and spent. An increase in unearned income is financed by either depleting the principal or earning an extra return on the principal. It is spent on either commodities or leisure, i.e. consuming more or working less. We refer to this two-step method as the *Mincerian Dynamic Approach*, inspired by Jacob Mincer's suggestion to relate labor supply responses to inheritances to those of an equivalent annual annuity (Holtz-Eakin et al. 1993, page 432).

We implement this approach empirically using our quasi-experimental design. The first step reveals that inheritances generate a roughly constant increase in unearned income over time for the average heir. This smoothing of unearned income provides evidence for a more general type of intertemporal substitution than traditional consumption smoothing does. Agents smooth unearned income under time-separable utility, but consumption smoothing requires the additional assumption of separability between consumption and leisure in the intra-temporal utility function. Moreover, the share of inheritances brought to each period does not vary considerably with the recipient's initial wealth and inheritance size.

The second step shows that wealthy heirs finance their extra unearned income through a higher return on inheritances, while other heirs deplete the principal, the inheritance itself. Thus, the former group manages to keep their inherited wealth intact while simultaneously consuming more and working less. On average, 70% of the extra unearned income in each period is devoted to consumption.[4] The remaining 30% goes to a reduction in labor income.[5] Using the car registry, we find that durable goods consumption accounts for at least one-fifth of the consumption responses in the first two years.

Based on these heterogeneous behavioral responses, the theoretical framework predicts that inheritances increase wealth inequality in the long run as inequality in remaining inheritances rises. This is precisely what we find. The short-run effect of inheritances on wealth inequality reverts within a decade. Both the top wealth shares and the ratios of the top percentiles to the median decline in the short run but revert over time.

Policy Implications Inheritance taxation changes short-run wealth inequality through only one of the three components discussed above, namely, the inheritance distribution. Intergenerational mobility and pre-inheritance wealth inequality are unchanged by an inheritance tax in the short run. Because inheritances decrease wealth inequality at baseline, a proportional inheritance tax *increases* wealth inequality in the short run by reducing the average magnitude of inheritances without changing inheritance inequality. However, if we lump-sum redistribute tax revenue, wealth

[4]We use the residual consumption method using the observed individual's wealth asset by asset (Koijen et al. 2015; Kolsrud et al. 2018, Eika et al. 2020 and Flodén et al. forthcoming). For consistency with this growing literature, we use the term consumption, even though as pointed out by a referee, the terms expenditure or spending are more accurate.

[5]Our meta-analysis shows that these estimated labor supply responses are larger than prior estimates. A partial explanation is that one-third of our labor supply responses are due to the non-pecuniary effects of losing a parent, such as grief or care-giving, rather than inheritances.

inequality will be reduced as the policy reduces inheritance inequality without decreasing the average magnitude of inheritances.[6] Taking behavioral responses to taxes into account is of second order relative to the mechanical effect of the tax in terms of changing the inheritance effect on wealth inequality. The long-run effect of an inheritance tax on wealth inequality depends purely on how extensively the inheritances of the wealthy are taxed, given that inherited wealth is persistent only for wealthy heirs.

These pieces of evidence enable us to compare inheritance taxation in the U.S., that taxes 0.2% of estates, to the Nordic countries, that have a much broader tax base (e.g., 34% in Sweden). The Nordic approach is less effective in dampening short-run wealth inequality. At the same time, both systems reduce wealth inequality similarly in the long run since the long-run effect only depends on the taxation of wealthy heirs. An additional downside of the Nordic approach is that it distorts bequest decisions of a broader population.

Prior Literature The recent years have seen renewed interest in the importance of inheritances for wealth inequality. Specifically, Wolff (2002), Boserup et al. (2016), Karagiannaki (2017) and Elinder et al. (2018) document that inheritances reduce wealth inequality in the short run. Our theoretical framework clarifies why inheritances reduce wealth inequality and generates predictions about the quantitative importance of different mechanisms.[7] We also show that in Sweden, the long-run effect on wealth inequality is opposite to the short-run effect. Intriguingly, this reversion is not due to heterogeneous consumption or labor supply responses, but to heterogeneous rates of return on inherited wealth, consistent with the return-gradient documented in Bach et al. (2020) and Fagereng et al. (2020). These results rely on a research design that combines the approach in Fadlon and Nielsen (2017) with the reweighting techniques of DiNardo et al. (1996). Moreover, we develop a simple method of adjusting the upper tail of the wealth distribution using the Pareto coefficients of its tail. This disciplines the tails of the distribution, ensuring that the results are not driven by extreme outliers.

Decomposing the behavioral responses to a wealth shock into inter- and intra-temporal decisions, we connect the literature on wealth effects to prior work on static income effects and the literature that investigates the effect of wealth on savings decisions (Johnson et al. 2006 and Parker et al. 2013 for tax rebates; Holtz-Eakin et al. 1993, Joulfaian and Wilhelm 1994, Brown et al. 2010, and Elinder et al. 2012 for inheritances; and Imbens et al. 2001, Cesarini et al. 2017 and Fagereng et al. forthcoming for lottery gains; Chetty 2006 and the references therein as well as Joulfaian 2006, Karagiannaki 2017 and Druedahl and Martinello forthcoming).

Our paper is also related to an older debate between Kotlikoff and Summers (1981) and Modigliani (1988) over the share of aggregate wealth that is due to inheritances, which is revisited in Piketty

[6] Any progressive inheritance tax – without the use of redistribution – is not effective in curbing short-run inequality. Theoretically, two counteracting forces are at play: wealthy heirs receive a higher share of large inheritances and a lower share of their wealth is inherited. We show empirically that the second effect dominates the first.

[7] For example, Elinder et al. (2018) write that "The equalizing effect can be explained solely by the distribution of wealth among the decedents being more equal than the distribution of wealth among the heirs." Our theoretical analysis shows that the distribution of wealth among the decedents is not a sufficient statistic for estimating the effect of inheritances on wealth inequality. One also needs to take intergenerational mobility into account. Similarly, Horioka (2009) finds that wealthier donors leave smaller bequests, concluding that inheritances reduce wealth inequality. Our framework highlights that this conclusion actually depends on how wealthy the heirs of these donors are.

(2011) and Ohlsson et al. (2020). Blinder (1988) points out the importance of behavioral responses for this debate, which is similar to our focus. Overall, a contribution of our paper is to estimate the effects of inheritances on all elements of the heir's inter-temporal budget constraint within one unified framework. This allows us to gauge the qualitative and quantitative implications of various mechanisms for the overall wealth distribution.

The outline of the paper is as follows. Section 1 presents a theoretical framework for how inheritances shape wealth inequality, both in the short and long runs, that guides the rest of the paper. Section 2 lays out the empirical setting that Section 3 uses to investigate the behavioral responses to inheritances. Section 4 investigates how heterogeneous behavioral responses to inheritances shape wealth inequality. Section 5 discusses our findings and their implications. Section 6 concludes. Theoretical derivations, proofs of propositions, additional empirical results, validity tests, and robustness checks are in the Appendix.

1 Theoretical Framework

This section provides a theoretical framework that guides our empirical analysis. We first examine how heirs respond to receiving inheritances and how these responses affect the evolution of inherited wealth. We then investigate the impact of inheritances on wealth inequality among heirs, in both the short and the long run, connecting the two perspectives through the behavioral responses that inheritances induce.

1.1 The Depletion of Inheritances and Its Causes

To study the evolution of wealth and the impact of inheritances on it, we denote the wealth of an individual at time t as $A_t = p_t \cdot q_t$, where p_t is a vector of asset prices and q_t a vector of the asset quantities owned by the individual. This granular representation of wealth is motivated by our rich microdata on asset holdings, as explained in Section 2.2. Changes in wealth over time can be decomposed into savings and capital gains:

$$\Delta A_t = \underbrace{p_t \cdot \Delta q_t}_{\text{Quantity changes: Savings } S_t} + \underbrace{\Delta p_t \cdot q_{t-1}}_{\text{Price changes: Capital gains } G_t} . \tag{1}$$

To micro-found the saving decisions, we assume time-separable utility. This allows us to cast an individual's decision as a two-step budgeting problem: an *intra-temporal* and an *intertemporal* decision.

The intra-temporal optimization dictates the choice of consumption C_t and labor income Z_t given a wage w_t and unearned (non-labor) income y_t,

$$v_t(y_t, w_t) = \max_{C_t, Z_t} u_t(C_t, Z_t/w_t),$$

subject to an intra-temporal budget constraint: $C_t = Z_t + y_t$. This optimization yields an intra-temporal (static) marginal propensity to consume (MPC) $\frac{\partial C_t}{\partial y_t}$ and to earn (MPE) $\frac{\partial Z_t}{\partial y_t}$.

In addition to her own utility over the life cycle, the agent receives altruistic utility $U_h(I')$ from donating inheritances I' to the next generation. She faces no uncertainty and has perfect foresight when solving the intertemporal problem,

$$\max_{\{q_t\},I'} \sum \beta^t v_t(y_t, w_t) + U_h(I'),$$

where β is the discount factor. This decision is made under two constraints: (i) unearned income is the sum of capital income and savings

$$y_t = \underbrace{r_t \cdot q_t}_{\text{Capital income } R_t} - \underbrace{p_t \cdot \Delta q_t}_{\text{Savings } S_t}, \tag{2}$$

where r_t is a *vector* of interest rates that vary across assets and (ii) an intertemporal (life-time) budget constraint, $\sum y_t \leqslant I - I'$, where I denotes inheritances received at time zero. The solution to this problem determines the allocation of inheritances to each period t, $\frac{\partial y_t}{\partial I}$, which we refer to as the marginal allocation of resources (MAR). The received inheritances can be used during the heir's life, $\frac{\partial y_t}{\partial I}$, either to consume more, $\frac{\partial C_t}{\partial I}$, or to work less, $\frac{\partial Z_t}{\partial I}$. They can also be bequeathed to the next generation, $\frac{\partial I'}{\partial I}$. Now we want to understand the connections between these parameters and the static MPC and MPE.

Let $\overline{y}_T = \frac{1}{T}\sum_{t\leqslant T} y_t$ denote average unearned income (extra resources) during the first T periods. We use similar notation for other parameters. Using Equations (1) and (2) and the intra-temporal budget constraint, the average effect of inheritances on unearned income (extra resources) allocated this period $\frac{\partial \overline{y_T}}{\partial I}$ can be decomposed in two ways: (i) according to its source: an increase in unearned income is *financed* either by depleting the principal or by receiving extra returns on the inherited wealth or (ii) according to its destination: an increase in unearned income is *spent* either on the consumption of goods or on leisure (MPC or MPE). We summarize these two decompositions as follows.

$$\underbrace{\underbrace{\frac{1}{T}\frac{\partial(A_0 - A_T)}{\partial I}}_{\text{Average depletion}} + \underbrace{\frac{\partial \overline{R}_T}{\partial I} + \frac{\partial \overline{G}_T}{\partial I}}_{\text{Average return}}}_{\text{Financing}} = \frac{\partial \overline{y}_T}{\partial I} = \underbrace{\underbrace{\frac{\partial \overline{C}_T}{\partial I}}_{\text{MPC}} + \underbrace{\frac{-\partial \overline{Z}_T}{\partial I}}_{\text{MPE}}}_{\text{Expenditure}}. \tag{3}$$

We use this equation in Section 3 when we investigate behavioral responses to inheritances. We refer to the right-hand-side objects as *dynamic (intertemporal)* MPCs (MPEs) to distinguish them from *static (intra-temporal)* MPCs (MPEs). The MAR governs the connection between the dynamic MPC and static MPC:

$$\underbrace{\frac{\partial C_t}{\partial I}}_{\text{Dynamic MPC}} = \underbrace{\frac{\partial C_t}{\partial y_t}}_{\text{Static MPC}} \times \underbrace{\frac{\partial y_t}{\partial I}}_{\text{MAR}}. \tag{4}$$

The same is true for the dynamic MPE and static MPE:

$$\underbrace{\frac{\partial Z_t}{\partial I}}_{\text{Dynamic MPE}} = \underbrace{\frac{\partial Z_t}{\partial y_t}}_{\text{Static MPE}} \times \underbrace{\frac{\partial y_t}{\partial I}}_{\text{MAR}}. \tag{5}$$

An example with actual numbers might be helpful to convey intuition. In Section 3.2, when we take Equations 4 and 5 to the data, we find an increase in wealth by 58 thousand SEK (abbreviated 58k) at the time of inheritance receipt. This leads to a 1.2k decline in annual labor earnings in the fifth year after receiving the inheritance (dynamic MPE at t=5). We also estimate that the 58k extra wealth is spread across time so that there are 7.6k of additional resources in that year (MAR at t=5), from which the 1.2k are spent on leisure and the rest on consumption. This implies a static MPE of 1.2/7.6=0.16. The earnings reduction of 1.2k should thus be compared to the 7.6k increase in unearned income and not to the initial 58k gain.

To put this approach into perspective, the most common approach in the literature has been to measure the effect of a wealth shock on consumption or earnings over time, i.e., the dynamic MPCs/MPEs – the left-hand sides of Equations 4 and 5.[8] These decompositions show that the dynamic MPCs/MPEs, are determined both by how agents dynamically allocate their extra wealth across time (MAR) and by how they split their extra resources within a time period between commodity consumption and leisure (static MPC and MPE).[9] They also illustrate the connection between the dynamic MPCs and MPEs through the MARs. Furthermore, they also show that the dynamic MPCs can vary over time even if the static MPCs are time invariant due to variation in the MAR.[10]

A key additional benefit of this approach is that it constitutes a general test for intertemporal smoothing. Time-separable utility implies that agents smooth the marginal utility of their unearned income across time. This implies a smoothing of unearned income if the indirect utility function and relative prices (including wages) are time-invariant and the interest rate is equal to the discount rate. Further assuming separable utility in consumption and leisure also implies consumption smoothing. Unearned income smoothing is thus a more general version of the often-used consumption smoothing.

Our representation contrasts with the previous literature that assumes, implicitly or explicitly, a constant MAR. For example, Jacob Mincer — given the data limitations at the time — suggested converting inheritances into an equivalent annuity (assuming a fixed interest rate) and then comparing the earnings responses to this annuity rather than to the initial wealth gain (Holtz-Eakin et al. 1993, p. 432). More recent papers (e.g. Imbens et al. 2001 and Cesarini et al. 2017) assume Stone-

[8]See Johnson et al. 2006 and Parker et al. 2013 for tax rebates; Holtz-Eakin et al. 1993, Joulfaian and Wilhelm 1994, Brown et al. 2010, and Elinder et al. 2012 for inheritances; and Imbens et al. 2001, Cesarini et al. 2017 and Fagereng et al. forthcoming for lottery gains; Chetty 2006 and the references therein as well as Joulfaian 2006, Karagiannaki 2017 and Druedahl and Martinello forthcoming

[9]These decompositions are similar to the decomposition of household responses to between- and within-individual decisions, e.g. Equation (2) in Nekoei (2013). There the required separability in utility comes from assuming an efficient intra-household allocation of resources (Chiappori, 1992) instead of time separability, which we assume here.

[10]With a time-invariant static MPC, Equation (4) implies that $\frac{\partial \overline{C}_T}{\partial I} = \frac{\partial C_t}{\partial y_t} \times \frac{\partial \overline{y}_T}{\partial I}$. This gives a useful interpretation for the implementation of Equation (3), see Figure 6.

Geary utility, which implies that agents equalize the level of unearned income across time, i.e., that there is a constant MAR, irrespective of fluctuations in e.g. wages or interest rates. Stone-Geary preferences are thus a way of micro-founding Jacob Mincer's suggestion. Instead, our *Mincerian dynamic approach* allows the actual extra resources brought into each period to vary. We implement this empirically by estimating the MAR in each period after inheritance receipt.

1.2 Inheritances and Wealth Inequality in the Short and Long Run

This subsection focuses on the effect of inheritances on wealth inequality by adding heterogeneity into the framework. First, we study the short-run effect when behavioral responses are absent. We then build on the previous analysis to project the short-run analysis into the long run.

Short-Run Effect The immediate impact of inheritances depends on how much larger the inheritances received by affluent heirs are relative to those received by their peers. We show that three well-known parameters — intergenerational wealth mobility, wealth inequality, and inheritance inequality — are sufficient statistics for identifying the effect of inheritances on wealth inequality.

Assume that each individual has one heir (child). Denote each individual by her rank in the within-cohort pre-inheritance wealth distribution. $\overline{A}$ and $\underline{A}$ denote average pre-inheritance wealth among the top θ and bottom $1-\theta$ heirs, respectively. $\overline{I}$ and $\underline{I}$ denote average inheritances *received* by each group. The analogous average inheritances that parents of the top θ and bottom $1-\theta$ *leave* are $\overline{I}_p$ and $\underline{I}_p$. α denotes the proportion of top heirs with top parents — the degree of intergenerational wealth immobility.

We first show that absolute measures of wealth inequality increase after inheritances or remain constant in the extreme case of perfect intergenerational mobility $\alpha = \theta$ (Proposition (4) in the Appendix). Intuitively, intergenerational immobility implies that wealthy heirs receive more inheritances and thus that inheritances increase the dispersion of wealth among heirs.

Our empirical analysis primarily investigates the effects on relative measures of inequality, such as the wealth shares of top groups and Kuznets (percentile) ratios, following e.g. Piketty and Zucman (2015). These moments are prevalent in the literature due to their empirical availability and their ability to capture the skewness of the wealth distribution. In our setting, the share of pre-inheritance wealth among the top-θ heirs S^W and the share of inheritances among the top-θ parents S^I are given by: $S^W \equiv \frac{\theta\overline{A}}{\theta\overline{A}+(1-\theta)\underline{A}}$ and $S^I \equiv \frac{\theta\overline{I_p}}{\theta\overline{I_p}+(1-\theta)\underline{I}_p}$.[11]

Proposition 1. *The share of wealth in the hands of the top θ of the wealth distribution upon receiving an inheritance is increasing in inheritance inequality (keeping the average inheritance constant), and decreasing in intergenerational wealth mobility. Moreover, inheritances reduce the wealth share of the top-θ heirs if and only if*

$$(1-\theta) \underbrace{\left(S^W-\theta\right)}_{\substack{\text{wealth}\\\text{inequality}}} > \underbrace{(\alpha-\theta)}_{\substack{\text{intergener.}\\\text{immobility}}} \underbrace{\left(S^I-\theta\right)}_{\substack{\text{inheritance}\\\text{inequality}}} \tag{6}$$

[11]The latter is not theoretically equal to the top-θ share of inheritances since the rankings and groups are defined by wealth, but they are empirically almost equal due to persistence in wealth rankings over the life cycle (Boserup et al. 2014).

In particular, condition (6) holds if one of the following is true:

i - inheritance inequality is lower than wealth inequality, $S^I < S^W$*, or*

ii - intergenerational wealth mobility is high, namely the likelihood of having a parent in the top group for top heirs is lower than their wealth share, $S^W > \alpha$*.*

The intuition for the proof is as follows. The top wealth share is reduced after inheritances if the share of wealth in the hands of the top θ exceeds their share of inheritances, $\frac{\overline{A}}{\underline{A}} > \frac{\overline{I}}{\underline{I}}$. Proposition (1) expresses this condition in terms of the basic parameters of the theoretical framework. Importantly, Proposition (1) can generate different predictions for the impact of inheritances on wealth inequality for different top groups.

Figure 1 illustrates the workings of Proposition (1). It depicts the two forces on the left hand side of condition (6): intergenerational wealth mobility on the y-axis ($-\alpha$) and inheritance inequality on the x-axis (S^I). The solid line indicates the cases in which inheritances do not change the top group's wealth share, i.e., where the condition (6) holds with inequality.

To gain some intuition, consider some corner cases in Figure 1. If all heirs receive equal inheritances, $S^I = \theta$, then the top wealth share is reduced by the inheritances, no matter the degree of intergenerational mobility. In fact, this holds true as long as inheritance inequality is lower than pre-inheritance wealth inequality even if there is no mobility, $\alpha = 1$, since wealthy heirs possess a lower share of inheritances than of pre-inheritance wealth.[12] Inheritances instead increase wealth inequality when inheritance inequality is higher than initial wealth inequality and when mobility is sufficiently low, as marked by the solid black curve.

Appendix A extends our analysis. Our first extension allows the composition of the top group to change over time.[13] The dashed curve in Figure 1 illustrates that the region in which wealth-inequality increases grows when inheritances reshuffle individuals across groups over time.[14] Our second extension considers other relative measures of inequality, e.g. the Kuznets (percentile) ratios and the coefficient of variation.[15]

Predicting the Short-Run Effect Using Aggregate Moments Proposition (1) determines whether inheritances increase or decrease wealth inequality among heirs. The prediction depends on three well-known moments: top shares of wealth and of inheritances and intergenerational wealth mobility, i.e. S^W, S^I and α. Figure 1 marks the locations of three countries with reliable estimates of these moments.[16]

[12]Inheritance inequality and wealth inequality are different since they reflect the wealth distributions of different generations. An additional factor is that they measure inequality at two distinct points in the life cycle. Therefore, any heterogeneity in the life-cycle pattern of wealth across the wealth distribution leads to a difference between inheritance inequality and pre-inheritance wealth inequality. For a theoretical exhibition, see Equation (15) in the Appendix. For empirical evidence, see Appendix Table C.4.

[13]Empirically, this extension does not affect the conclusions much because individuals' wealth rankings are persistent over time (see Appendix Figure C.15A and Boserup et al. 2014) and the effect of inheritances on the top-group composition is relatively small (see Appendix Figure C.15B).

[14]Keeping wealth inequality and intergenerational mobility constant, a higher inheritance inequality implies a larger gap between the top share's post-inheritance wealth when measured with fixed top groups and the share when the top group can change. This explains the expansion of the region in which inequality increases in the latter case.

[15]It is challenging to find necessary and sufficient conditions for when inheritances reduce percentile ratios due to the difficulties in handling the quantiles of the sum of two random variables (Watson and Gordon 1986 and Hernández et al. 2014).

[16]In Sweden, we estimate $\overline{\alpha} = .987$, $S^W = 30\%$ and $S^I = 24\%$ for the top 1%. Appendix Tables C.4, C.5 and C.6 also

Focusing on the top 1%, Proposition (1) predicts that inheritances reduce wealth inequality in Sweden and the U.S. because of their low inheritance inequality relative to their wealth inequality. This conclusion holds despite the lack of an estimate of wealth mobility in the U.S. Additionally, for France, we do not have an estimate of intergenerational mobility. However, inheritance inequality is sufficiently high in France for the mobility estimate to determine the direction of the effect. For the top-20% measure, all moments exist for the U.S. and imply declining wealth inequality.

Long-Run Effect We have thus far focused on the short-run effect of inheritances, i.e. how wealth inequality changes upon inheritance receipt. This analysis compares the distribution of pre-inheritance wealth A_0 with the distribution of wealth after inheritances $A_0 + I$. We showed that to understand the short-run effect one needs to investigate how inheritance inequality compares with pre-inheritance wealth inequality and the degree of intergenerational wealth mobility (copula of A_0 and I). In contrast, the long-run effect of inheritances depends both on the initial short-run effect and on the evolution of inherited wealth among heirs.

Suppose for now that pre-inheritance wealth does not grow over time, $A_t = A_0$. To understand the inheritance effect on wealth inequality in the long run, we should compare the distributions of A_0 and $A_0 + I \times \frac{\partial A_t}{\partial I}$, using a linearization. Using our framework, the long-run effect is determined by the inequality in the inheritances remaining at time t — $I \times \frac{\partial A_t}{\partial I}$ — and the rank relationship (the copula) between A_0 and $I \times \frac{\partial A_t}{\partial I}$, i.e., the heterogeneity in the remaining inheritances by pre-inheritance wealth.

Our empirical strategy relaxes this zero-growth assumption by using a control group whose wealth evolves at the same rate as that of the treated group in the absence of treatment. The relevant long-run comparison is then between the treatment and control groups' wealth, A_t and A_t^c. This is equivalent to the comparison of $A_t^c + I \times \frac{\partial A_t}{\partial I}$ and A_t^c. Using our framework, the long-run effect is determined both by the inequality in the remaining inheritances, $I \times \frac{\partial A_t}{\partial I}$ and the relationship between A_t^c and $I \times \frac{\partial A_t}{\partial I}$. The former depends on the inequality in the initial inheritances and the evolution of small and large inheritances. The evolution of inheritances is related to the return obtained on them and on the MPE and MPC of inheritances (Equation (3)). The latter represents the mobility (copula) in the remaining inheritances, i.e., how strongly pre-inheritance wealth and the inheritances remaining at time t are related given the empirical regularity that wealth ranks are constant in the absence of inheritances. Thus, the key is to understand the heterogeneity in the evolution of inheritances. This is the focus of the empirical part of the paper.

2 Setting, Data and Empirical Strategy

With a population of approximately 10 million, Sweden is characterized by a low inequality of income and of wealth, high intergenerational income mobility and a large government relative to those of most industrialized countries (Calvet et al. 2007 and Jäntti and Jenkins 2015). Net private

present parameter estimates for the top 1, 10 and 20%, respectively, using different measures of parental wealth: at the time of death, one year before death, in 1991 and the 1991-1993 average. Only two non-Nordic countries — France and the U.S. — have reliable estimates available (Piketty et al. 2006 and Garbinti et al. 2020 for France and Saez and Zucman 2016, Alvaredo et al. 2017 and Charles and Hurst 2003 for the U.S.). See Appendix Section A for the details.

wealth in Sweden has been increasing since the late 1990s, reaching 434 percent of national income in 2014, compared to 470 percent in the U.S. (Alvaredo et al. 2016). This growth has accrued proportionally to all parts of the distribution, with no impact on wealth inequality (Appendix Figure C.1).[17] Consequently, Sweden has experienced an increase in inheritance flows over the last forty years even though its level of inheritances remains low by international standards.[18]

2.1 Institutional Setting

According to the Swedish inheritance law, the default succession rule prescribes that the surviving spouse receives the entire estate. In his or her absence, the estate is divided among the direct descendants, and in the absence of such descendants, more distant relatives inherit.[19] At least half of the estate must be transferred according to the aforementioned default succession rule while the other half can be divided through a will.

Sweden taxed inheritances progressively until December 15, 2004. The four-bracket tax system imposed marginal tax rates of 0, 10, 20 and 30 percent with thresholds depending on the relationship with the deceased. For example, in 2002, the thresholds for children were 70, 370 and 670 thousand Swedish kronor (kSEK).[20] The analogous cutoffs for spouses were 280, 580 and 880 kSEK. This difference in tax schedules led to considerable transfers of wealth to children at the time of the death of the first parent. The average inheritance received by a child after the death of a first parent is 39 kSEK, on average, compared to 78 kSEK in the case of the second parent's death. 43 percent of children who received inheritances from a parent during 2002-2004 paid inheritance taxes. Inter vivos transfers were also taxed according to the same rules.

2.2 Data

We match eleven individual-level administrative datasets covering the population of Sweden for this study: (i) the Income Tax Register, (ii) the Wealth Tax Register, (iii) the Property Tax Register, (iv) the Inheritance and Estate Tax Register, (v) the Integrated Database for Labour Market Research, (vi) the Wage and Hours Survey, (vii) the Multi-generation Register, (viii) the Death Date Register, (ix) the Cause-of-Death Register, (x) the Car Ownership Register and (xi) the Patient Register. We complement these data with prices on financial securities from various sources as well as the household balance sheet data from the National Accounts.

Our analysis population is constructed as follows. The register with intergenerational linkages provides the connections between parents and children who were born in 1932 or later. We start with these data and add the death dates of the parents. We focus on individuals who lose a parent during

[17]This increase is mainly driven by capital gains in the real estate sector and not increased savings rates (Appendix FigureC.1).

[18]The share of total inheritances over national income was 6 percent in 2000, compared to 12 percent in France or 8 percent in the U.K. (Piketty 2011 and Atkinson 2018). Ohlsson et al. (2020) argue that the Swedish welfare state and pension systems explain these difference.

[19]If the couple has common children, the surviving spouse has disposal rights to the estate but is not allowed to bequeath it. If the deceased has children from a previous marriage or cohabitation, the deceased's estate goes to those children directly, unless the children postpone their inheritances until the death of the surviving spouse.

[20]This corresponds to roughly 8, 43 and 78 thousand USD.

1999-2015 and restrict attention to children who are alive in 2014 to obtain a balanced panel. Even though the law stipulates that a surviving spouse receives the entire estate (unless the deceased's children are from a previous marriage; see Section 2.1), we include first parent deaths in our analysis since the data reveal considerable inheritance flows to children in these cases as well, as discussed above.

The Measurement of Wealth Our baseline measure of individual-level wealth is based on detailed third-party-reported data on assets and liabilities, collected for the purpose of wealth taxation during 1999-2007.[21] We use these data to construct a measure of wealth that follows the definition of the National Accounts. This measure can be divided into financial assets, real estate assets and liabilities and the total value of each component in our data matches that of the aggregate household balance sheets, subject to a few exceptions. Section 5.3 discusses these deviations and offers remedies. Appendix Table B.1 provides a comprehensive comparison of the total value of household wealth in our microdata with that of the National Accounts, broken down by asset types. The table shows that we capture 95% of all household wealth after adjustments.

The Measurement of Savings Equation (1) decomposes wealth changes into savings and capital gains. It is empirically challenging to separate the two, as it requires the observation of both prices and quantities. To overcome this challenge, we leverage the rich Swedish administrative wealth data, which contain asset-by-asset ownership at the individual level. We describe the broad idea of this implementation here, and provide a detailed account of this strategy in Appendix Section B.4.

We observe each individual's total portfolio composition of financial assets that are indexed by their International Securities Identification Number (ISIN). We obtain asset prices from the tax authority and from financial databases, such as Bloomberg, Factset and Datastream. For real estate, we observe purchases and sales directly. We hedonically estimate the market value of such transactions based on the observed tax value and characteristics of houses and the ratio of the market price to the tax value for such units as reported by Statistics Sweden using actual transactions.

There are two limitations to our measure of savings. First, changes in quantity should be valued by their transaction price. These prices are unobservable to us since we are unaware of the exact time of the transaction. In Equation (1), we implicitly assume that individuals rebalance their portfolios at the end of each year. However, our results are robust to relaxations of this assumption.[22] The second limitation is that any wealth transfers to or from the agent, including inheritances, are included in savings. We solve this issue by subtracting inheritances from savings. We either observe inheritance amounts directly or impute them from the parent's wealth and the succession rules. Our measure is thereby purged of inheritances, and other types of wealth transfers should be balanced between the control and treatment groups (see Section 2.3 below).

The Measurement of Consumption We construct consumption as the residual of the individual intra-temporal budget constraint, i.e. as labor income plus unearned income (see Section 1.1). Unearned income is, in turn, measured as capital income – the sum of interest income, dividends,

[21] These reports are available for the entire population, not only the roughly 10% who pay wealth taxes (Seim, 2017).

[22] We employ alternative assumptions to $\alpha = 1$, in the general formulation of Equation (1), $\Delta A_t = (\alpha p_t + (1-\alpha) p_{t-1}) \cdot \Delta q_t + ((1-\alpha) q_t + \alpha q_{t-1}) \cdot \Delta p_t$.

coupon payments, and rental income net of interest payments and the costs associated with renting out a private residence – minus savings. Labor income is measured as the sum of wage earnings, business and self-employment income, fringe benefits and severance pay. To estimate post-tax consumption, we deduct taxes and add transfers. Taxes include labor, capital, consumption, property, wealth and inheritance taxes. Transfers include sickness, unemployment and disability benefits, pension income, parental benefits and housing transfers.

2.3 Empirical Strategy

Our empirical strategy provides estimates of the causal effects of inheritance receipt on individual-level responses, e.g. consumption, and on aggregate outcomes, e.g. measures of wealth inequality. It compares individuals from the same birth cohort and with the same education level who lose a parent at age s (treatment) to those who lose a parent at age $s + \delta$ (control). It exploits randomness in the timing of death within δ years, building on Fadlon and Nielsen (2017).[23]

The identification assumption is that the life-cycle patterns in outcomes are the same in the absence of the event for individuals of the same birth cohort and education level who lose a parent within δ years. We implement this strategy by reweighting the observations in the control group by four education levels (primary school, high school, vocational tertiary education and college) and year of birth to match the treatment group, following DiNardo et al. (1996). The weights range from 0.46 to 11.93.

Figure 2A tests the parallel-trend assumption for values of δ ranging from 3 to 14. It plots the time series of median nominal wealth for heirs who lose a parent in different calendar years. All time series exhibit the same trend before the event, ensuring that these heirs' wealth follows the same life cycle pattern in the absence of treatment. Importantly, a larger δ enables an evaluation of long-run effects. For instance, comparing the 2000 cohort to 2006 identifies effects over a period of six years.[24]

Figure 2B presents the results from investigating the post-treatment patterns by fixing the treatment group while varying the control group ($\delta \in \{2, 10\}$). It suggests that the immediate effect of losing a parent on wealth, measured one year after the parent's death, is insensitive to the choice of control group within ten years. Moreover, it reveals a depletion of inherited wealth that is also similar across potential control groups.[25]

We conclude from Figure 2 that the wealth of heirs who receive an inheritance within a decade of each other evolves similarly. Therefore, our baseline estimation strategy uses heirs who receive inheritances during 2000-2004 to form the treatment group, while those receiving an inheritance in 2008-2012 constitute the control group. The only role of the control group is to identify deviations in the treatment group from a calendar-time trend around the event of receiving an inheritance. We thus demean each outcome with the control-group mean so that heir i's outcome $\hat{y}$ at time t is $\hat{y}_{i,t} = y_{i,t} - \bar{y}^c_t$, where $\bar{y}^c_t$ is the control-group mean of y at time t. We then estimate the following event-study equation:

[23] For related designs, see Ruhm (1991), Grogger (1995) and Hilger (2016).

[24] We document similar patterns for other moments of the wealth distribution (see Appendix Figure C.3).

[25] The observed, constant effect of inheritances after the control groups become treated — the dashed lines — suggests that the treatment and control groups exhibit the same life cycle patterns after both have received their inheritances. This pattern is not necessary for our research design to be valid but is nevertheless reassuring.

$$\hat{y}_{i,t} = \gamma_i + \sum_k \beta_k I_{t-\sigma(i)=k} + \varepsilon_{i,t}, \tag{7}$$

where $\sigma(i)$ denotes the year when child i receives an inheritance. The index k represents the event time and the β_k coefficients capture the dynamic average effects of losing a parent nonparametrically. We also include indicators for the year of inheritance (treatment-group fixed effects) γ_i. We use the same estimation strategy when estimating the dynamic effects on the group-level outcomes — the wealth inequality measures — in Section 4.2.

We refer to this approach as the *fixed-control* method since it uses the same control group for all parent death years. This method is different from the *fixed-delta* method of the previous literature, which uses individuals treated at age $s + \delta$ as a controls for those treated at age s. Given that the choice of δ is not relevant for all $\delta \in \{2, \ldots, 10\}$, we prefer the fixed-control method for all wealth-related outcomes. The same control group for all treatment units helps the unbalanced nature of our wealth panel (the wealth register is available during 1999-2007).[26] However, for labor market outcomes, for which we have a longer panel, we use the fixed-delta method.[27]

The fixed-control method has three advantages. First, the role of the control group is transparent. It only captures calendar-year patterns. Second, it is computationally faster as the control group is only used for demeaning. Third, it allows for an estimation of proportional effects, as $\hat{y}_{i,t} = y_{i,t}/\bar{y}^c_t$, which is useful for variables that can be non-positive, such as wealth.

We further validate our empirical strategy using a pure event study approach. Since population ranks are stable over time in the absence of treatment, we estimate inheritance effects on wealth ranks without a control group. Figure 2C shows that heirs' wealth rank increases by almost three percentiles, on average, after receiving inheritances, but reverts back over time.[28]

Population and Descriptive Statistics Table 1 presents summary statistics for our baseline estimation sample, which covers 680 thousand parental deaths and 1.460 million surviving heirs (children). Parents and heirs are on average 77 and 48 years of age, respectively, at the time of the parent's death. The average inheritance received by heirs amounts to approximately 60 kSEK, according to the Inheritance Register, which is similar to the inheritance we impute using the succession rules and parents' civil status, number of children and wealth from the Wealth Tax Register (see Appendix B.5 for the exact procedure). Even though inheritances are skewed, the size of the inheritances relative to the heirs' pre-inheritance wealth is declining across the wealth distribution (Appendix Figure C.34). In other words, wealthier heirs receive larger inheritances in absolute terms, but not relative to their own wealth.[29] We return to this point in Section 4.1.

[26] Our baseline estimates are the same irrespective of whether we use the fixed-control or fixed-delta method (Appendix Figure C.4).

[27] The treatment group is the same across methods and includes parent death years 2000-2004. The control group in the fixed-delta method comprises heirs receiving an inheritance 8-11 years after the treatment group (i.e. $\delta \in \{8, 11\}$), as pooling several δ's increases precision.

[28] Further validations of the research design are available in Appendix Section C.6.

[29] We show this directly in Appendix Figure C.14.

3 Inheritance Depletion and Its Causes

3.1 Inheritance Depletion

Using our empirical strategy, Figure 3 investigates the evolution of wealth around inheritance receipt for the average heir. Our research design purges the evolution of wealth among the treatment group from general fluctuations, thereby allowing us to infer the dynamic pattern of inheritances from the figure. Panel A presents the coefficients from estimating Equation (7) for several measures of individual-level wealth. We start by estimating the effects on wealth at market value, i.e. $p_t.q_t$ according to the notation in Section 1.[30] The average heir's wealth increases by approximately 58 kSEK (6.7 thousand USD) one year after the parent's death (Column 2 of Table 2).[31] This amounts to 10 percent of pre-inheritance wealth or 30 percent of average annual labor income. Most importantly, we find a strong and almost linear depletion of inherited wealth.

The second measure of wealth, $p_{2000}.q_t$, holds prices fixed at their level in the year 2000. Effects on this measure are purged of capital gains and are solely due to quantity changes (savings). The similarity between the effects on wealth at current and fixed prices suggests that the observed depletion of inheritances is mainly due to changes in quantities (savings) rather than price changes (capital gains). If heirs had kept their inherited wealth untouched, price changes would have led to a constant inheritance effect over time, as shown in the constant-quantity series.[32] The last wealth series not only fixes the inherited quantities but also assumes that inheritances are invested in money, real estate, stocks, and funds in the same proportions as the heir's pre-inheritance portfolio composition. Under this scenario, the average heir would have doubled her inherited wealth during the seven-year period. All in all, Figure 3A shows that the average heir depletes her inheritances by reducing the quantities of assets owned. This is the focus of Section 3.2 below.

Figure 3B reveals that the proportional effects of inheritances on wealth follow a similar depletion pattern. It uses two complementary methods to overcome the challenge that an individual's wealth can be negative or zero. The first method measures the ratio of each treated individual's wealth over the control group average wealth, as explained in Section 2.3. The second method transforms wealth using the more common inverse hyperbolic sine function.[33] Taken together, Figure 3 suggests that seven years after losing a parent, half of the inherited wealth is depleted and the 10% increase in wealth upon receiving the inheritance is down to 2.5%.[34]

[30] In this section, we winsorize wealth at the 0.1 and 99.9 percentiles of the total population in each calendar year. However, our results still hold under other, alternative adjustments (Appendix Figures C.5 and C.6).

[31] The delay between parent death and the occurrence of inheritances is due to the estate's appraisal, the approval by the Tax Agency, and the division of the estate among heirs. We discuss and assess the magnitude of this effect in Appendix Section B.5.

[32] Even though house prices increase significantly during this period, housing wealth represents only approximately 10% of inheritances (Appendix Figure C.7). Instead, financial wealth accounts for the lion's share of inherited wealth. This share is larger for inheritances than for estates (80% versus 50%) since heirs sell indivisible assets to split the estate (Appendix Figures C.34 and C.7).

[33] $\text{arsinh}_\theta(A) = \log(\theta A + \sqrt{1 + (\theta A)^2})$, (Johnson 1949; Burbidge et al. 1988). We calibrate $\theta = 4$ so that the estimated proportional mechanical effect matches the ratio of the mechanical effect to the average pre-inheritance wealth.

[34] The depletion is not due to intra-household transfers. The direct impact of inheritances on household wealth is 19% larger than heir own wealth, i.e. 69 as opposed to 58 kSEK (Appendix Figure C.7C). In addition, the almost-linear depletion is also present for population-wide within-cohort wealth rank (Appendix Figure C.7D).

The most striking feature of Figure 3 — the rapid depletion of inheritances — has two implications. First, the swift disappearance of inherited wealth speaks to the Kotlikoff-Summers and Modigliani debate (see the Introduction), and suggests that the total size of the inheritances in the hands of a generation is only considerable around the time of inheritance receipt. These findings lend support to Modigliani's position in the debate.[35] Second, although the depletion is aligned with previous findings of wealth shocks crowding out savings (see Joulfaian 2006, Karagiannaki 2017 and Druedahl and Martinello forthcoming for inheritances and Cesarini et al. 2017 for lotteries), it is not reconcilable with models that feature complete markets or an intergenerational budget constraint, an issue we discuss further in Section 5.2.

3.2 Responses to Inheritances

While the average heir's wealth increases by approximately 10% upon the loss of a parent, the lion's share of inherited wealth disappears within the first decade due to a reduction in the quantity of assets. How do heirs spend their inheritances (MAR)? How much of the spent inheritance is devoted to consumption; i.e., what is the marginal propensity to consume (MPC) out of inherited wealth? How much of the inheritance is devoted to leisure; i.e., what is the marginal propensity to earn (MPE)? How do these responses vary over the years after inheritance receipt? To answer these questions, we apply the two steps of the Mincerian dynamic approach, developed in Section 1.

MAR Unearned income — the non-labor resources in each period — is capital income minus savings (Equation (2)). Figure 4A shows that the average effect of inheritances on unearned income amounts to approximately 6.4 kSEK per year, confirming that the rapid depletion of inherited wealth reflects active savings decisions.[36] The effect in the year of inheritance receipt is not statistically different from that in year seven, suggesting that individuals do smooth unearned income, in line with the assumption of time-separable utility (Section 1).

Heirs spend the extra resources allocated to each period either on commodities or on leisure. We first estimate the dynamic MPCs and MPEs, i.e. the effects of the inheritances on consumption and labor earnings, and then we estimate the implied static MPCs and MPEs using Equation (4).

Dynamic MPCs Figure 4A documents an increase in the net consumption of goods of around 3 kSEK upon inheritance receipt. The difference between the effects on gross and net consumption amounts to 1,350 SEK, averaged over time, which suggests that around 20% of the unearned income effects are net transfers to the government.[37]

Figure 4A also shows the responses of car purchases, retrieved from the Swedish car registry. Heirs increase car consumption upon receiving inheritances by approximately 700 SEK in the first two years, which suggests that about one-fifth of the consumption response is due to consumption of durables (Column 6 of Table 2). This is broadly similar to the findings in Parker et al. (2013), who study responses to tax rebates. Car expenditures are negative in later years, suggesting that inheritances advance the timing of a car purchase.

[35] That said, section 3.3 shows evidence contradicting Modigliani's assumption of zero capitalization.

[36] Because unearned income at time t is constructed using end-of-the-year information at times t and t-1 and our data start in 2000, we have three pre-treatment years. The same is true for consumption.

[37] Appendix Figure C.10 studies dynamic effects using ranks instead of the levels reported in Figure 4A.

Dynamic MPEs Figure 4A also shows that labor income declines by approximately 2 kSEK upon inheritance receipt. This corresponds to a decline of 1% of annual earnings, which is larger than most of the previous estimates. Appendix Figure C.13 provides a comprehensive meta-analysis. The discrepancy can partly be explained by the fact that our estimates include labor supply responses due to grief and care-giving.[38] We find an almost-complete recovery of labor income after seven years.

Decomposing labor supply effects into intensive and extensive responses, Figures 4B and 4C show that both margins contribute to the total decline. The intensive margin is investigated using the log of labor income when income is positive, whereas the extensive margin is captured by the likelihood of having positive labor income or labor earnings above a low, time-varying threshold. Along the intensive margin, labor supply is reduced by one percent upon inheritance receipt but the reduction vanishes completely after seven years.[39] The extensive margin effect corresponds to a 0.4 percentage-point reduction from a baseline of 85%, which persists over time, albeit with a diminishing magnitude.

The panel aspect of the data sheds some light on the nature of the reduction in participation in the labor market. We measure the hazard of entering (exiting) employment by whether an individual has positive (zero) earnings, conditional on having zero (positive) earnings the year before. Figure 4C shows a 0.3 percentage-point increase in the exit rate from a base of 4% during the first four years after receiving inheritances. However, some of these exits are temporary as we detect increased entry in the years after.

Intra-Temporal MPEs and MPCs The last column of Table 2 presents the intra-temporal (static) MPEs for each post-inheritance period using the MARs and the dynamic MPEs (Equation (4); the static MPCs are just one minus the static MPE). The static MPEs are estimated as the ratio of the labor supply effects to the unearned-income effects (with opposite sign) and amount to around 30% in the first three years before declining to 10% in the last three years. Standard errors, estimated using the delta-method, reveal that these are statistically significant. These time-varying static MPEs suggest either time-varying intra-temporal preferences, perhaps due to the nature of the shock, or that the indivisibility of labor prevents heirs from adjusting their labor income smoothly over time (Hansen 1985).

Taken together, the Mincerian approach shows that the almost linear depletion of inheritances is mirrored by an almost constant effect on unearned income in each year following the inheritance receipt. Moreover, these extra resources are allocated to the consumption of goods and to leisure in different proportions over time.

3.3 Heterogeneous Depletion and Its Mechanisms

Figure 5 investigates heterogeneity in the evolution of heirs' inherited wealth by their own wealth and their inheritances. We divide heirs by their pre-inheritance wealth into the top 5% and bottom

[38] We estimate labor supply responses for heirs who receive no inheritances and for all other heirs. At most, one-third of the effect is due to grief and care-giving (Appendix Figure C.8), assuming that such non-pecuniary effects of losing a parent are similar across heirs with different inheritance amounts. We find a small but statistically significant effect on wealth for heirs who do not receive inheritances because parents' wealth one year before death is not a perfect proxy for the estate.

[39] Table 2 also documents a persistent drop in hours worked, conditional on hours being positive.

95% and then do the same according to inheritances. We apply the empirical strategy described in Section 2.3 to each of these four subsamples. For heirs in the bottom 95% of the pre-inheritance wealth distribution who receive inheritances within the bottom 95% of the inheritance distribution, we see the same depletion pattern as for the average heir. However, for other heirs, we find a constant effect on wealth irrespective of whether we study wealth at current or at constant prices.[40] This shows that while most heirs deplete their inheritances within a decade, the inheritances of wealthy heirs stay intact.

There are two potential mechanisms behind this observed heterogeneity, as implied by the decomposition in Equation (3). Either wealthy heirs consume less in response to inheritances (i.e. a lower dynamic MPE and MPC) or they obtain a higher return on their inherited wealth.

To investigate this, we estimate the effects of inheritances on all elements of Equation (3) for the different heir groups.[41] We start by estimating the effects on annual consumption, consumption of durables (cars) and labor income. The sum of these responses represents the effect on unearned income. We then estimate how the unearned-income effects are financed by estimating the effect on annual depletion and on the capital return, defined as the sum of capital income and capital gains. We average these responses over the seven post-inheritance years and make them comparable across groups by dividing by the size of the inheritance, as measured by the wealth effect one year after parent death.

Figure 6 displays the results. The total heights of the bars in the figure reveal that heirs increase their annual unearned income over the post-inheritance years by 13-16% of their inheritances. These unearned-income effects are similar for heirs in the bottom 95% of the wealth distribution irrespective of how large their inheritances are, while they are larger for wealthy heirs with large inheritances.

It is striking that the two top groups — those with large inheritances — barely deplete their principal (their inheritances) but do increase their unearned income. The key difference is how the additional unearned income is financed. While the bottom group finances roughly half of the additional unearned income by depleting their principal, the top groups use the returns on their inherited wealth.

On the expenditure side, the similarity among the groups is more striking than the differences. The groups differ only slightly in how they allocate the additional resources, with the bottom group spending more on durables and on leisure than the top groups. These results are both statistically significant and represent a constant pattern of responses (Appendix Figure C.19), just as for the average heir. In light of the Kotlikoff-Summers and Modigliani debate, these findings suggest that Modigliani's assumption of zero capitalization is incorrect. Instead, the return on inheritances is considerable, but, at the same time, the MPEs and MPCs are high enough, leading to a depletion of the principle.

[40]The same pattern holds when splitting heirs and parents into the top 1% and bottom 99% of the corresponding distributions (Appendix Figure C.18), even though the estimates become noisier. We also split the sample by heir wealth only and show that these effects also hold for wealth ranks and for the inverse hyperbolic sine function (Appendix Figure C.23).

[41]We focus on three of the four groups, leaving wealthy heirs who receive moderate inheritances out of the analysis. This is the smallest group — less than 1% of the sample — and their inheritance as a share of their baseline wealth is low, so the estimated behavioral responses are noisier (Appendix Figure C.19). In all other analyses apart from that shown in Figure 6, we include this group.

The average recipient of large inheritances receives a capital return that is larger than that of recipients of small inheritances, in proportion to the inheritance amount. Moreover, heirs who are wealthy before inheritances obtain a higher return than those who are not. These effects are either due to differences in portfolio composition or heterogeneity in returns within asset classes.[42] We show that although both differences are present, the compositional differences are more significant. Wealthy heirs hold a higher share of their inherited wealth in financial assets and real estate while others hold more wealth in their bank accounts (Appendix Figure C.20). We also document heterogeneity in the average annual return within asset classes across these three groups. For instance, wealthy heirs who receive large inheritances obtain a higher average annual return on their financial wealth than poorer heirs do, and they face lower interest payments on their liabilities (Appendix Figure C.21). Assuming that the annual return within an asset class is the same for both pre-inheritance wealth and inherited wealth, we obtain a steep gradient in the average annual return on inherited wealth, mainly due to differences in portfolio composition but also due to differences in returns within categories.

4 Inheritance Effect on Wealth Inequality in the Short and Long Run

4.1 Short-Run Analysis

Upon the receipt of an inheritance, the distribution of wealth among heirs changes. While absolute inequality always increases, the short-run effect of inheritances on relative measures of wealth inequality is theoretically ambiguous, as shown in Section 1.

We complement the predictions from Section 1.2 with direct empirical evidence. We exploit the joint distribution of wealth and inheritances that we observe by matching the Wealth Tax Register and the Inheritance and Estate Tax Register, a unique possibility with the Swedish data.

Figure 7 illustrates the role played by each driver of the short-run effect according to Proposition (1). It presents the top groups' shares, where the top groups range from the top 1% to the top 30% on the x-axis. Panel A depicts these elements by plotting the three relevant top shares:

I. Pre-inheritance wealth inequality among heirs 30% of total pre-inheritance wealth is held by heirs in the top 1%, and 63% by those in the top 10%.[43]

II. Inheritance inequality from the parents' perspective 23% of total inheritances is possessed by parents in the top 1%, and 68% by those in the top 10%.

Comparing **II** to **I**, inheritance inequality is lower than pre-inheritance wealth inequality at the 1% level, but is higher at the 10% level. The difference between pre-inheritance wealth inequality and inheritance inequality is either due to differences in the wealth distributions of the two consecutive generations or due to wealthy parents leaving a different share of their wealth to the next generation from that left by less wealthy parents.[44]

[42] Such patterns are consistent with Bach et al. (2020) and Fagereng et al. (2020), who estimate the gradient of the return on wealth over the wealth distribution.

[43] Heirs in the top 40% hold all the wealth while the average wealth of the bottom 60% is zero, as they include people with small positive wealth (roughly 51%), people with no wealth (6%), and people with net negative wealth (43%) (see Figure 1 in Nekoei and Seim, 2019).

[44] See Section 1, in particular, footnote 11 and Equation (15) in the Appendix. In addition, the fact that net negative wealth

III. Inheritance inequality from the heirs' perspective 6% of total inheritances is received by heirs in the top 1%, defined by their pre-inheritance wealth, and 25% by those in the top 10%.

The shares in **III** are the result of both inheritance inequality **(II)** and intergenerational wealth mobility (Proposition (1)). In the case of no mobility, **II** and **III** would be the same; i.e., the share of inheritances left by wealthy parents would be the same as the share received by wealthy heirs because wealthy parents all have wealthy heirs.[45] The higher the mobility is, the lower the top shares in **III** relative to **II**. In the extreme case of full mobility, there is no inequality in **III** irrespective of the level of inheritance inequality (**II**).

The comparison of pre-inheritance wealth inequality **(I)** and inheritance inequality from the heirs' perspective **(III)** determines how the wealth share of the top pre-inheritance group changes upon inheritance receipt. For example, given that the top-1% heirs, defined by pre-inheritance wealth, hold 30% of the pre-inheritance wealth but receive 6% of total inheritances, inheritances reduce the wealth share of the top-1% heirs. Since **III** is the result of both **II** and intergenerational mobility, the reduction in wealth inequality can be due to either low inheritance inequality or high mobility.

Mobility shapes the effect of inheritances on wealth inequality through another channel, namely, by reshuffling the wealth ranks of heirs. Up to this point, we have considered the effect of inheritances on the share of wealth held by top heirs, defined by their pre-inheritance wealth. Intergenerational mobility changes the wealth ranks of heirs given that some wealthy heirs receive smaller inheritances than some less wealthy heirs do. This implies that top wealth shares are higher when we allow ranks to change. However, this force is empirically inconsequential, and thus **III** is the main driver of the short-run effect.[46]

Figure 7B presents the results from investigating these considerations directly and finds support for the above claim. It does so by depicting the effect of inheritances on the shares of wealth held by top groups against the top group on the x-axis. More precisely, it reports the difference between top groups' wealth shares before and after inheritance receipt. Top groups' wealth shares decline at all levels. The share of the top 1%'s (10%) falls by 1.65 (2.78) percentage points. Figure 7B also shows the effect when we take the inheritance tax into account. The tax actually marginally *reduces* the equalizing effect of inheritances — an issue that we discuss in Section 5.1. In contrast, gifts amplify the equalizing effect of inheritances, albeit by a small amount. This result is based on a calculation of the average value of lifetime gifts within each percentile of the wealth distribution that we perform with administrative data on inter vivos transfers.[47]

We next construct counterfactual cases to gauge the importance of inheritance inequality and intergenerational mobility in shaping the effect of inheritances on inequality. The first hypothetical case equalizes the average inheritance received by each wealth group. Such a scenario would occur in the case of full intergenerational mobility or that of no inheritance inequality. In the data, we implement this case by assigning parents to heirs randomly. Proposition (1) predicts that inheritances

(liabilities) cannot be inherited by law lowers inheritance inequality.

[45]While **I** and **II** correspond to Lorenz curves of pre-inheritance wealth among heirs and inheritances among parents, **III** does not.

[46]For quantitative evidence, see Section 1.2 and Appendix Figure C.15.

[47]See Appendix Section C.5 for details. Moreover, taking the hidden wealth of donors and heirs into account à la Alstadsæter et al. (2019) marginally strengthens the equalizing effect of inheritances (Appendix Figure C.16).

should reduce inequality even more in this case than occurs in reality. We implement the second case — no intergenerational mobility — by perfectly assortative-matching parents to heirs (inheritances to pre-inheritance wealth). According to Proposition (1), the equalizing effect of inheritances should be reduced, and inheritances should decrease (increase) the wealth shares of the top 10% (1%). We implement the third hypothetical case, extreme inheritance inequality, by allocating all inheritances to the top-1% parents. Again, we predict that the equalizing effect of inheritances should be diminished so that the inheritance effect turns to become inequality-increasing.

Figure 7B confirms these three predictions. Under the first hypothetical scenario, inheritances equalize wealth more than in reality for all top groups. In the second case, inheritances reduce the top 1%'s wealth share but increase the top 10%'s share. In the third case, inheritances lead to a large increase in wealth inequality. If only top-1% parents leave inheritances to their heirs, then the effect of inheritances on wealth inequality is of almost the same magnitude as in reality, but with the opposite sign.[48]

Taken together, letting intergenerational mobility approach the extreme of no mobility has a minor impact on the inheritance effect compared to the effect when we allow inheritance inequality approach its extremes. Figure 7B thus suggests that relatively low inheritance inequality is the main driver of the inequality-reducing effect at the top of the Swedish wealth distribution in the short run.

4.2 Long-Run Analysis

Figures 8A and 8B present the results of investigating the evolution of the wealth distribution among heirs by applying our empirical strategy from Section 2.3 to an outcome variable defined as the likelihood of being in different parts of the wealth distribution within the population, defined as one's within-cohort rank among all Swedish residents. It shows that inheritances shift the distribution of wealth among heirs to the right, increasing the likelihood of being in the top 35% of the population distribution. However, the wealth distribution shifts back over time. By year seven, the distribution of wealth looks similar to the distribution of wealth of their peers who did not receive any inheritances, everywhere except at the very top where we see persistent effects. The likelihood of being in the top 2% is higher than the counterfactual after seven years. We find that this long-run effect persists for ten years when we replicate the analysis using capitalized wealth (Appendix Figure C.31).

Not only does the wealth distribution of heirs shift to the right, but the dispersion of wealth among heirs also increases upon receiving inheritances. The distance between the top percentiles (e.g. 99th or 99.9th) and the median increases upon inheritance receipt, and that increase is larger for higher percentiles (Appendix Figure C.25). Over time, however, the wealth dispersion returns to its pre-inheritance levels, except among the top 1%. This illustrates the same phenomenon that we observed above, namely that inherited wealth is persistent only at the top of the wealth distribution.[49] These

[48]We also investigate other extreme cases in which inheritances are allocated to the top 10%, 1%, 0.1% or 0.01% as well as the effect of inheritances on the top wealth shares when top heirs are defined (and fixed) in the pre-inheritance period (Appendix Figure C.16, Panels A and B). The higher the concentration of inheritances is, the higher the share of newcomers in the post-inheritance top wealth group, which means that we are further from the setting in Proposition (1) and closer to the generalized version in Appendix Section A.

[49]We also find that these patterns remain when wealth changes only because of active savings decisions (Appendix Figure C.26 and C.30 hold asset prices fixed at their year-2000 level).

findings complement those of Bleakley and Ferrie (2016). They study the effects of a wealth gain through land lotteries in the 19th century in the United States and find no wealth effect on the lower part of the wealth distribution 18 years after the lottery.

The persistence of inherited wealth at the top of the wealth distribution suggests that the short-run equalizing effect of inheritances on relative measures of wealth inequality reverts over time. We document this in Figures 8C and 8D by estimating the effect of inheritances on two types of relative measures of wealth inequality: Kuznets (percentile) ratios and top shares. These coefficients are, again, obtained by estimating Equation 7 on demeaned data although here the unit of analysis is a cohort, defined by parent's year of death, and calendar time. The confidence intervals are based on standard errors from a nonparametric bootstrap in which we sample individuals with replacement.

First, the Kuznets ratios, e.g., the ratio of the 99th percentile of the wealth distribution to the median, falls from approximately 26 to 22 upon inheritance receipt but reverts back almost to its initial level after seven years. Other ratios, ranging from the 75th to the 99.9th percentiles (all relative to the median) show the same pattern of an initial fall and a strong convergence (Appendix Figure C.27).

Second, the top groups' wealth shares decline in the short run but revert back over time. For instance, the share of wealth in the hands of the top 1% falls by around one percentage point upon inheritance receipt, but reverts back and becomes even larger than the counterfactual after seven years, although the difference is not statistically significant.[50]

The top shares are sensitive to the wealth of a few extremely wealthy individuals in the sample. For example, in one of the cohorts defined by parent year of death, the two wealthiest individuals each hold 42 times more wealth than the third wealthiest heir. The equivalent number for other cohorts is approximately 2 (Appendix Figure C.28). To account for the sensitivity of the results to these super wealthy individuals, we adjust the Pareto tail of the wealth distributions when estimating the dynamic inequality effects. Concretely, we adjust the top tail of the wealth distribution so that each treatment group distribution has the same Pareto coefficient. We verify that our main results are not sensitive to this specific adjustment by considering two other less sensitive but more common adjustments (Appendix Figure C.29).

To look beyond seven years post inheritances, we use a capitalized wealth series (Section 5.3). Although the top shares in the capitalized wealth series are estimated with more noise, they reveal the same narrative: an immediate negative effect of inheritances followed by a pattern of reversion that causes inheritance to increase inequality after a decade (Appendix Figure C.32).

These pieces of empirical evidence show a reversal in the inheritance effect on wealth inequality over time. According to our theoretical framework, this can either be due to an increase in inequality of (remaining) inherited wealth or a increase in the correlation between inherited wealth and heir wealth change (Section 1). Our empirical findings supports the role of the former force, i.e., a rapid and substantial rise in inequality of inherited wealth (Section 3.3). In fact, the copula of heir wealth and inherited wealth evolves marginally over time (Appendix Figure C.24).

[50]Note that there is a slight discrepancy between the estimated short-run effects on wealth inequality here and those presented in Section 4.1. This is because here, we exploit the Wealth Tax Register only, while the short-run analysis uses the Inheritance and Estate Tax Register directly.

Taken together, our findings show that heterogeneity in the rate of return on inherited wealth leads to an increasing inequality of inherited wealth that generates substantially different long-run effects on wealth inequality from those of the short-run, depicted in the shift to the right of the Swedish flag in Figure 1.

5 Discussions

5.1 How Can Inheritance Taxation Change Wealth Inequality?

This subsection discusses the potential role of inheritance taxation in changing wealth inequality in light of the empirical evidence presented thus far. In the short run, inheritance taxation can change wealth inequality through only one of the three drivers laid out in Section 1, namely, by altering the inheritance distribution. In fact, intergenerational wealth mobility and pre-inheritance wealth inequality are unchanged by an inheritance tax.

When analyzing the role of inheritance taxation in curbing wealth inequality, we resort to a two-step approach that first considers how collecting inheritance tax revenue affects wealth distribution. In the second step, we also allow the effects to change when the planner transfers the revenue back to her citizens. The decomposition exposes the role of both steps pedagogically. Moreover, the effect of redistributing the inheritance tax revenue on wealth distribution depends on the MPC of the receivers. If the revenue is spent on a transfer program with a high MPC, the effect of redistributing revenue on the wealth distribution is negligible relative to the effect of raising revenue.

In the short run, we find that an *unexpected* proportional tax increases relative measures of wealth inequality (Appendix Figure C.17). Such a tax reduces the observed inequality-decreasing baseline effect because it decreases inheritance sizes while keeping the distribution of inheritances constant. However, if the revenue of the tax is uniformly redistributed among all heirs, the tax indeed reduces wealth inequality — as predicted by the theoretical framework in Section 1 — because such a redistributive tax scheme reduces inheritance inequality while keeping the overall magnitude of inheritances unchanged.

Moreover, an unexpected progressive tax also increases inequality in the short run unless it is extremely progressive. A marginal tax of 90% on the inheritances of the top 1% reduces wealth inequality, but the effect is marginal. There are two countervailing forces at play. First, those in the top 1% of the wealth distribution receive a higher share of inheritances from the top 1% of the inheritance distribution. This means that taxing large inheritances indeed targets the top of the wealth distribution. Second, a lower share of the wealth of wealthy heirs is inherited, implying that the inheritance tax affects a smaller share of the total wealth of the wealthy than of their peers.[51] Similar to a flat tax, a revenue-neutral progressive inheritance tax reduces wealth inequality by reducing inheritance inequality. Comparing tax schemes with and without redistribution reveals that the main way to curb wealth inequality is through the redistribution of inheritances, not by taxing them.[52]

[51] This explains why the Swedish inheritance tax affects short-run wealth inequality among heirs only marginally (Elinder et al. 2018 and Figure 7B).

[52] In Nekoei and Seim (2019), we confirm this directly using a research design that leverages the quasi-experimental variation induced by the unexpected repeal of the Swedish inheritance tax. We find that the extra inheritances received by

In the short run, the effect of an *expected* tax on wealth inequality consists of a mechanical effect, similar to that of an unexpected tax, and a behavioral effect that includes parental responses to the tax, such as the use of non-financial channels to support children, e.g., human capital investments (Stantcheva 2015). Such responses generate more pre-inheritance wealth inequality among heirs and lower inheritance inequality, which causes inheritances to reduce inequality more substantially (Proposition (1)). When thinking about whether the tax reduces or increases wealth inequality, the behavioral effect is of second order relative to the direct mechanical effect, which increases wealth inequality. The effect of an inheritance tax on short-run inequality is thus only attenuated when parents may respond in advance.

The long-run effect of an inheritance tax depends on how the short-run effect of inheritances on wealth inequality evolves over time. Our finding that inherited wealth remains intact only among wealthy heirs suggests that the long-run effect of the tax depends on how extensively the inheritances of wealthy heirs are taxed. This is true of both an expected and an unexpected tax. To conclude, both an expected and an unexpected tax would reduce the equalizing effect of inheritances in the short run, but they would decrease wealth inequality in the long run by decreasing the inherited wealth among the wealthy.

The current discussion can shed light on the external validity of our empirical findings. During part of our study period, Sweden taxed both inheritances and wealth, which affected the wealth accumulation behavior of donors and heirs and both the inheritance and wealth distributions. The inheritance tax compressed the inheritance distribution while expanding the pre-inheritance wealth distribution. The wealth tax compressed both distributions. Although it is difficult to precisely assess our findings' external validity for Sweden without these taxes, our theoretical framework and empirical results can provide two insights. First, the critical factor in determining the effect of inheritances on wealth inequality is the comparison between the wealth and inheritance inequalities and how taxes change this comparison. Second, the high degree of intergenerational mobility that we observe implies that inheritances continue to decrease wealth inequality in Sweden irrespective of inheritance and wealth inequality. Third, in the long-run, inheritances continue to increase wealth inequality given that only the wealthy keep their inherited wealth.

The varying depletion rates by both the size of pre-inheritance wealth and inheritance amounts calls for a nontraditional form of inheritance taxation that is progressive in terms of both the inheritance amount and pre-inheritance wealth. Such taxation would affect the inheritance distribution and also alter intergenerational wealth mobility (the copula of inheritances and pre-inheritance wealth). Such a double effect contrasts with traditional inheritance taxes that only affect the inheritance distribution. Another advantage of such a nontraditional inheritance tax is its ability to capture unobserved inter vivos transfers.

5.2 Interpretations of the Depletion of Inheritances and the Behavioral Responses

The observed rapid depletion of inherited wealth and the estimated consumption and labor supply responses to inheritances are difficult to explain using standard models with no uncertainty and no

already wealthy heirs are preserved over time.

frictions. They are also not reconcilable with complete markets in which heirs can borrow against future bequests or with an intergenerational budget constraint (Barro 1974).[53]

The failure of either of these assumptions can explain our empirical findings. One realistic scenario is that heirs are over-saved at the time of inheritance receipt and are unable to borrow against future expected bequests. Over-saving in the Swedish setting can be due to extensive and mandatory pension systems and the rent-controlled housing system. In this scenario, heirs deplete their inheritances over time and gradually approach their optimal wealth trajectory. However, the estimated rapid depletion rate reflects a high discount factor.

We shed light on these explanations empirically by investigating patterns among unconstrained heirs, defined as those with more money in their bank accounts before receiving their inheritances than the average inheritance amount. For this group, we also find a rapid depletion of inherited wealth.[54] The caveat of this approach is that illiquid assets are also a sign of high transitory income risk. Alternatively, we can use total wealth as a proxy for credit constraint. However, our results from Section 3.3 showed how wealthy heirs both do not deplete their inheritances and act as credit-constrained agents. They increase consumption and reduce their labor supply. This can be interpreted as evidence for hand-to-mouth behavior of wealthy agents (Kaplan and Violante 2014).

Another realistic potential failure of these assumptions concerns young heirs, who face a rising profile of labor earnings and are not able to borrow against future income. However, the empirical evidence stands in contrast to this hypothesis since younger heirs actually display a lower depletion rate (Appendix Figures C.11 and C.12). A third scenario is that heirs systematically underestimate their inheritance amounts, leading to a depletion pattern. To make sense of the observed depletion rate requires both that a large share of inheritances are unexpected and a high discount factor.

We test this hypothesis by splitting the sample into parents who die unexpectedly and those who do not (Appendix Figure C.36). The inheritances received by those in the two groups are similar, and we do find a stronger depletion pattern among those who receive inheritances unexpectedly as compared to all others. The difference seven years after inheritance receipt is statistically significant. Moreover, the same depletion pattern emerges in both groups, implying that unexpected inheritances cannot by themselves explain this depletion pattern. All in all, our evidence suggests that the average heir in Sweden behaves like a credit-constrained agent with a high discount factor.

5.3 Measurement of Wealth

This section discusses potential problems with our wealth measure and lays out the remedies we apply to solve these issues. The National Accounts serve as the benchmark against which we compare our microdata. Financial assets consist of around 52% of households' total assets according to the National Accounts. Among the various financial assets, our data lack four components: (i) pension wealth and insurances, amounting to 23 percent of households' total assets; (ii) shares in unlisted

[53] If heirs can borrow against future bequests and even if they have perfect information about the inheritance amount but not its exact timing, inheritances would not affect behavior and there should not be any mechanical effect of inheritances on heirs wealth.

[54] See Appendix Figure C.37. We also use other proxies for liquidity constraints, such as having more than twice one's monthly income in bank accounts, with similar results.

companies, 5 percent of total assets; (iii) around 25 percent of total bank accounts, comprising 1 percent of total assets and (iv) cash, corresponding to less than 1 percent of total assets.

How do these limitations affect our analysis? First, we may underestimate wealth transfers from parents to children at the time of death, what we refer to as the mechanical effect. Second, if inheritances are invested in these unobserved assets over time, we will incorrectly define such investments as consumption and not savings.

Regarding the first concern about underestimating the mechanical effect, the first reassuring fact is that the size of this effect, measured using the Wealth Tax Register, is the same as that of the average inheritance according to the Inheritance and Estate Tax Register (Table 1 and Appendix Figure B.10). This fact is reassuring since the four unobserved components in the wealth register are taxed according to the inheritance tax base. Moreover, we find that three out of four estates have more than one heir. The typical procedure in these cases is to sell indivisible assets. In addition, we also can gauge the size of the bias quantitatively for the first three unobserved components.

Pension wealth and insurances — the largest unobserved component — are of two types: with or without a beneficiary. The share of the former type is approximately one-fourth according to the main insurance partners in Sweden. Naming a beneficiary yields a lower return but makes the pension bequeathable according to the default succession rule (Section 2.1). In our data, around 57 percent of the deceased do not have a surviving spouse. This implies that 14 percent of pension wealth is inherited by the next generation if we assume that the share of pensions in the wealth of the deceased is the same as in the National Accounts. These bounds imply that unobserved pension wealth would increase our mechanical effect by 3.3 percent.

We address the lack of information on unlisted equity and bank accounts as follows (see Appendix Section B for more details). We capitalize business income to obtain the value of closely held corporations (Saez and Zucman 2016). Banks are not mandated to report accounts with low balances. Exploiting the fact that some banks nonetheless report the balances of such accounts, we impute bank values among those for whom we do not observe balances.

Regarding the second concern, we have records on flows into and out of pension wealth for heirs. We find positive and statistically significant effects of inheritances on net contributions to pensions (Appendix Figure B.9). However, the magnitude is so small that adjusting the wealth series for these investments does not affect the dynamic effects on wealth. We add these flows to our measure of savings, thus correctly defining pension wealth flows as savings and not as consumption.

A similar concern arises in the case of durable and luxury goods, such as cars, boats, art, and jewelry, since our measure of wealth excludes such goods. This definition is consistent with the wealth definition in the National Accounts, but implies that heirs' purchase of such goods is defined as consumption, not savings, in our analysis. We find that car purchases — the most significant consumption of a durable good — do increase in the first years after inheritance receipt but fall thereafter, suggesting a retiming of purchase (Section 3.2). This suggests that if other durable and luxury good purchases follow the same dynamic pattern, then the observed depletion pattern is not due to acquisitions of these goods. More generally, an average depreciation rate of durables of approximately 15% implies a similarly strong depletion pattern of inherited wealth even if all extra consumption are devoted to durables.[55]

As a general validity check for both concerns, we construct an entirely new wealth time series by estimating individual wealth using the capitalization method.[56] These series are constructed using entirely different data sources — the labor and capital income and property tax registers instead of the Wealth Tax Register — and they covers a longer period than the wealth data – 1995-2012 in contrast to 1999-2007 for the wealth register. An individual's wealth is estimated using the capital income or property taxes paid within each asset class using the national average rate of return or tax rate for that class. We find that the estimated magnitudes of the mechanical effect differ slightly between the two series, but the depletion patterns are remarkably similar. Appendix Section B.3 provides all assumptions and the implementation of our approach.

6 Conclusion

Wealth inequality can be decomposed into two sources. The first is inequality in pre-inheritance wealth due to heterogeneity in labor income, the savings rate, or the rate of return on savings. The second is inequality in bequeathed wealth that reflects inequality in previous generations' pre-inheritance wealth that is perpetuated through inheritances. This paper focuses on the role of inheritances in shaping wealth inequality and on how inheritance taxation can modify it.

Our motivation is threefold. From a policy perspective, the relative contributions of pre-inheritance wealth and inherited wealth determine the potential of various taxes for changing the wealth distribution. Second, support for taxing inherited and pre-inheritance wealth varies extensively (Harbury et al. 1977 and Fisman et al. 2020). Third, wealth brings power and influence, an issue that motivated the pioneering work on wealth inequality (King 1927 and Lampman 1962). Therefore, an understanding of wealth inequality is at the heart of any social struggle. Although wealth inequality is not equivalent to welfare inequality, there are strong reasons why we should care about how inheritances influence the distribution of wealth.

We document that most heirs deplete their inheritances within a decade, in contrast to wealthy heirs. These heterogeneous depletion rates are not due to differential responses to inheritances (the MPE or MPC of inheritance), but rather to heterogeneous returns on inherited wealth. Upon receipt, inheritances reduce relative measures of wealth inequality. In the long run, the heterogeneous depletion rates increase inequality in the remaining inheritances, thereby also increasing wealth inequality.

The main focus of this paper is on intergenerational wealth transfers at the time of death, even though our analysis suggests that inter vivos transfers decrease inequality in the short run, just as inheritances do. Under the assumption that the detected behavioral responses to inheritances are also representative of those to inter vivos gifts, we conclude that the total sum of intergenerational transfers increases wealth inequality in the long run. Future work should directly test this conclusion by estimating the long-run effects of inter vivos transfers on wealth inequality. The empirical

[55] For the depreciation rate, see Fraumeni (1997) and Waldenström, 2016.

[56] The capitalization method was first used in Atkinson (1956) and further developed in Saez and Zucman (2016). To our knowledge, this is the first application of the capitalization method to a quasi-experimental setting.

challenge lies in observing inter vivos transfers, such that a retail bank account dataset that records pecuniary transactions may enable the breaking of new ground.

Data Availability Statement

The data used in this article consist of confidential administrative data from Sweden, which cannot be shared publicly. The data can be accessed by researchers by placing an order and undergoing security clearance with Statistics Sweden. However, all replication scripts, detailed information on data construction etc. are available at DOI: https://doi.org/10.5281/zenodo.5958218.

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Table 1: Summary Statistics

Year of death	2000	2001	2002	2003	2004	2008-2012
Children						
Age	46.50	46.50	46.50	46.50	46.50	46.50
Female	0.50	0.50	0.50	0.50	0.50	0.50
Spouse	0.61	0.61	0.61	0.61	0.61	0.62
Sibling order	1.97	1.96	1.93	1.93	1.90	1.77
Labor income	181.01	180.74	181.54	182.35	181.72	184.37
Labor income (cond. on positive)	208.11	207.89	208.61	209.11	208.49	211.08
Share with positive income	0.87	0.87	0.87	0.87	0.87	0.88
Wealth	496.98	532.93	943.82	488.82	482.42	479.30
Wealth (median)	142.79	140.59	144.08	141.97	140.44	144.41
Wealth rank	52.25	52.15	52.25	52.21	52.11	52.24
Wealth, year before parent's death	496.98	580.38	907.81	574.38	629.34	1213.57
Wealth rank, year before parent's death	52.25	52.23	52.43	52.77	52.46	53.48
Observations	137,642	140,624	144,332	144,236	141,810	751,481
Parents						
Age	77.27	77.02	76.79	76.47	76.17	74.45
Number of children	2.94	2.94	2.93	2.95	2.93	2.90
Wealth	431.33	486.12	507.65	508.86	511.29	551.27
Wealth (median)	107.86	136.54	144.53	154.10	164.12	196.83
Wealth per child	57.09	69.27	73.76	71.08	58.36	79.36
Inheritance			61.67	62.23	55.23	
Observations	65,619	66,727	68,367	67,507	66,361	345,463

Note: This table presents descriptive statistics for the main estimation sample. The first five columns present variable means for each parent death year 2000-2004, except "Wealth (median)". The last column presents means for the control group – parent death years 2008-2012. All variables measured in year 1999 unless differently stated. Monetary variables are measured in current kSEKs. Labor income is measured gross of taxes and transfers. Wealth percentile ranks are within birth cohort in the total Swedish population. We reweigh the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. For more summary statistics, see Appendix Tables C.and C.2.

Table 2: Regression Coefficients

Event year	(2) Wealth	(3) Unearned inc.	(4) Gross cons.	(5) Net cons.	(6) Car purchases	(7) Labor earn.	(8) Enter	(9) Exit	(10) Hours	(11) *Static* MPE
-4	-1.224				0.0268	0.455	0.0016	0.0003	0.0481	
	(1.7491)				(0.1165)	(0.1418)	(0.0017)	(0.0003)	(0.0298)	
-3	-1.414	0.955	1.501	0.878	-0.271	0.160	-0.0006	0.0004	0.0260	-0.168
	(1.1925)	(0.7040)	(0.7434)	(0.5778)	(0.0863)	(0.1319)	(0.0017)	(0.0003)	(0.0240)	(0.1853)
-2	-1.488	-0.672	-0.494	-0.620	-0.229	0.0530	0.0002	0	0.0062	0.0789
	(0.7612)	(0.6052)	(0.6258)	(0.4971)	(0.0812)	(0.1144)	(0.0016)	(0.0003)	(0.0190)	(0.1845)
-1	0	0	0	0	0	0	0	0	0	
0	31.00	4.933	3.454	2.984	0.619	-1.566	-0.0010	0.0008	-0.0517	0.318
	(0.5050)	(0.5244)	(0.5387)	(0.4286)	(0.0767)	(0.1058)	(0.0015)	(0.0004)	(0.0170)	(0.0400)
1	58.11	7.094	5.053	4.071	0.717	-2.240	0.0013	0.0033	-0.0523	0.316
	(0.7161)	(0.5012)	(0.5235)	(0.4106)	(0.0744)	(0.1325)	(0.0014)	(0.0004)	(0.0192)	(0.0291)
2	56.94	6.072	4.306	3.757	-0.436	-2.131	0.0036	0.0023	-0.0463	0.351
	(0.9139)	(0.4873)	(0.5158)	(0.3992)	(0.0742)	(0.1604)	(0.0014)	(0.0004)	(0.0206)	(0.0386)
3	56.32	6.358	4.863	3.858	-0.508	-1.986	0.0064	0.0020	-0.0101	0.312
	(1.1161)	(0.5035)	(0.5371)	(0.4135)	(0.0734)	(0.1826)	(0.0014)	(0.0004)	(0.0215)	(0.0379)
4	52.85	7.001	5.915	4.295	-0.526	-1.688	0.0048	0.0009	-0.0158	0.241
	(1.6317)	(0.5435)	(0.5986)	(0.4487)	(0.0779)	(0.2017)	(0.0014)	(0.0004)	(0.0222)	(0.0344)
5	46.65	7.589	6.481	4.690	-0.510	-1.236	0.0048	0.0001	0.00320	0.163
	(2.2406)	(0.6119)	(0.6951)	(0.5082)	(0.0849)	(0.2238)	(0.0013)	(0.0004)	(0.0228)	(0.0323)
6	36.66	6.979	6.155	3.954	-0.348	-0.788	0.0038	0.0004	0.0196	0.113
	(3.1387)	(0.7228)	(0.8503)	(0.6049)	(0.0940)	(0.2369)	(0.0013)	(0.0004)	(0.0233)	(0.0359)
7	28.12	5.387	4.558	2.395	-0.0157	-0.572	0.0030	0.0006	0.0437	0.106
	(4.9018)	(0.9878)	(1.1745)	(0.8361)	(0.1104)	(0.2482)	(0.0013)	(0.0004)	(0.0236)	(0.0500)
Observations	6,376,500	5,603,473	5,603,473	5,603,473	5,685,296	14,469,717	14,180,725	14,180,725	4,101,467	5,603,473

Notes: This table presents regression coefficients for various outcomes. Net consumption is measured after taxes and transfers. Estimates are based on the fixed-control group method with parent death years of 2000-2004 (2008-2012) as the treatment (control) group, except for labor earnings, which employ the fixed-delta method. We reweigh the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. 95% confidence intervals based on standard errors clustered at the heir level. Standard errors for the *Static* MPE are computed using the Delta-method. kSEK = thousand Swedish kronor.

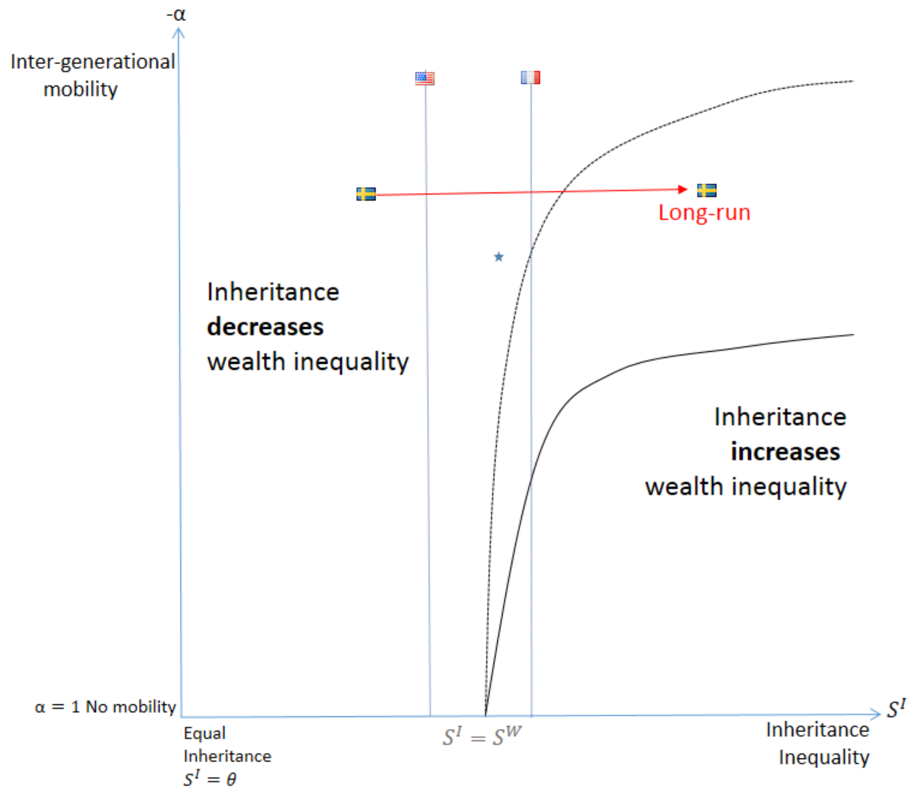


Figure 1: *Theoretical effect of inheritances on wealth inequality among heirs*

Note: This figure illustrates the theoretical determinants of the effect of inheritances on wealth inequality in the short-run: intergenerational wealth mobility (y-axis) and inheritance inequality (x-axis) relative to pre-inheritance wealth inequality. The solid line indicates the cases in which inheritances do not change the top group's wealth share. The top group is defined according to pre-inheritance wealth (Proposition (1)). The dashed line represents the same locus while allowing the top groups to evolve over time (Appendix Proposition 2). Flags indicate country-level predictions for the top 1% group. As there are no mobility estimates for France or the U.S., they are graphed as vertical lines. The star represents the top 20% group in the U.S., a group for which all estimates are available. For the data sources, see Appendix A. Applying the framwork to the *long-run, the* prediction for Sweden is based on our estimates of the dynamic inheritance effects (Sections 3.3 and 4.2).

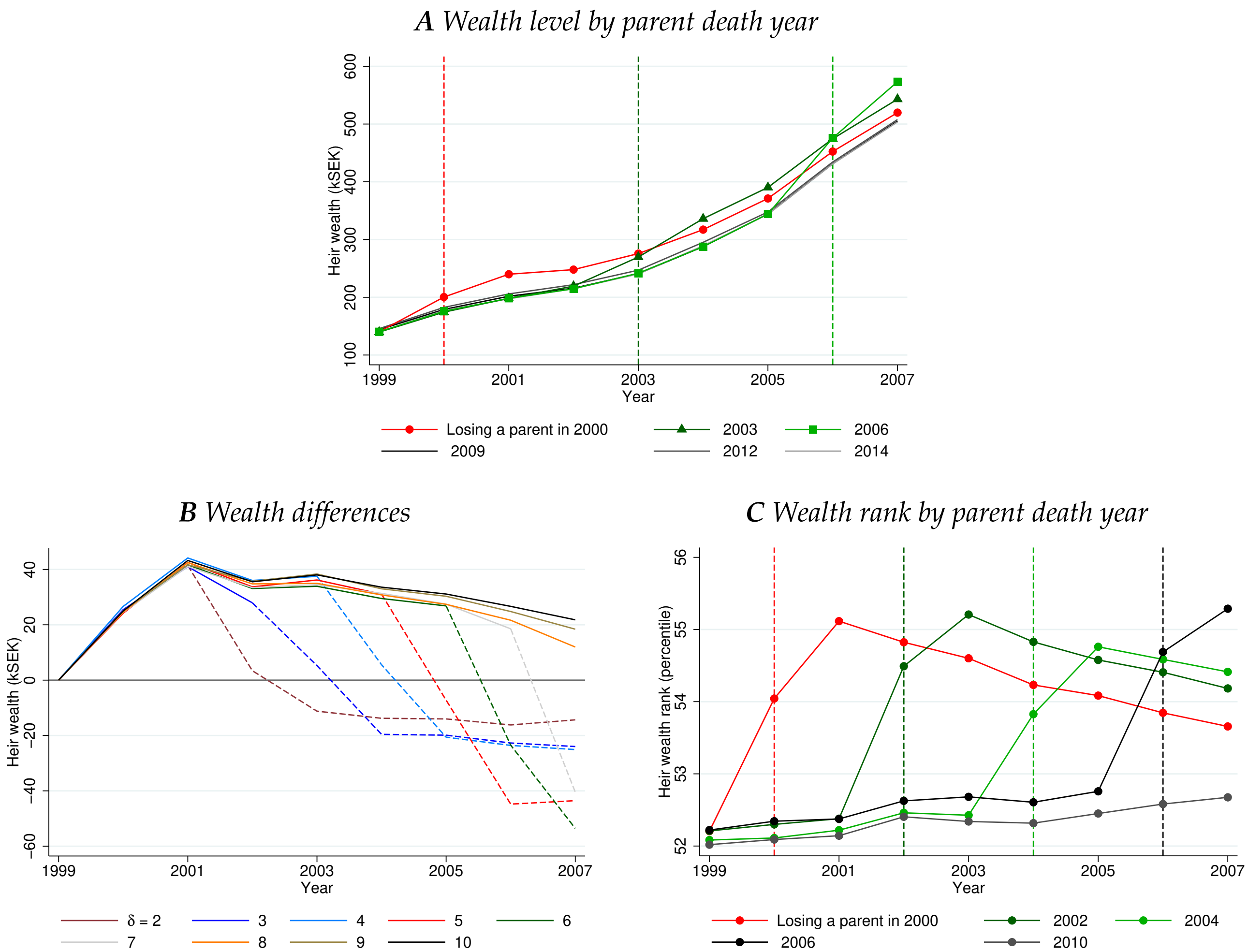


Figure 2: *Empirical design*

Note: **Panel A** shows median wealth over time by parent death year (without normalization). **Panel B** displays the difference between the median wealth of children whose parents die in 2000 (treatment group) and various control groups, normalized in 1999. For example, $\delta = 2$ corresponds to a control group with a parent death year of $2000 + \delta = 2002$. The solid (dashed) lines denote the years before (after) the control group's parent death, the point at which the control group is treated as well. **Panel C** repeats Panel A for the wealth ranks: one's percentile within birth cohort in the Swedish population. In all panels, we reweight the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. kSEK = thousand Swedish kronor.

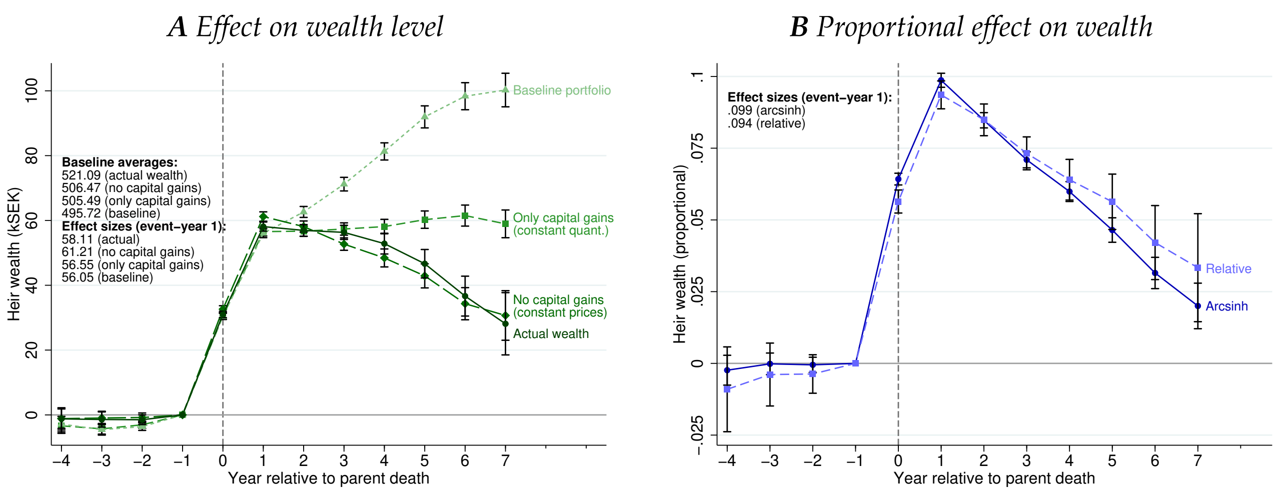


Figure 3: *The effect of inheritances on the wealth of heirs*

Note: **Panel A** shows the dynamic effects of inheritances on four measures of heir wealth: *"Actual wealth"*: nominal wealth at current prices (similar to Figure 2); *"No capital gains"*: prices fixed at their 2000 level; *"Only capital gains"*: quantities fixed at their level at the time of inheritance receipt; *"Baseline portfolio"*: quantities fixed assuming that inheritances are invested in the same way as pre-inheritance wealth across housing, stocks and bank accounts. **Panel B** displays the effects on proportional wealth measures. *"Arcsinh"*: the inverse hyperbolic sine function; *"Relative"*: wealth relative to the control group average. Estimates are based on the fixed-control group method with parent death years 2000-2004 (2008-2012) as the treatment (control) group, except for *"Baseline portfolio"* and *"Only capital gains"*. These are estimated using the fixed-delta method, in which the same treatment cohort is assigned to a control group that receives inheritances 8-11 years because those estimates fix the portfolios of the control and treatment groups. We reweight the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. The 95% confidence intervals are based on standard errors clustered at the heir level. kSEK = thousand Swedish kronor.

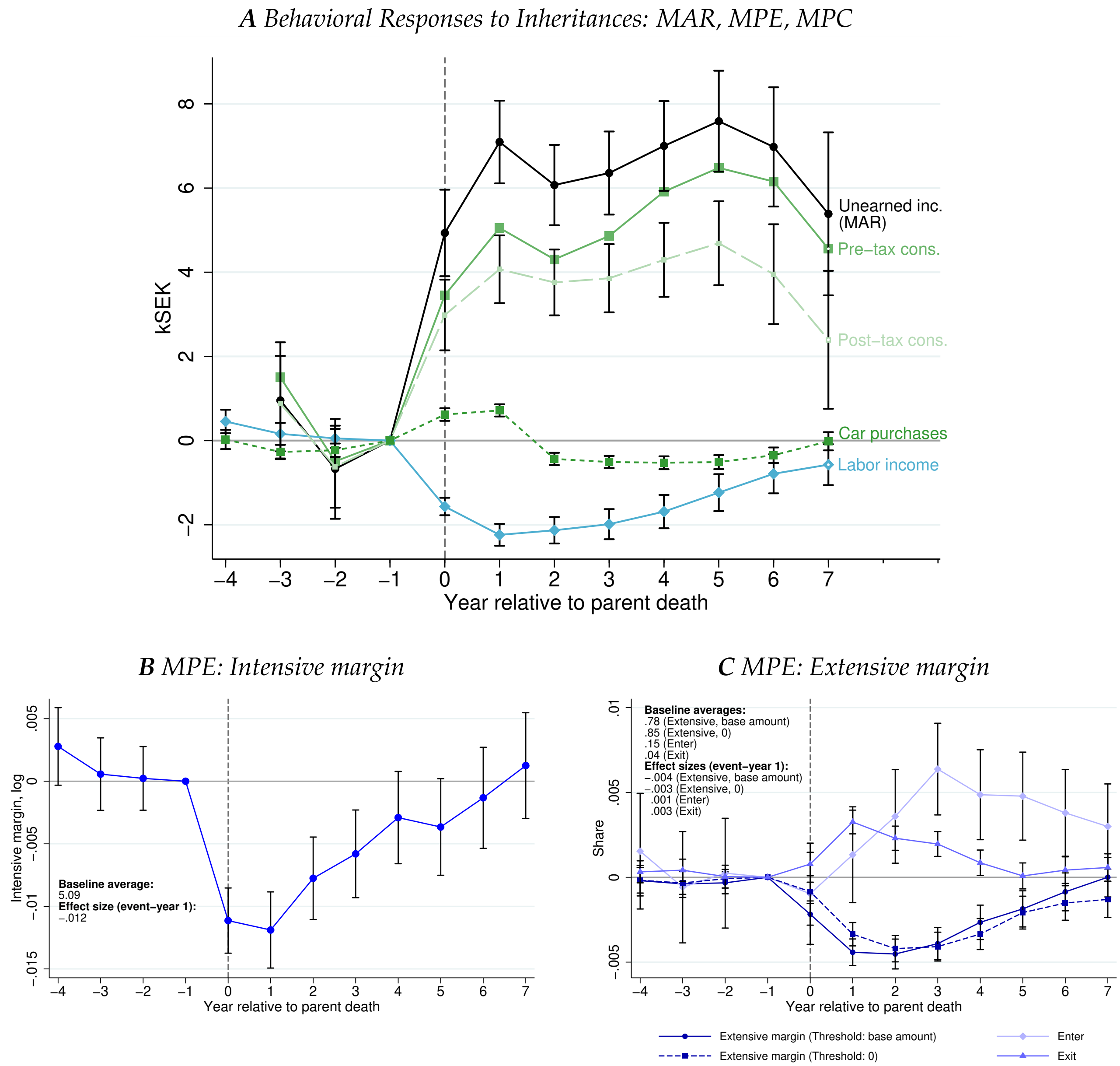


Figure 4: *How heirs spread inheritances across time (MAR) and their responses (MPC/MPE)*

Note: **Panel A** reports estimates of how inheritances are spread and used over time. The circle series display the effects on unearned income (MAR: marginal allocation of resources). The square series indicate how these extra resources are used to consume more goods (MPC) over time. The diamond series show the corresponding estimates for labor supply (MPE). **Panel B** displays the effects on the intensive margin of labor supply, the log of labor income. **Panel C** shows the effects on the extensive margins: an indicator for labor income being above a threshold and an indicator for exiting (entering) employment, defined as having zero (positive) earnings in the current year and positive (zero) earnings in the previous year. The labor income effects are obtained by using the fixed-delta method, and the others are obtained by using the fixed-control strategy. We reweight the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. The 95% confidence intervals based on standard errors clustered at the heir level. kSEK = thousand Swedish kronor. For further results on labor supply responses, see Appendix Figure C.9.

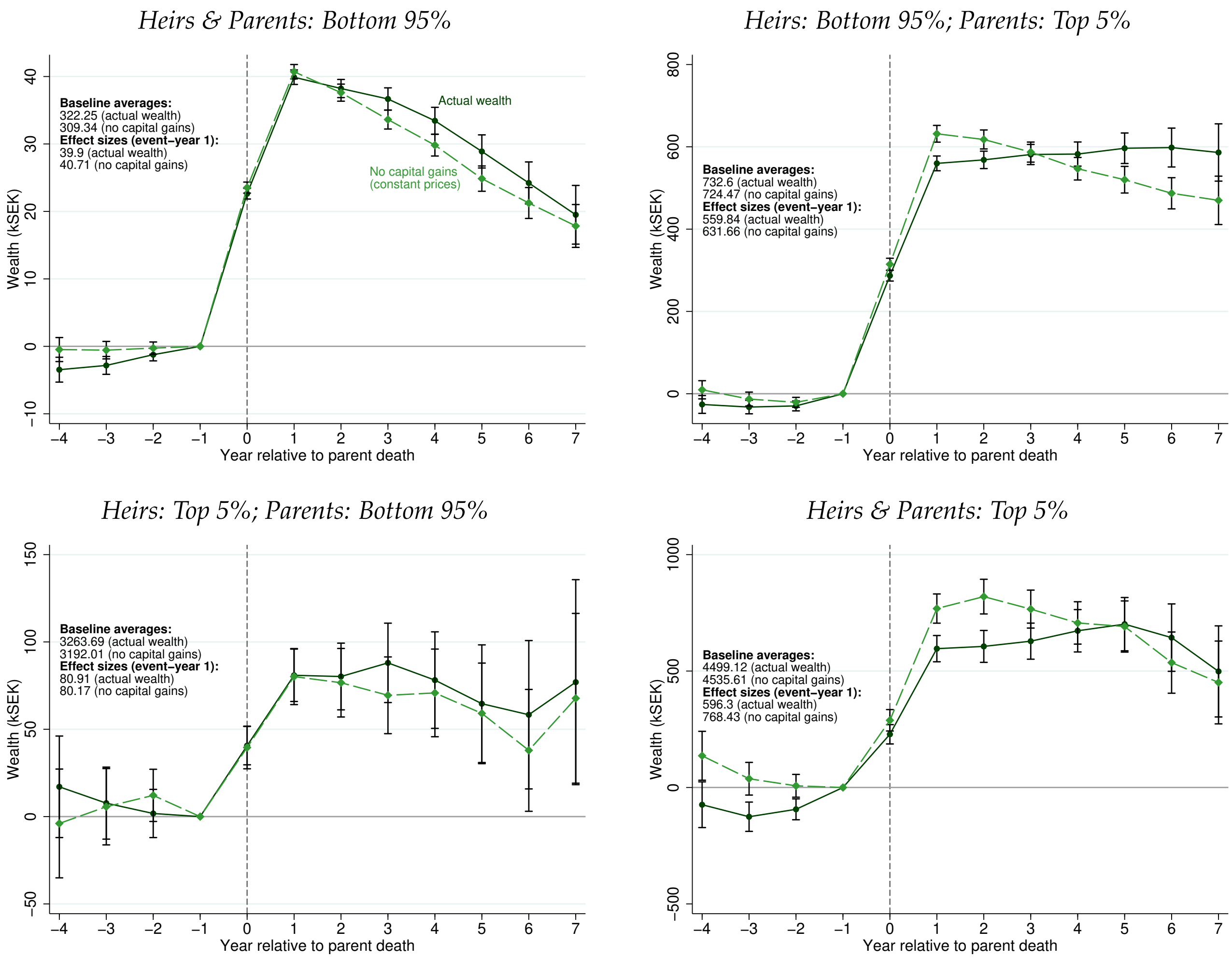
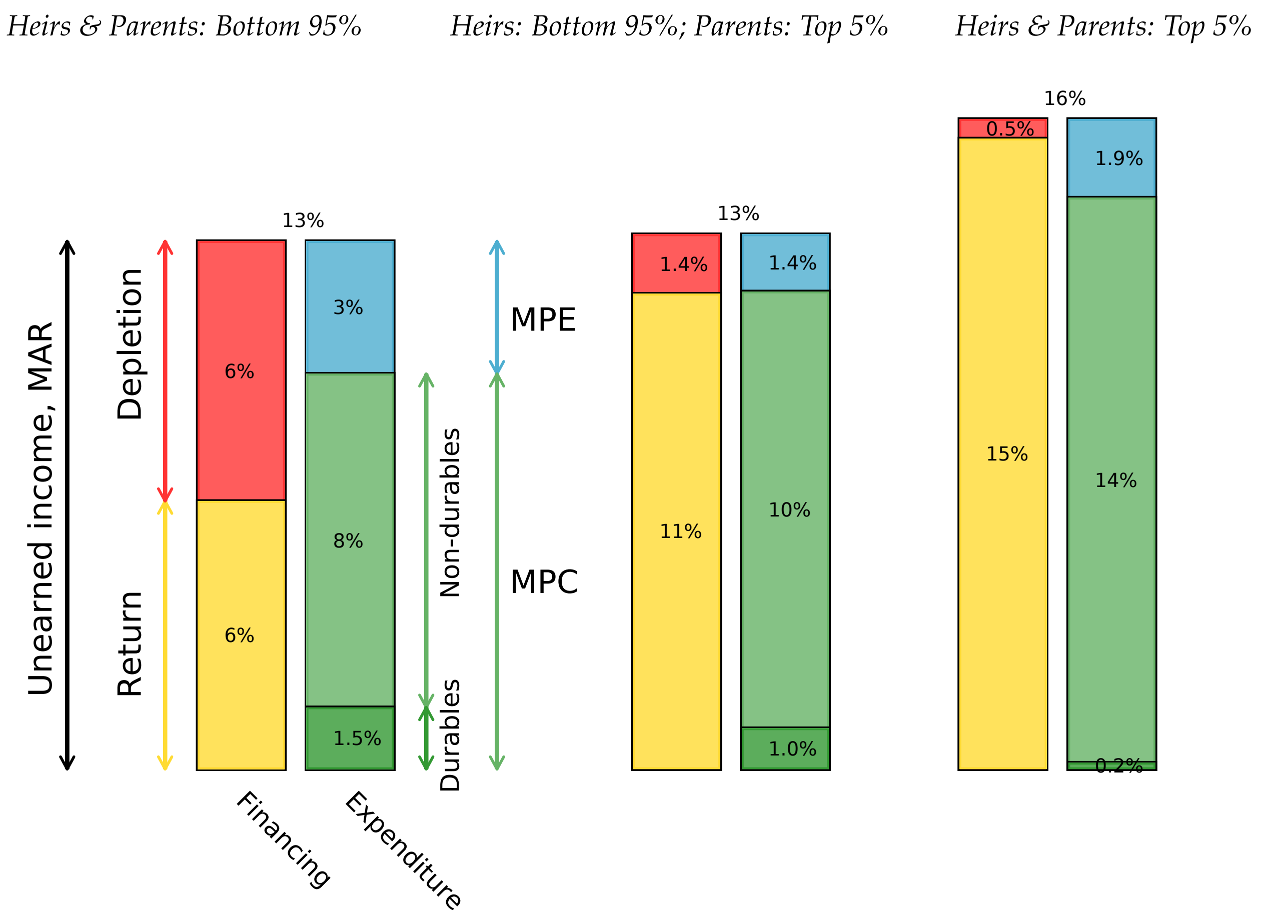


Figure 5: *Heterogeneous inheritance depletion rates by heir and parent wealth*

Note: This figure shows the effects of inheritances on wealth for four subsamples based on separate regressions. For example, the top left panel focuses on children who belong to the bottom 95% of the wealth distribution and receive inheritances from the bottom 95% of inheritances (both computed in 1999). The fraction of heirs in the different categories is, clockwise from the top left, 92.4%; 2.6%; 4.2% and 0.8%. Estimates are based on the fixed-control method with the treatment (control) group comprising parent death years 2000-2004 (2008-12). We reweight the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. The 95% confidence intervals are based on standard errors clustered at the heir level. kSEK = thousand Swedish kronor.



$$\underbrace{\underbrace{\frac{1}{T}\frac{\partial\left(A_0-A_T\right)}{\partial I}}_{\text{Depletion}}+\underbrace{\frac{\partial\overline{R_T}}{\partial I}+\frac{\partial\overline{G_T}}{\partial I}}_{\text{Return}}}_{\text{Financing}}=\underbrace{\frac{\partial\overline{y_T}}{\partial I}}_{\text{Unearned Income}}=\underbrace{\underbrace{\frac{\partial\overline{C_T}}{\partial I}}_{\text{MPC}}+\underbrace{\frac{-\partial\overline{Z_T}}{\partial I}}_{\text{MPE}}}_{\text{Expenditure}}.$$

Figure 6: *Heterogeneous responses and returns to inheritances by heir and parent wealth*

Note: This figure shows the heterogeneity in how the depletion of inheritances and the extra returns on inheritances (the LHS of the equation above) finance increased consumption and reduced labor income due to the inheritance (RHS). The heights of the bars correspond to the average effects of inheritances on unearned income (the middle part of the equation). All numbers reported are estimated as a difference of treatment and control group using our empirical research strategy (Section 2.3). This leads to a small discrepancy between the height of the expenditure and financing bars within each group, from which we abstract here (Appendix Figure C.22). The equation above replicates Equation (3). $T = 7$. The group definitions are similar to those in Figure 5, e.g., the top left panel includes children who belong to the bottom 95% of the wealth distribution and receive an inheritance from the bottom 95% of the inheritance distribution.

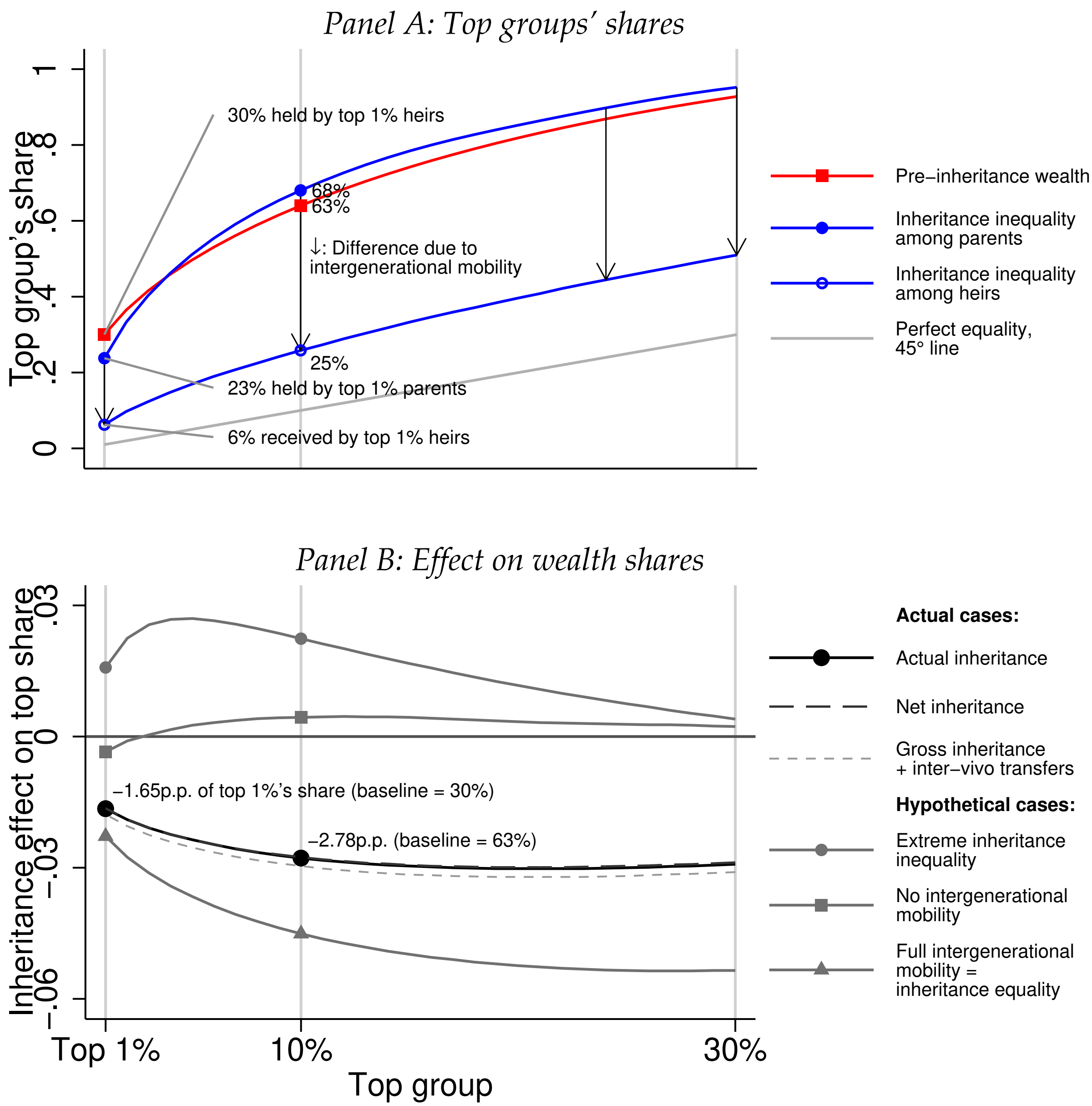


Figure 7: *The effect of inheritances on the top shares of wealth in the short run*

Note: **Panel A** shows the shares of wealth and of inheritances (y-axis) accruing to the top groups (x-axis). The square series focuses on pre-inheritance wealth among heirs; the circle series focuses on inheritances among parents, and the hollow circular series focuses on inheritances when heirs are ranked by pre-inheritance wealth. **Panel B** presents the short-run effect of inheritances on the top wealth shares: the difference between the top share of wealth before and after inheritances. The dark-gray dashed series display the effects net of inheritance taxes and the light-gray dashed series add inter vivos transfers to gross inheritances (Section 4.1 and Appendix Figure C.33 for more details). We also present the effects of inheritances in three hypothetical cases. Extreme inheritance inequality: all estates assigned to the top 1% wealthiest parents (see alternative definitions in Appendix FigureC.16). No intergenerational mobility of wealth: perfect assortative matching of parent and heirs by wealth. Full intergenerational mobility or, equivalently, no inheritance inequality: equal expected inheritances for each heir or random assignment of parents to heirs.

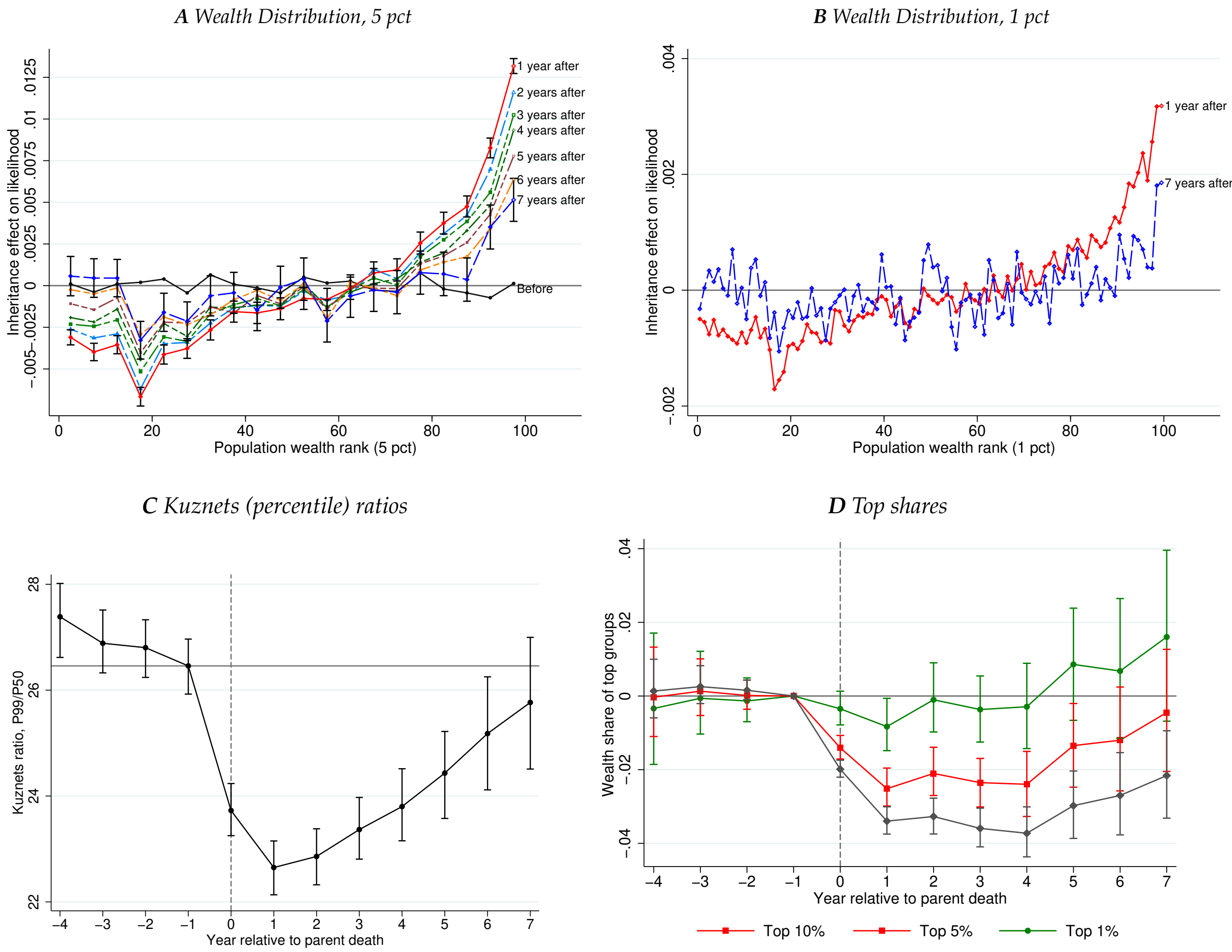


Figure 8: *The effects of inheritances on the wealth distribution and wealth inequality: Short vs. long run*

Note: **Panel A** displays the effects of inheritances on the likelihood of heirs being in each 5-percentile bin of the population wealth distribution separately for each of the seven years after inheritance receipt as well as in the year before inheritance receipt (placebo). Estimations are based on Equation (7) using dummies for belonging to each 5-percentile bin of the wealth distribution as the dependent variables. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals only for years one and seven to keep the figure readable. **Panel B** shows the analogous effects for 1-percentile bins. **Panel C** and **D** present the effects of inheritances on the P99/P50 percentile ratio (other percentile ratios are reported in Appendix Figure C.27) and on the top wealth shares. We reweight the birth-year and education-level distribution of each parent-death-year cohort to match the distribution of the 2000 cohort. The figures display 95%-confidence intervals from 1000 bootstrap replications.