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Abstract

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 com-pressed inheritance distribution or similar chances of having wealthy parents (high inter-generational 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.

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

Arash Nekoei David Seim

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

[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.

This paper aims to measure and understand the role of inheritances in shaping wealth inequality. The *immediate* consequence of inheritances for wealth inequality depends on the difference between inheritances received by wealthy and less wealthy heirs. A higher concentration of inheritances among already wealthy individuals leads to more wealth inequality. *Over time*, the effect of inheritances on wealth inequality also depends on behavioral responses to inheritances. Behavioral responses may amplify the immediate effects if inheritances are well invested and grow or may attenuate them if heirs deplete their inheritances by consuming more or working less.

We provide a comprehensive analysis of the effect of inheritances on wealth inequality.[2] Our empirical laboratory is Sweden where we use a unique population-wide dataset that matches eleven administrative registers with information on inheritances, inter vivos transfers, and third-party reported wealth. 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.

The Evolution of Inheritances and Its Roots While most heirs deplete their inheritances within a decade, wealthy heirs — those starting with 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 is 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 periods. 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*.

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.[3] The remaining 30% goes to a reduction in labor income.[4] Using the car registry, we find that

[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 inter vivos transfers observed in the tax records are potentially under-reported.

[3]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.

[4]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

durable goods consumption accounts for at least one-fifth of the consumption responses in the first two years.

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. Three well-studied moments — intergenerational wealth mobility, pre-inheritance wealth inequality, and inheritance inequality — are sufficient to predict the inheritance effect. 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.[5] Over time, this short-run effect is transformed by heterogeneous depletion rates, and we predict that inheritances increase wealth inequality in the long run since the inequality in remaining inheritances rises.

Taking the theoretical framework to the microdata, we find direct evidence that inheritances immediately reduce relative measures of wealth inequality in Sweden. This equalizing effect is mainly due to a low level of inheritance inequality, rather than to high intergenerational wealth mobility. Moreover, taking inter vivos transfers into account as well barely changes this conclusion. However, the short-run effect reverts within a decade, just as the theoretical framework predicts. 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. 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 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.

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or care-giving, rather than inheritances.

[5] See Karagiannaki (2017) for the U.K., Wolff (2002) for the U.S. and Elinder et al. (2018) for Sweden.

[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.

These insights help us to compare inheritance taxation around the world. While in the U.S., approximately 0.2% of estates are taxed, the corresponding shares in Nordic countries have been much higher (e.g. 34% in Sweden). Although this difference matters for the wealth distribution in the short run, both reduce wealth inequality similarly in the long run with the caveat that the Nordic system distorts behavior within 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. We build a theoretical framework that 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 the opposite of 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. 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). The Mincerian Dynamic Approach we develop is inspired by Jacob Mincer's suggestion to relate the labor supply responses to inheritances to those of an equivalent annual annuity (Holtz-Eakin et al. 1993, page 432).

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 (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

[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.

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

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:

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

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 decision: 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 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:

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

The same is true for the dynamic MPE and static MPE. Furthermore, the MAR also connects the dynamic MPCs and MPEs. The effect of a wealth shock at time zero on consumption at time t, the left-hand side, is 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).[8]

This representation allows the dynamic MPCs to vary over time even if the static MPCs are time invariant.[9] The variation in the dynamic MPCs is then due to variation in the MAR.

[8]The decomposition in Equation (4) is 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.

[9]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.

An example with actual numbers might be helpful. In Section 3.2, when we take Equation 4 and its equivalent for the MPE to the data, we find that an increase in wealth by 58 thousand SEK (abbreviated 58k) 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 1.2k are spent on leisure and the rest on consumption. This implies a static MPE of 1.2/7.6=0.16. So the earnings reduction of 1.2k should be compared to the 7.6k increase in unearned income and not to the initial 58k gain.

Another benefit of our dynamic approach, in addition to estimating and connecting the static MPEs/MPCs to each other, 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-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 than 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. $\bar{I}$ 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 $\bar{I}_p$ 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 $S^I \equiv \frac{\theta\overline{I_p}}{\theta\overline{I_p}+(1-\theta)\underline{I}_p}$.[10]

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*

$$(1-\theta) \underbrace{\left(S^W-\theta\right)}_{\substack{\text{wealth}\\ \text{inequality}}} > \underbrace{(\alpha-\theta)}_{\substack{\text{intergener.}\\ \text{immobility}}} \underbrace{\left(S^I-\theta\right)}_{\substack{\text{inheritance}\\ \text{inequality}}} \tag{5}$$

In particular, condition (5) 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). 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.[11] 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.

[10] 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).

[11] 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 (14) in the Appendix. For empirical evidence, see Appendix Table C.4.

Appendix A extends our analysis. Our first extension allows the composition of the top group to change over time.[12] The dashed curve in Figure 1 illustrates that the region in which wealth-inequality increases grows when inheritances reshuffle individuals across groups over time.[13] Our second extension considers other relative measures of inequality, e.g. the Kuznets (percentile) ratios and the coefficient of variation.[14]

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.[15]

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

[12]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).

[13]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.

[14]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).

[15]In Sweden, we estimate $\overline{\alpha} = 9.87$, $\underline{\alpha} = 99.09$, $S^W = 30\%$ and $S^I = 24\%$ for the top 1%. Appendix Tables C.4, C.5 and C.6 also present parameter estimates for the top 1, 10 and 20%, respectively, using different measures of parental wealth. We use measurements at different points in time: at the time of death, one year before death, in 1991 and the 1991-1993 average. The estimates are stable. 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.

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 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).[16] 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.[17]

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.[18] 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).[19] 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

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

[17] 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.

[18] 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.

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

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 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.[20] 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 solutions. 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

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

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.[21] 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). 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).[22]

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.[23]

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

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

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

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

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.[24]

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:

$$\hat{y}_{i,t} = \gamma_i + \sum_k \beta_k I_{t-\sigma(i)=k} + \varepsilon_{i,t}, \tag{6}$$

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).[25] However, for labor market outcomes, for which we have a longer panel, we use the fixed-delta method.[26]

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.[27]

[24] 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.

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

[26] 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.

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

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.[28] We return to this point in Section 4.1.

3 Inheritance Depletion and Its Causes

3.1 Inheritance Depletion

Using our empirical strategy, Figure 3 investigates the evolution of inheritances for the average heir. Panel A presents the coefficients from estimating Equation (6) 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.[29] 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).[30] 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.[31] 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

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

[29] 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).

[30] 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.

[31] 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).

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.[32] All in all, 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%.[33]

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. This is closer to Modigliani's position in the debate, although we find that his 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 (Section 3.3). 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 — has two components (Equation (2)). The first component is capital income, which we measure as the sum of interest income, dividends, coupon payments, and rental income net of interest payments and the costs associated with renting out a private residence. The second component is the negative of savings. 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.[34] 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).

[32] $\mathrm{arsinh}_\theta(A) = \log(\theta A + \sqrt{1 + (\theta A)^2})$, (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.

[33] 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).

[34] 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.

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.[35]

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.

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.[36] 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.[37] 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

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

[36] 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.

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

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 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.[38] 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.[39] 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

[38]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).

[39]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.

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.

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.[40] 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

[40] 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.

heirs in the top 1%, and 63% by those in the top 10%.[41]

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.[42]

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.[43] 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.[44]

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 1s% (10%) falls by 1.65 (2.78) percentage points. Figure 7B also shows

[41] 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).

[42] See Section 1, in particular, footnote 11 and Equation (14) in the Appendix. In addition, the fact that net negative wealth (liabilities) cannot be inherited by law lowers inheritance inequality.

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

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

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.[45]

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 should reduce inequality even more in this case than occurs in reality. We implement the second case — no intergenerational mobility — by perfectly assortatively matching parents to heirs (inheritances and 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, wealth inequality falls for inequality measures such as the top 1%'s share but not for, say, the top 10%'s holdings. In the third case, we document a large increase in wealth inequality due to inheritances. 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.[46]

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 let 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

[45]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).

[46]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.

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.[47] These 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.

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.[48]

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 superwealthy 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

[47] 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).

[48] 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.

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. Using our theoretical framework (Section 1), the main driver of this evolution is the rapid and substantial rise in inequality in inherited wealth (Section 3.3 and, in particular, Figure 5). We also document a marginal change over time in the copula of pre-inheritance wealth and inherited wealth (Appendix Figure C.24). This evidence suggests that the evolution of the effect of inheritances on wealth inequality is driven mainly by the increase in inheritance inequality, as shown by the shift to the right of the Swedish flag in Figure 1.

Taken together, our findings show that heterogeneity in the rate of return on inherited wealth generates substantially different long-run effects on wealth inequality from those of the short-run.

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. 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 negligable 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.[49] 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.[50]

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 distri-

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

[50] 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 already wealthy heirs are preserved over time.

bution. 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 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).[51]

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.[52] The caveat of this approach is 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.

[51] 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.

[52] 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.

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 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.[53]

As a general validity check for both concerns, we construct an entirely new wealth time series by estimating individual wealth using the capitalization method.[54] 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

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

[54]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.

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 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.

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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.1 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.

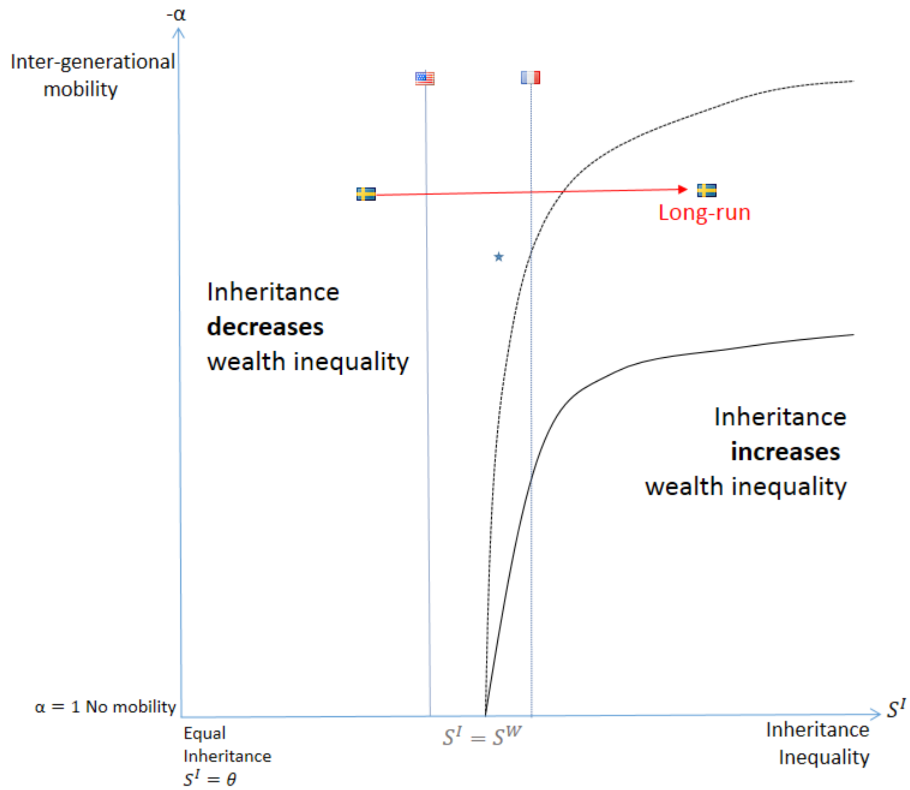


Figure 1: Theoretical effect of inheritances on wealth inequality among heirs

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 case 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).

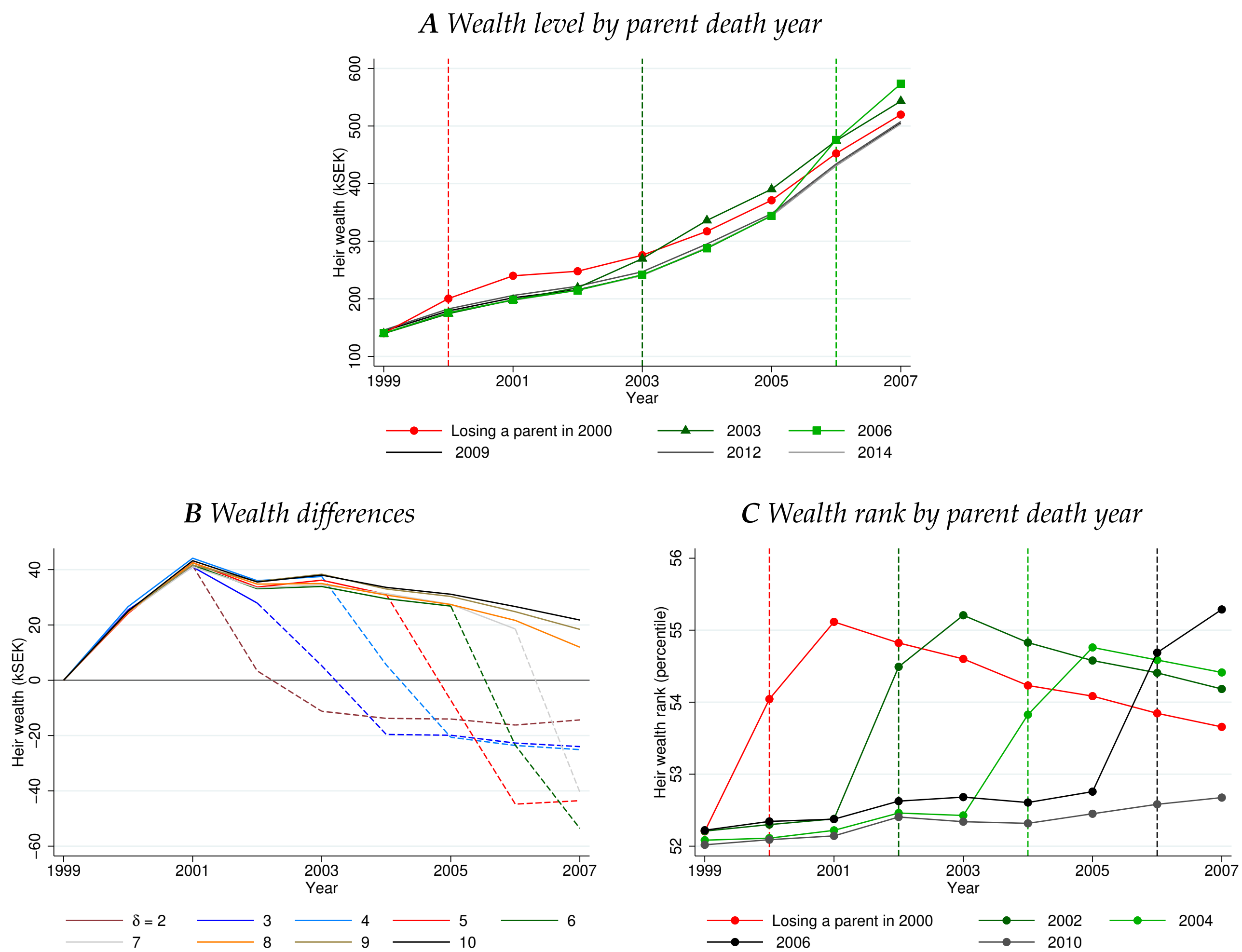


Figure 2: Empirical design

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.

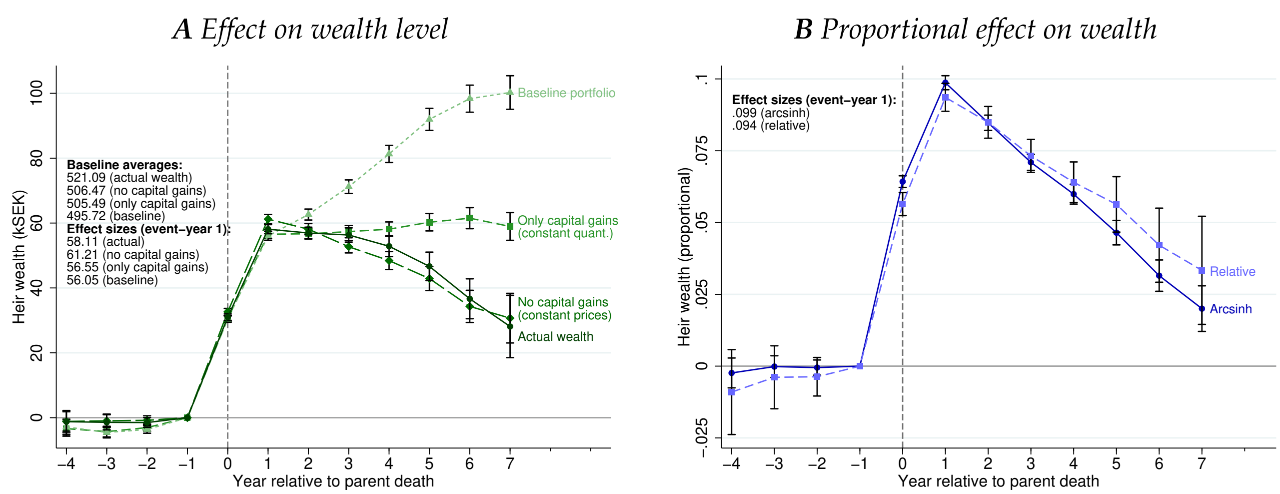


Figure 3: The effect of inheritances on the wealth of heirs

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.

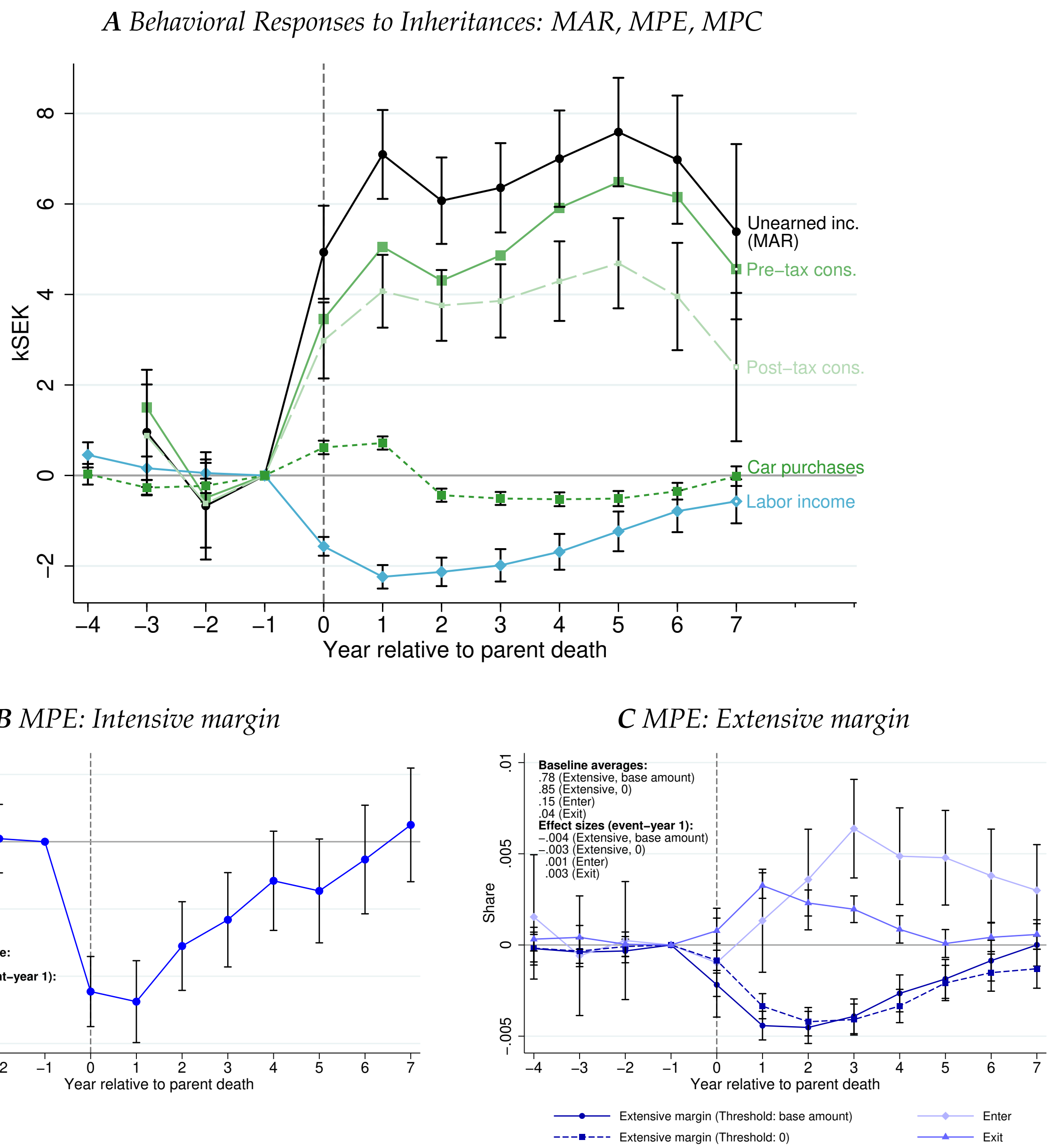


Figure 4: How heirs spread inheritances across time (MAR) and their responses (MPC/MPE)

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.

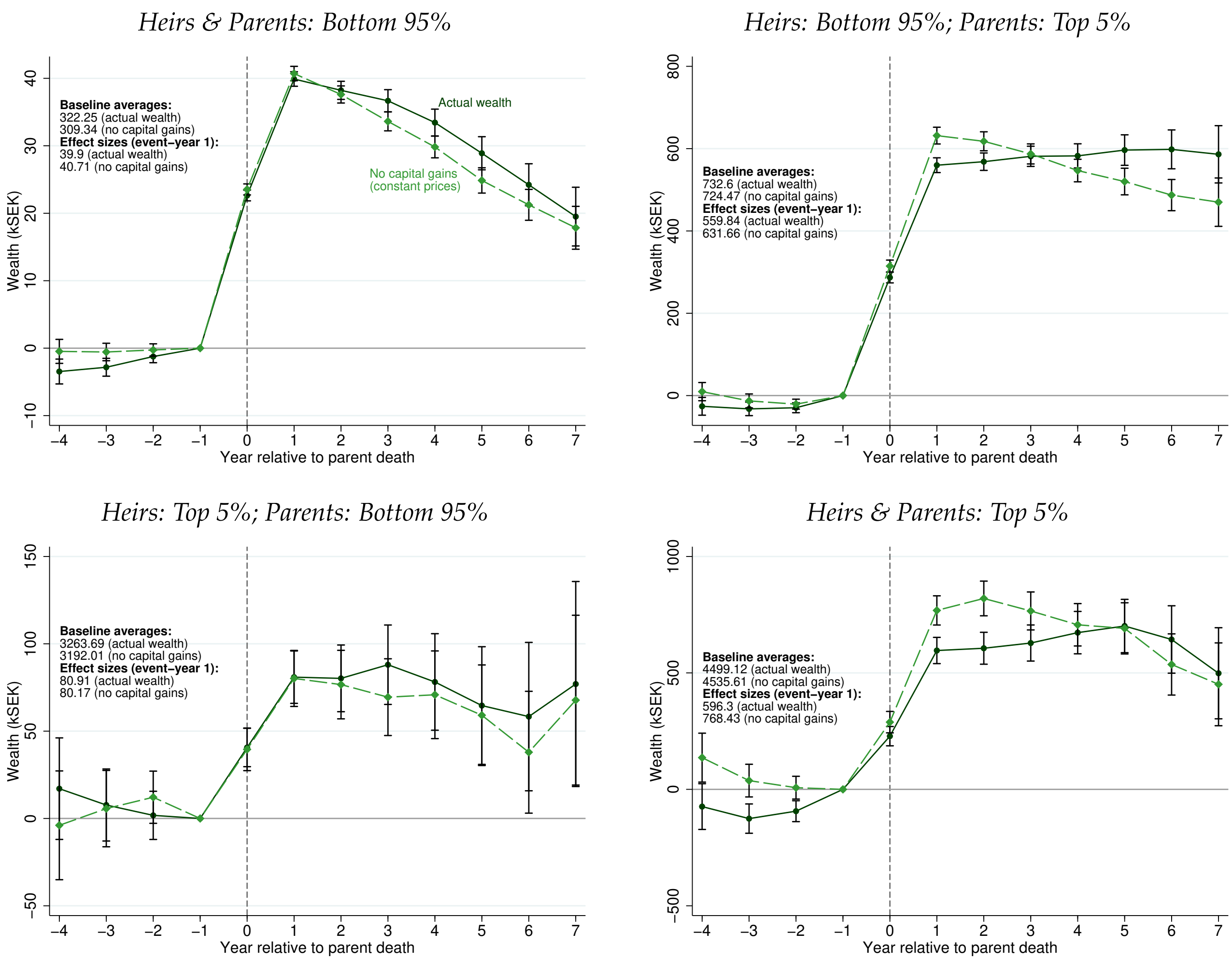
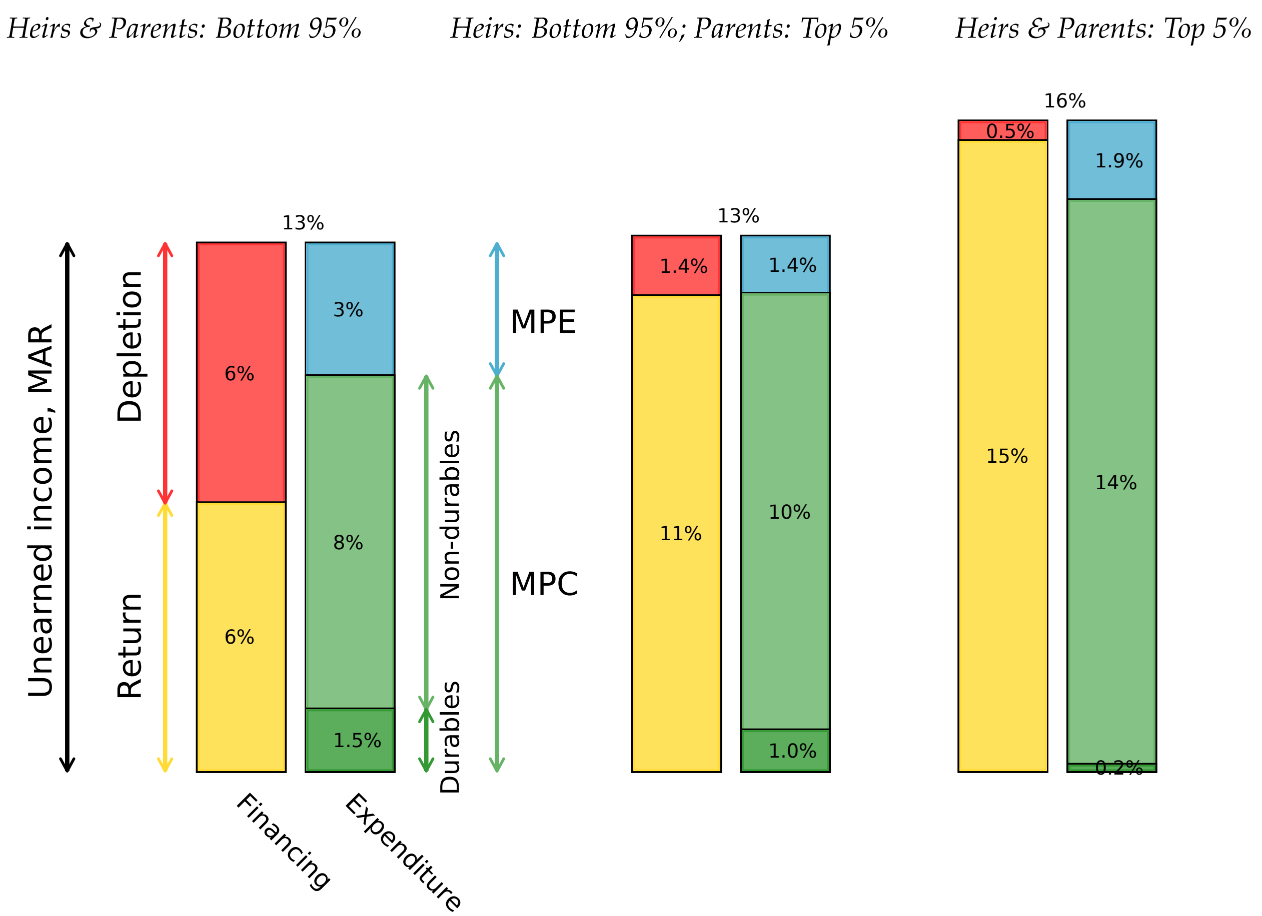


Figure 5: Heterogeneous inheritance depletion rates by heir and parent wealth

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.

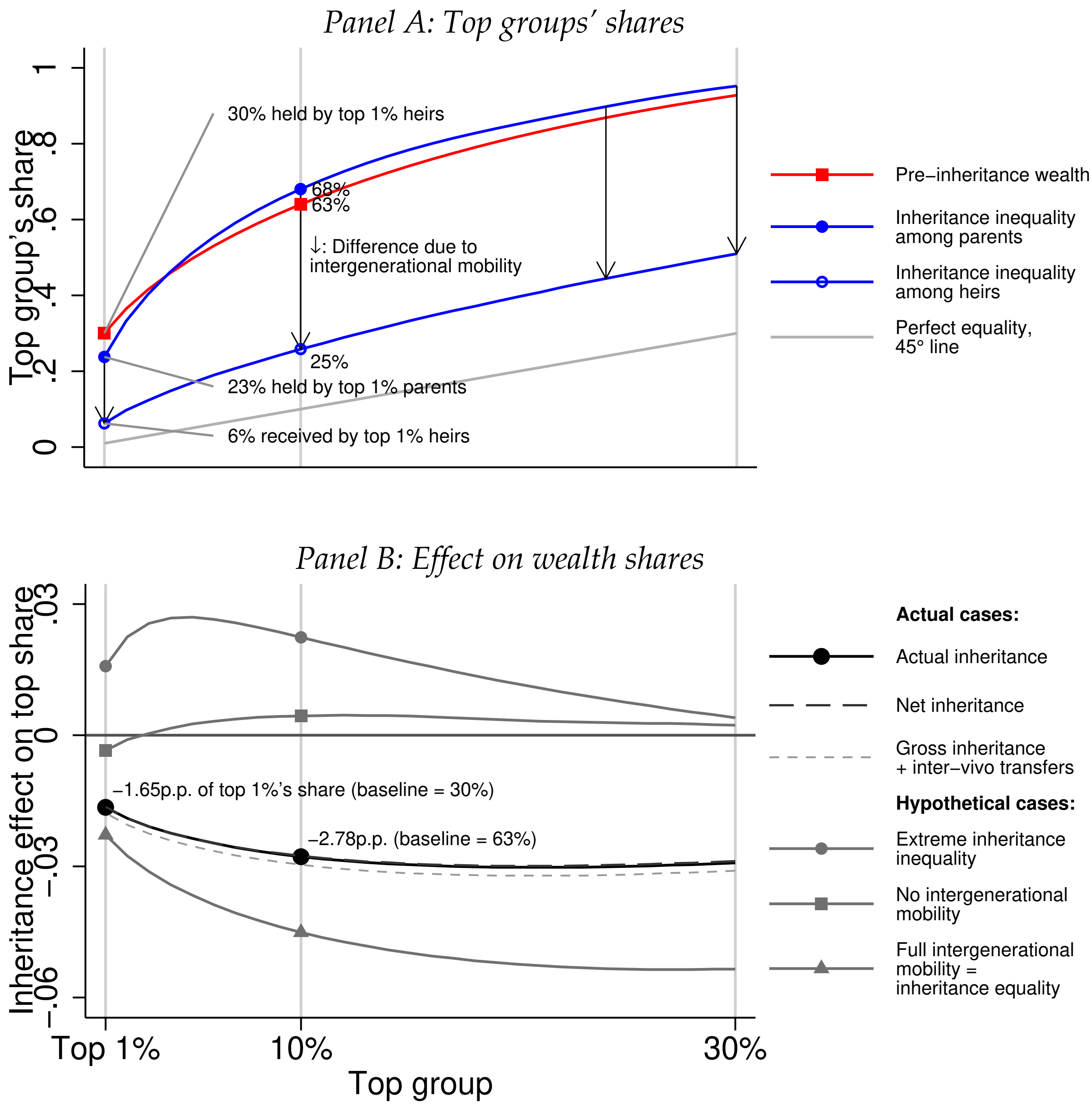


Figure 7: The effect of inheritances on the top shares of wealth in the short run

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 Figure C.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.

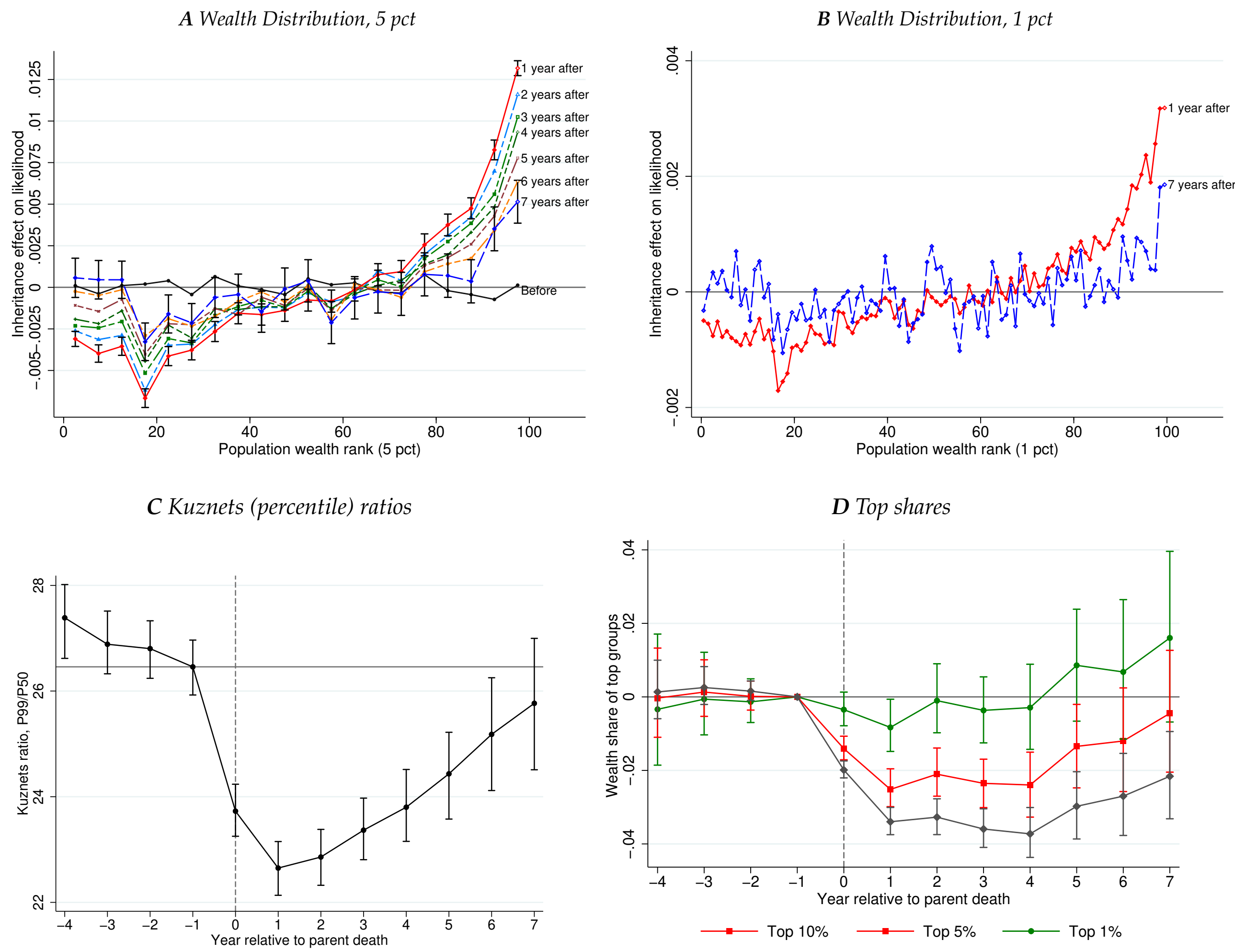


Figure 8: The effects of inheritances on the wealth distribution and wealth inequality: Short vs. long run

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 (6) 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.

Online Appendix (not for Publication)

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A Inheritances and Wealth Inequality: Proofs and Generalizations

A.1 Proof of Proposition 1

This section provides the proof of more general versions of Proposition 1 in the main text.

Consider a dynastic economy where each individual has one child (heir).

We denote the proportion of children among the top θ of the heirs' wealth distribution whose parents are within the top θ of the parents' wealth distribution by $\overline{\alpha}$. The corresponding share for the bottom $1-\theta$ is denoted $\underline{\alpha}$. There is a one-to-one mapping between the two alphas, $\frac{1-\overline{\alpha}}{1-\underline{\alpha}} = \frac{1-\theta}{\theta}$, and a higher alpha means a lower level of intergenerational wealth mobility. Moreover, $\overline{\alpha} \in [\theta, 1]$ and $\underline{\alpha} \in [1-\theta, 1]$ where the lower bounds are attained if there is perfect wealth mobility.

For simplicity, assume that all agents receive inheritances at the same age and denote each individual by her rank in the within-cohort wealth distribution just before receiving inheritance. $\overline{A}$ and $\underline{A}$ denote the average wealth among heirs before receiving inheritance. Similarly, $\overline{A_p}$ and $\underline{A}_p$ denote the average wealth among similar groups for the parent generation. Parents' wealth just before passing away (inheritance) is parametrized as $\overline{\gamma}\overline{A_p}$ and $\underline{\gamma}\underline{A}_p$ for each group, so that $\{\overline{\gamma}, \underline{\gamma}\}$ denote wealth patterns over life-cycle. They thus capture heterogeneity in the life-cycle pattern of wealth. We assume that wealthier parents leave larger inheritances behind, $\frac{\overline{\gamma}}{\underline{\gamma}}\frac{\overline{A_p}}{\underline{A}_p} > 1$, although we allow that they consume a larger share of their wealth during their life-time, that is $\frac{\overline{\gamma}}{\underline{\gamma}}$ can be smaller than one.

We denote by $\overline{\lambda}$ the difference between the wealth of top parents who have top and bottom heirs, respectively. More precisely, $\overline{\lambda}$ is the ratio of average inheritances among top θ heirs relative to bottom $1-\theta$ heirs, conditional on both having top θ parents. In the same way, $\underline{\lambda}$ is the ratio of average inheritance of top θ heirs relative to bottom $1-\theta$ heirs, conditional on both having bottom $1-\theta$ parents. Positive intergenerational mobility implies that both lambdas are larger than one.

The inheritances *received* by the top θ and bottom $1-\theta$ of the new generation are

$$\overline{I} = (1-\overline{\alpha})\,\underline{\lambda}\,\underline{\gamma}\underline{A}_p + \overline{\alpha}\,\overline{\lambda}\,\overline{\gamma}\overline{A_p} \tag{7}$$

and

$$\underline{I} = \underline{\alpha}\underline{\gamma}\underline{A}_p + (1-\underline{\alpha})\,\overline{\gamma}\overline{A_p}, \tag{8}$$

respectively. From the senders perspective, the inheritances sent by the top θ and bottom $1-\theta$ of the old generation are

$$\overline{I_p} = \left(1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}\right)\overline{\gamma}\overline{A_p} \tag{9}$$

and

$$\underline{I}_p = \left(\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}\right)\underline{\gamma}\underline{A}_p, \tag{10}$$

respectively.

The wealth share in the hands of top θ heirs before inheritances is denoted by $S^W = \frac{\theta\overline{A}}{\theta\overline{A}+(1-\theta)\underline{A}}$. The share of inheritances left by top θ parents is $S^I = \frac{\theta\overline{I_p}}{\theta\overline{I_p}+(1-\theta)\underline{I}_p}$. The latter is not the top θ share of inheritances since the θ-groups are defined by wealth. S^I is approximately equal to the top share of

				Parent	
				Top θ	Bottom $1-\theta$
		Average Wealth	Average Inheritance	$\overline{I}_p$	$\underline{I}_p$
Heir	Top θ	$\overline{A}$	$\overline{I}$	$(\overline{\alpha}, \overline{\lambda}\overline{\gamma}\overline{A}_p)$	$(1-\overline{\alpha}, \underline{\lambda}\underline{\gamma}\underline{A}_p)$
	Bottom $1-\theta$	$\underline{A}$	$\underline{I}$	$(1-\underline{\alpha}, \overline{\gamma}\overline{A}_p)$	$(\underline{\alpha}, \underline{\gamma}\underline{A}_p)$

Table A.1: Parameters of the model: $(\text{mobility likelihood}, \text{average inheritance})$

inheritances if wealth ranks are persistent over life-cycle, which is empirically supported by findings in Boserup et al. (2014).

What turns out to matter for the result below is the following parameters:

$$\lambda \equiv 1 - \frac{\overline{\lambda}}{\underline{\lambda}} \frac{\underline{\alpha} + (1-\underline{\alpha})\,\underline{\lambda}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}} \in [0,1]\,.$$

In Sweden during the period under study, $\overline{\lambda}$ and $\underline{\lambda}$ are close, see the transition matrix of Tables C.4, C.5 and C.6 for $\theta = 0.01$, $\theta = 0.1$ and $\theta = 0.2$, respectively. This implies that $\lambda = .13(.08)$ for top 1% (10%). So that the simplifying assumption in the main text, $\lambda = 0$, is plausible. More precisely, the $\overline{\lambda}$ is $2.49\,(1.76)$ and $\underline{\lambda}$ is $2.63\,(1.7)$ for top 1% (10%). These are calculated using the average inheritance of parents from the top 1% and the bottom 99% to heirs of top 1% being equal to 2152 and 100, to heirs of bottom 99% being 865 and 38. Exact the same numbers for top 10% are 441, 34; 251 and 20, respectively.

Lemma 1. *$\frac{\overline{A}}{\underline{A}} > \frac{\overline{I}}{\underline{I}}$ is equivalent to*

$$\left(S^W - \theta\right) > \frac{\overline{\alpha}-\theta}{1-\theta}\left(S^I - \theta\right) + \lambda\left(S^W - \overline{\alpha}\right) S^I. \tag{11}$$

In case of $\overline{\lambda} = \underline{\lambda} = 1$, then $\lambda = 0$ and the above condition is equivalent to $\frac{S^W-\theta}{S^I-\theta} > \frac{\overline{\alpha}-\theta}{1-\theta}$.

Proof. Using the definition of the top wealth share, $S^W = \left(1 + \frac{1-\theta}{\theta}\frac{\underline{A}}{\overline{A}}\right)^{-1}$, the ratio of average wealth between the two groups can be then written as:

$$\frac{\overline{A}}{\underline{A}} = \frac{S^W}{\theta} \Big/ \frac{1-S^W}{1-\theta} \tag{12}$$

In the same way, we get the ratio of inheritances as $\frac{\overline{I}_p}{\underline{I}_p} = \frac{S^I}{\theta} / \frac{1-S^I}{1-\theta}$. Using the latter, as well as (10) and (9), we get that $\frac{\overline{\gamma}\overline{A}_p}{\underline{\gamma}\underline{A}_p} = \frac{1-\theta}{\theta}\frac{\underline{\alpha}+(1-\underline{\alpha})\underline{\lambda}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\frac{S^I}{1-S^I}$. Then we use the latter as well as equations (12), (7) and (8) to rewrite $\frac{\overline{A}}{\underline{A}} > \frac{\overline{I}}{\underline{I}}$ as

$$\frac{\theta}{1-\theta}\frac{1-S^W}{S^W} < \frac{\underline{\alpha} + (1-\underline{\alpha})\,\frac{1-\theta}{\theta}\,(1-\lambda)\,\frac{S^I}{1-S^I}}{(1-\overline{\alpha}) + \overline{\alpha}\frac{1-\theta}{\theta}\,(1-\lambda)\,\frac{S^I}{1-S^I}}$$

After some algebra, this leads to condition (11). □

Note that the second term on the right hand side of condition (11) can be positive or negative, comparing the wealth inequality and wealth mobility.

We are now equipped to tackle a generalized version of Proposition 1. We will do so in two parts.

Proposition 2. *(Part I of the extension of Proposition 1 in the main text)*

The share of wealth in the hands of the top θ of the wealth distribution is reduced upon receiving inheritance iff

$$\left(S^W-\theta\right) > \frac{\overline{\alpha}-\theta}{1-\theta}\left(S^I-\theta\right)+\lambda\left(S^W-\overline{\alpha}\right)S^I. \tag{13}$$

In particular, this is the case if one the following is true:

i - Intergenerational wealth mobility is high, $S^W > \overline{\alpha}$, independent of the level of inheritance inequality.

ii - Inheritance inequality is lower than wealth inequality, $S^I < S^W$, independent of the degree of intergenerational wealth mobility. This is equivalent to

$$\frac{\overline{I_p}}{\underline{I_p}} = \frac{\overline{\gamma}}{\underline{\gamma}} \times \frac{\overline{A_p}}{\underline{A_p}} < \frac{\overline{A}}{\underline{A}}. \tag{14}$$

Proof. We define a real function $f(.)$ as $f(x) = \frac{1}{1+\frac{1-\theta}{\theta}\frac{1}{x}}$. The share of top θ of total wealth among heirs, $S^W = f\left(\frac{\overline{A}}{\underline{A}}\right)$, changes to $S^W_{after} = f\left(\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\right)$ after receiving inheritances. Given that $f(.)$ is an increasing function, inheritances reduce wealth inequality if and only if the ratio of top to bottom average wealth falls, that is if and only if $\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}} < \frac{\overline{A}}{\underline{A}}$. This is equivalent to $\frac{\overline{I}}{\underline{I}} < \frac{\overline{A}}{\underline{A}}$, and applying Lemma (1), equivalent to inequality 13.

Step1- The right hand side of inequality 13 is increasing in S^I if and only if

$$\frac{\overline{\alpha}-\theta}{1-\theta}+\lambda\left(S^W-\overline{\alpha}\right) > 0.$$

This condition always holds since the expression is increasing in $\overline{\alpha}$ and $\overline{\alpha} \geqslant \theta$. This implies that the inequality 13 always holds if it holds for the case of maximum inequality in inheritance, $S^I = 1$. In this case, the inequality 13 is equivalent to $S^W > \overline{\alpha}$. This implies that the inequality 13 holds no matter the distribution of inheritance if $S^W > \overline{\alpha}$.

Step 2 - Since the right hand side of inequality 13 is increasing in S^I, then inequality 13 holds in case of $S^W \geqslant S^I$ if and only if it holds when $S^W = S^I$. In the latter case, the condition 13 is equivalent to

$$\lambda\left(S^I\right)^2 - \left(\frac{1-\overline{\alpha}}{1-\theta}+\lambda\overline{\alpha}\right)S^I + \frac{1-\overline{\alpha}}{1-\theta}\theta < 0.$$

This holds since it holds at boundary values of S^I, namely θ and 1. Moreover, if there is no mobility, then the condition 13 is equivalent to $S^W \geqslant S^I$. □

Proposition 3. *(Part II of the extension of Proposition 1 in the main text)*

The share of wealth in the hands of the top θ of the wealth distribution upon receiving inheritance is increasing in inheritance inequality (keeping the average inheritance constant), and decreasing in intergenerational wealth mobility.

Proof. Using $S^{W}_{after} = f\left(\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\right)$, We proceed in two steps and show that $\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}$ is increasing in inheritance inequality, and thereafter that it is decreasing in intergenerational wealth mobility.

Step 1 - We will first investigate whether that $\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}$ is increasing in S^I. The derivative of the former with respect to the latter has the same sign as

$$\frac{d\overline{I}}{dS^I} - \frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\frac{d\underline{I}}{dS^I}. \tag{15}$$

Now, using equations (7), (8), (9), and (10), we have

$$\overline{I} = \frac{(1-\overline{\alpha})\,\underline{\lambda}}{(\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda})}\underline{I_p} + \frac{\overline{\alpha}\,\overline{\lambda}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\,\overline{I_p} \tag{16}$$

and

$$\underline{I} = \frac{\underline{\alpha}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}\underline{I_p} + \frac{1-\underline{\alpha}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\,\overline{I_p}. \tag{17}$$

These can be written as

$$\overline{I} = \frac{(1-\overline{\alpha})\,\underline{\lambda}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}I_p\frac{1-S^I}{1-\theta} + \frac{\overline{\alpha}\,\overline{\lambda}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\,I_p\frac{S^I}{\theta} \tag{18}$$

$$\underline{I} = \frac{\underline{\alpha}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}I_p\frac{1-S^I}{1-\theta} + \frac{1-\underline{\alpha}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\,I_p\frac{S^I}{\theta} \tag{19}$$

Differentiating these with respect to the top inheritance share, we get

$$\frac{d\overline{I}}{dS^I} = I_p\left[\frac{\overline{\alpha}\,\overline{\lambda}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\frac{1}{\theta} - \frac{(1-\overline{\alpha})\,\underline{\lambda}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}\frac{1}{1-\theta}\right]. \tag{20}$$

and

$$\frac{d\underline{I}}{dS^I} = I_p\left[\frac{1-\underline{\alpha}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\frac{1}{\theta} - \frac{\underline{\alpha}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}\frac{1}{1-\theta}\right] \tag{21}$$

Using 21 and 20 in condition 15, we get that $\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}$ is increasing in S^I iff

$$\frac{\overline{\alpha}\,\overline{\lambda}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\frac{1}{\theta} - \frac{(1-\overline{\alpha})\,\underline{\lambda}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}\frac{1}{1-\theta} - \frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\left[\frac{1-\underline{\alpha}}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}}\frac{1}{\theta} - \frac{\underline{\alpha}}{\underline{\alpha}+(1-\underline{\alpha})\,\underline{\lambda}}\frac{1}{1-\theta}\right] > 0.$$

The left-hand side is an increasing function of the two lambdas, implying that this condition is satisfied when the lambdas reach their lowest levels, or

$$\frac{\overline{\alpha}}{\theta} - \frac{1-\overline{\alpha}}{1-\theta} - \frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\left[\frac{1-\underline{\alpha}}{\theta} - \frac{\underline{\alpha}}{1-\theta}\right] > 0,$$

which holds since it does when the two alphas reaching their lower bounds.

Step 2 - In a similar fashion, $\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}$ is increasing in $\overline{\alpha}$ if and only if

$$\frac{d\overline{I}}{d\overline{\alpha}} - \frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\frac{d\underline{I}}{d\overline{\alpha}} > 0. \tag{22}$$

Using equation (19), we get

$$\frac{\partial \underline{I}}{\partial \overline{\alpha}} = -\frac{\left(\overline{\lambda}-1\right)\left(1-\underline{\alpha}\right)}{\left(1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}\right)^2} I_p \frac{S^I}{\theta}$$

and

$$\frac{\partial \underline{I}}{\partial \underline{\alpha}} = \frac{\underline{\lambda}}{\left(\underline{\alpha}+\left(1-\underline{\alpha}\right)\underline{\lambda}\right)^2} I_p \frac{1-S^I}{1-\theta} - \frac{1}{1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}} I_p \frac{S^I}{\theta}$$

These two equalities together, and using the fact that $\frac{\partial \underline{\alpha}}{\partial \overline{\alpha}} = \frac{\theta}{1-\theta}$, imply that

$$\frac{d\underline{I}}{d\overline{\alpha}} = \frac{\theta}{1-\theta} I_p \left[\frac{\underline{\lambda}}{\left(\underline{\alpha}+\left(1-\underline{\alpha}\right)\underline{\lambda}\right)^2}\frac{1-S^I}{1-\theta} - \frac{\overline{\lambda}}{\left(1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}\right)^2}\frac{S^I}{\theta}\right] \tag{23}$$

Now using this and $\frac{d\overline{I}}{d\overline{\alpha}} = -\frac{d\underline{I}}{d\overline{\alpha}}\frac{1-\theta}{\theta}$ in condition 22, we get that $\frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}$ is increasing in $\overline{\alpha}$ iff

$$-\frac{d\underline{I}}{d\overline{\alpha}}\left(\frac{1-\theta}{\theta} + \frac{\overline{A}+\overline{I}}{\underline{A}+\underline{I}}\right) > 0.$$

This means that condition 22 is equivalent to saying that the higher is mobility, the higher the share of wealth received by poor heirs, $\frac{d\underline{I}}{d\overline{\alpha}} < 0$. Using equation 23, this is equivalent to:

$$\frac{\overline{\lambda}}{\left(1-\overline{\alpha}+\overline{\alpha}\overline{\lambda}\right)^2}\frac{S^I}{\theta} - \frac{\underline{\lambda}}{\left(\underline{\alpha}+\left(1-\underline{\alpha}\right)\underline{\lambda}\right)^2}\frac{1-S^I}{1-\theta} > 0.$$

Since the left-hand-side is an increasing function of two lambdas, this condition is satisfied when lambdas reach their lowest levels that is equivalent to $1 < \frac{1-\theta}{\theta}\frac{S^I}{1-S^I} = \frac{\overline{I_p}}{\underline{I_p}}$. Q.E.D. □

Proposition 4. *Absolute measures of wealth inequality always increase as a result of inheritances as long as the intergenerational mobility is not perfect.*

Proof. Wealthier heirs receive more inheritance in absolute terms, $\underline{I} < \overline{I}$ or using equations 7 and 8,

$$\underline{\alpha} + \left(1-\underline{\alpha}\right)\frac{\overline{\gamma}}{\underline{\gamma}}\frac{\overline{A_p}}{\underline{A_p}} < \left(1-\overline{\alpha}\right) + \overline{\alpha}\frac{\overline{\gamma}}{\underline{\gamma}}\frac{\overline{A_p}}{\underline{A_p}}$$

iff $1 < \underline{\alpha} + \overline{\alpha}$ which is the case as long as there is some degree of intergenerational immobility.

□

A.2 A Generalized Model

Consider a population of heirs of size N where each individual has one parent. The heirs are ranked according to their pre-inheritance wealth, and a function $w(.)$ maps the rank to wealth level so that the highest level of wealth among heirs is $w(1)$. More precisely, w is a decreasing real function on $\widehat{N} = \{1, 2, ..., N\}$. To mimic the data, we assume that the wealth distributions is convex, that is $w(i) - w(i+1) > w(i+1) - w(i+2)$ for all i when i, and $i+2$ are elements of $\widehat{N}$. We denote the analogous mapping for the parent generation by $\widetilde{w}(.)$. With a slight abuse of notation, we denote

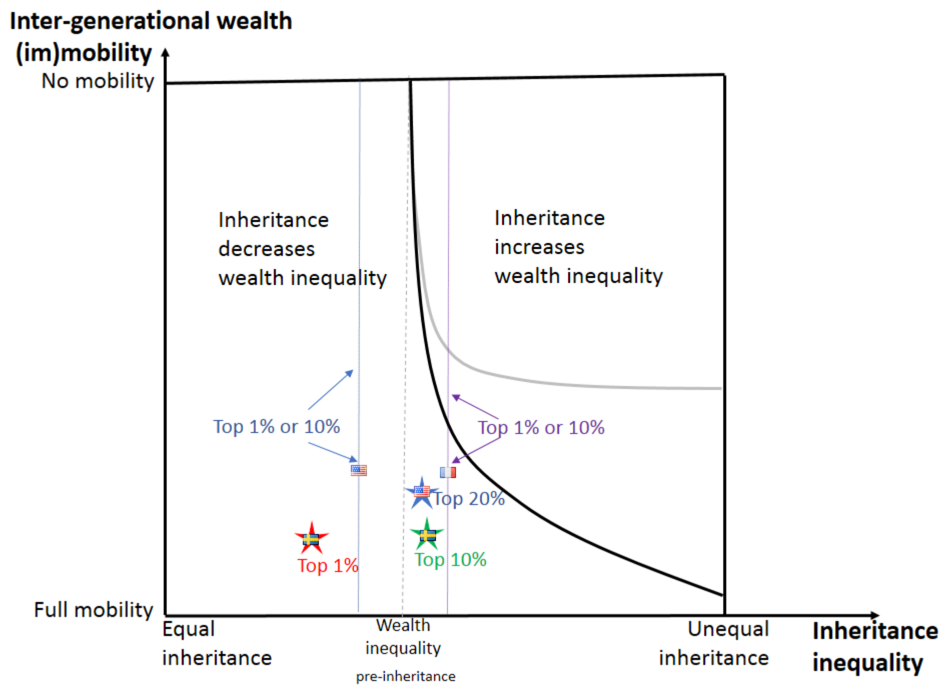


Figure A.1: The short-run effect of inheritance on wealth inequality among heirs

Note: The gray solid line represents the curve where the inheritance flow does not change the share of wealth in the hand of wealthiest heirs in the pre-inheritance period (Proposition 1). The black solid line represents the same curve once we focus on the wealth of the top wealthiest heirs in each period. Inequality in wealth or inheritances is measured in relative terms as the top 1% share. The x-axis represent S^I in the model, and the y-axis $\overline{\alpha}$. Lower and upper bounds of x- and y-axes are θ and 1. The points on both axises marked by wealth inequality correspond to the top share measure, S^W. This figure is rotated version of the Figure 1 in the main text.

the total amount of wealth in each generation by w and $\widetilde{w}$, respectively. Now that we specified the marginal distribution, we will consider the copula, in spirit of Sklar's theorem.

The inter-generational mobility of wealth is denoted by the mapping that takes an heir's rank as input and gives the parent's rank, denoted by $\pi(.)$. More precisely, π is a permutation on $\widehat{N}$, that is a bijective function from $\widehat{N}$ to $\widehat{N}$. The function π is often called copula, but given our context, we refer to it as the mobility function. We denote the set of all such permutation functions on $\widehat{N}$ by Π.

We also separate the shape and scale of wealth distribution by denoting with $s(i) = \frac{w(i)}{w}$ the share of wealth in the hand of i'th heir. Then w and $s(.)$ measure scale and shape of wealth distribution (independently of its level). S denotes the set of all possible distributions, that is

$$S \equiv \left\{ s(.) \,|\, \sum_{i \in \widehat{N}} s(i) = 1 \,,\, s(i) \geqslant s(i+1) \; \forall_{i \in \widehat{N}} \,,\, s(N+1) = 0 \right\}$$

Similarly, we define $\widetilde{s}(.)$ and $\widetilde{S}$ for inheritances.

The distribution of wealth before inheritance $\{w(r)\}$ changes to $\{w(r) + \widetilde{w}(\pi(r))\}$ after inheritances. We define the wealthiest individual after inheritances by

$$m \equiv \arg\max_{i \in \widehat{N}} w(i) + \widetilde{w}(\pi(i)). \tag{24}$$

This means that the share of wealth held by the top individual is reduced upon inheritance if and only if

$$\frac{w(1)}{w} > \frac{w(m) + \widetilde{w}(\pi(m))}{w + \widetilde{w}}. \tag{25}$$

We next denote all potential m given a wealth distribution and total inheritance as M

$$M \equiv \max_{\pi(.) \in \Pi, \widetilde{s}(.) \in S} \arg\max_{i \in \widehat{N}} w(i) + \widetilde{w} \times \widetilde{s}(\pi(i)).$$

$M = 1$ corresponds to the assumption in proposition 2 that we relax in this section.

If the wealthiest individual remains the same individual after inheritances, $m = 1$, then this condition is equivalent to $\frac{w(1)}{w} > \frac{\widetilde{w}(\pi(1))}{\widetilde{w}}$, i.e., whether her share of wealth is larger than her share of inheritances. In spirit of the proposition 2 , inheritance reduces wealth inequality if and only if

$$\frac{w(1)}{w} > \frac{\widetilde{w}(1)}{\widetilde{w}} \frac{\widetilde{w}(\pi(1))}{\widetilde{w}(1)}. \tag{26}$$

The right-hand-side corresponds to the product of the top share among inheritances and a measure of intergenerational mobility that measures how wealthy the parent of the wealthiest heir is.

There is a limit on the level of m implied by following observation: all individuals who are wealthier than m before inheritances must have less wealthy parents: $\pi(i) > \pi(m)$ for all $i < m$. This implies that a positive correlation between heir and parent wealth implies that m must be close to 1.

The following proposition shows that a similar pattern for the evolution of top wealth shares depicted in Figure 1 is true also in this general setting.

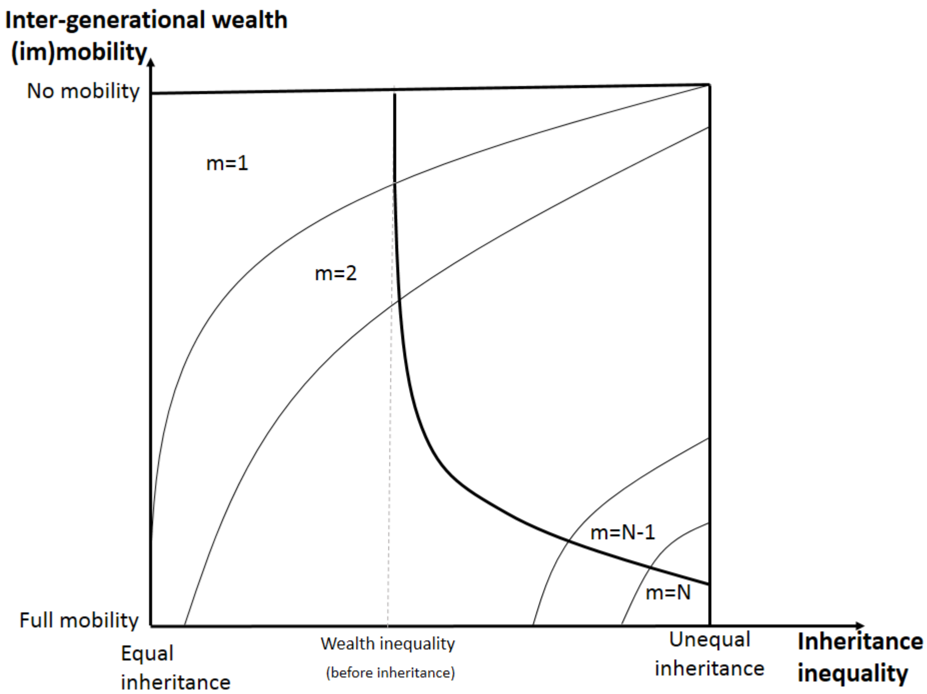


Figure A.2: Distribution of m for the case of $M = N$

Proposition 5. *Inheritance reduces the share of wealth in the hand of the wealthiest individual if either*

i - inheritance inequality is lower than wealth inequality, or

ii - $\widetilde{w} > w(1) - w(N)$ and inheritance inequality is higher than wealth inequality and mobility is higher than a threshold that is a function of inheritance inequality

Moreover, if inheritances reduce the share of wealth in the hands of the wealthiest individual, then it does so also if we set intergenerational mobility at full mobility, keeping the wealth and inheritance distributions the same.

Proof. The proof is presented in eight steps.

Step 1. We characterize M in this step. More precisely, we show that $M = 1$ if and only if

$$w(1) - w(2) > \widetilde{w},$$

and$M = N$ if and only if

$$\widetilde{w} > w(1) - w(N),$$

and otherwise the value of M is between the two extreme and implicitly define with:

$$w(1) - w(M+1) > \widetilde{w} > w(1) - w(M).$$

First, when is the poorest heir the richest heir after inheritances, i.e., $M = N$? This holds if there is one mobility function and a inheritance distribution that leads to $m = N$. The best scenario for the poorest pre-inheritance agent is when she receives all inheritances $\widetilde{w}$. This can only occur under full mobility $\pi(N) = 1$ and under full inheritance inequality $\widetilde{w}(1) = \widetilde{w}$. In this case equation 24 is equivalent to $w(N) + \widetilde{w} > w(1)$.

$$\widetilde{w} > w(1) - w(N)$$

Second, we can have $M = N - 1$

$$w(N-1) + \widetilde{w} > w(1)$$

but at the same time, $m < N$, that is

$$w(N) + \widetilde{w} < w(1).$$

These two imply that

$$w(1) - w(N) > \widetilde{w} > w(1) - w(N-1)$$

Finally, we can have $M = 1$, if and only if $\widetilde{w} < w(1) - w(2)$.

Step 2. In the case of no mobility or inheritance equality, in these cases $m = 1$, or the wealthiest individual is unchanged by inheritances.

In the case of full mobility and full inheritance inequality, i.e., all inheritances held by one heir, the wealthiest individual after inheritances is either the wealthiest or the poorest pre-inheritance heir. If we denote the wealthiest post-inheritance heir at full mobility and full inheritance inequality by $m_{FM,II}$, then

$$m_{FM,II} = \begin{cases} 1 & \widetilde{w} \leqslant w(1) - w(N) \\ N & \widetilde{w} > w(1) - w(N) \end{cases}.$$

This implies that, using step 1 we get that $M = N$ if and only if $m_{FM,II} = N$. However, if $m_{FM,II} = 1$, M can take any value less than N.

Consider the case where $m_{FM,II} = N$, then using inequality (25), inheritance is wealth inequality-reducing if and only if

$$\frac{w(1)}{w} > \frac{w(N) + \widetilde{w}}{w + \widetilde{w}}. \tag{27}$$

This condition is necessary and sufficient for inheritances being inequality-reducing at full intergenerational mobility (FM) and at extreme inheritance inequality (II). The necessary condition is that wealth inequality must be higher than the share of total wealth that is inherited. If the poorest heir has no pre-inheritance wealth, then it is also sufficient.

If the total amount of inheritances is smaller than the dispersion of wealth among heirs measured as $\widetilde{w} \leqslant w(1) - w(N)$, then inheritance flows do not change the top wealth heir under full mobility and extreme inheritance inequality, i.e. $m_{FM,II} = 1$. Given that $m = 1$, then the necessary and sufficient condition for inheritances being wealth inequality-decreasing is that inheritance inequality is lower than wealth inequality. The more interesting case is when $m_{FM,II} = N$, which implies that the wealthiest post-inheritance individual can be any heir depending on the inheritance distribution and mobility function.

Step 3: We define A as the set of child-parent pairs for which — if they are matched — the post-inheritance share of wealth of the child is below the top share of pre-inheritance wealth. More precisely

$$A \equiv \left\{ (i,j) \,|\, \frac{w(1)}{w} > \frac{w(i) + \widetilde{w}(j)}{w + \widetilde{w}} \right\}.$$

This set is not empty since $(N, N) \in A$ as long as there exists some degree of pre-inheritance wealth or inheritance inequality. This definition is independent of intergenerational wealth mobility, $\pi(.)$.

Step 4: A is covering the whole space, $A = \widehat{N} \times \widehat{N}$, if and only if inheritance inequality is lower than wealth inequality, $\frac{\widetilde{w}(1)}{\widetilde{w}} < \frac{w(1)}{w}$

Inequality (25) is equivalent to

$$\frac{w(1)}{w} > \frac{\widetilde{w}(\pi(m))}{\widetilde{w}} - \frac{w(1) - w(m)}{\widetilde{w}}. \tag{28}$$

If inheritance inequality is lower than wealth inequality, $\frac{w(1)}{w} > \frac{\widetilde{w}(1)}{\widetilde{w}}$, then condition (28) always holds, no matter the wealth mobility, since

$$\frac{\widetilde{w}(1)}{\widetilde{w}} \geqslant \frac{\widetilde{w}(\pi(m))}{\widetilde{w}} \geqslant \frac{\widetilde{w}(\pi(m))}{\widetilde{w}} - \frac{w(1) - w(m)}{\widetilde{w}}.$$

The equalities holds if and only if there is no inheritance inequality at the top-$\pi(m)$ and no wealth inequality at the top-m, respectively.

Moreover, consider a wealth and inheritance distribution for which no wealth mobility function leads to a wealth inequality-increasing inheritance. The mobility that maximizes the right-hand-side of inequality (25) is when $\pi(1) = 1$. In this case, inequality (25) is equivalent to $\frac{w(1)}{w} > \frac{\widetilde{w}(1)}{\widetilde{w}}$. This is also the case of full mobility.

Step 5: Now consider the case where inheritance inequality is higher than wealth inequality, $\frac{\widetilde{w}(1)}{\widetilde{w}} > \frac{w(1)}{w}$. Using (28), we can characterize A as

$$A = \left\{ (i,j) \mid (i,j) \in \widehat{N} \times \widehat{N}, \, j > \overline{\pi}(i) \right\},$$

where $\overline{\pi}(i)$ is the wealthiest parent whose inheritances make the child i not too wealthy so that her share of total post-inheritance wealth is smaller than pre-inheritace top share,

$$\overline{\pi}(i) \equiv \min \left\{ j \,|\, j \in \widehat{N}, \, \phi(i) > \frac{\widetilde{w}(j)}{\widetilde{w}} \right\},$$

where

$$\phi(i) \equiv \frac{w(1)}{w} + \frac{w(1) - w(i)}{\widetilde{w}}.$$

$\overline{\pi}(.)$ is an decreasing function since $\phi(i)$ is increasing, and we also know that $\overline{\pi}(i) \leqslant N$ and $\overline{\pi}(1) > 1$. $\phi(i)$ is a measure of wealth inequality, and if this reaches the extreme, then $\phi(i) > 1$ and $\overline{\pi}(i) = 1$ for all $i \in \widehat{N}$ except the very top.

The condition (25) holds if and only if $(i, \pi(i)) \in A$ for all $i \in \widehat{N}$. Or $\pi(i) > \overline{\pi}(i)$ for all $i \in \widehat{N}$. This is equivalent to having a level of intergenerational mobility high enough so that each individual has a parent with a lower rank than a given threshold. The higher is inheritance inequality, the higher the level of $\overline{\pi}(.)$, implying that the mobility needed to make inheritances wealth inequality-decreasing is higher.

The necessary and sufficient condition for the existence of such a mobility function is that for all n there are at least n heirs with lower bar of smaller than n. That is $N - n + 1 > \overline{\pi}(n)$, for all n. This is equivalent to

$$\frac{w(1)}{w} + \frac{w(1) - w(n)}{\widetilde{w}} > \frac{\widetilde{w}(N - n + 1)}{\widetilde{w}}, \tag{29}$$

So if in an economy inheritances are wealth inequality-decreasing, then this must also be the case under full mobility. In particular, a necessary condition for the existence of such a mobility function is $1 > \overline{\pi}(N)$, that is equivalent to

$$\frac{w(1) - w(N)}{w} \frac{w}{\widetilde{w}} > \frac{\widetilde{w}(1)}{\widetilde{w}} - \frac{w(1)}{w}, \tag{30}$$

The convexity of the wealth distribution implies that this condition is sufficient as well, except in the case where $m = 1$.

The right hand side of condition 30 is positive since we assume that inheritance inequality is higher than wealth inequality. It grows with inheritance inequality, moving to the right of Figure A.2, and converges to $1 - \frac{w(1)}{w}$, while condition 30 converges to 27. Under the last condition, there is a threshold such that when inheritance inequality is above it, inheritances are inequality-increasing independent of intergenerational mobility. Condition 30 dictates the intercept of the locus and the x-axis in case of $m_{FM,II} = N$.

Condition (29) can be seen as restricting the aggregate size of inheritance flows. This means that if inheritance inequality is higher than wealth inequality, then a large inheritance flow will be inequality-increasing. But this is not the question of interest here.

Step 6: The distribution of inheritances that leads to an increase in wealth inequality maximizes the right-hand-side of equation (25). That is, it maximizes $w(m) + \widetilde{w}(\pi(m))$. The former representation of the problem of finding the inheritance distribution that maximizes the post-inheritance inequality given a wealth distribution and intergenerational mobility mapping is:

$$\max_{\widetilde{s}(.) \in S} \max_{i \in \widehat{N}} w(i) + \widetilde{w} \times \widetilde{s}(\pi(i)). \tag{31}$$

This can be achieved, conditional on m, by placing all inheritances equally among the top $\pi(m)$ parents. This leaves them with $\frac{\widetilde{w}}{\pi(m)}$ inheritance each. An inheritance distribution that leads to an increase in wealth inequality exists if and only if

$$\phi(m) < \frac{\widetilde{w}(\pi(m))}{\widetilde{w}} = \frac{1}{\pi(m)}.$$

An inheritance distribution that leads to a wealth inequality increase exists if and only if there exists an heir with rank k so that $\pi(k) < \phi(k)^{-1}$. This condition implies that $\pi(i)$ is higher than any level of $\overline{\pi}(i)$. This is equivalent to $(i, \pi(i)) \in A$ for all i and implies that the condition (25) holds, no matter the inheritance distribution.

We should look for k among all k so that all heirs who are wealthier than heir rank k have poorer parents than her, that is,

$$\left\{i \,|\, i \in \widehat{N}\; i < m \,\&\, \pi(i) < \pi(m)\right\} = \emptyset.$$

We denote the left-hand subset by $\Omega(m)$ from now on. We characterize $\{k|\Omega(k) = \emptyset\}$ by $\{k_1, ..., , k_K\}$, where $k_1 = 1$, $\pi(k_K) = 1$, $k_i < k_{i+1}$ and $\pi(k_i) > \pi(k_{i+1})$.

An inheritance distribution that leads to an increase in wealth inequality exists if and only if there exists an heir of rank k such that

$$\pi(k) < \phi(k)^{-1}, \Omega(k) = \emptyset$$

Inheritance flows reduce wealth inequality independent of the inheritance distribution if and only if mobility is high, or, more precisely, if and only if, for all $i \in \widehat{N}$, such that $\Omega(i) = \emptyset$, $\pi(i)$ is higher than $\phi(i)^{-1}$. The level of mobility needed to make inheritances wealth inequality-increasing is increasing in wealth inequality. If there is no wealth inequality, then these conditions can never hold since $\phi(i)^{-1} = N$. If there is no intergenerational wealth mobility then these conditions do not hold since $l = 1$ and $\pi(1) = 1 < \phi(i)^{-1} = \frac{w}{w(1)}$. The full mobility concept is difficult in this discrete framework.

Step 7 - We consider the extreme case of inheritance inequality is characterized by $\widetilde{w}(1) = \widetilde{w}$. Let us denote with l the lucky heir who receives inheritance $\pi(l) = 1$. Given that $\widetilde{w} > w(1) - w(N)$ then the wealthiest heir after inheritances is the lucky heir, $m_{II} = l$ and condition (25) is equivalent to $(l, 1) \in A$ which is equivalent to $\phi(l) > 1$. We define

$$\bar{l} = \max_i \left\{i \in \widehat{N} | 1 > \phi(i)\right\},$$

which is well-defined and $\bar{l} > 1$.

We next conclude that, as long as mobility is high, $l \geqslant \bar{l}$, inheritances are wealth inequality-decreasing in the case of extreme inheritance inequality. No mobility can satisfy this condition when $\bar{l} = N$, that is the case if and only if $1 > \phi(N)$. The latter is equivalent to condition (27).

Two observations are worth mentioning here. First, $\bar{l}$ is increasing in wealth inequality: higher mobility needed to make inheritances reduce inequality. Second, this condition is equivalent to the condition of previous step of the proof, $\overline{\pi}(i) \leqslant \pi(i)$, in case of extreme inheritance inequality, $\widetilde{w}(1) = \widetilde{w}$.

Now consider an arbitrary inheritance distribution. Inheritances are wealth inequality-increasing if and only if there exists an $i \in \widehat{N}$ such that $(i, \pi(i)) \notin A$. This is equivalent to $\frac{\widetilde{w}(\pi(i))}{\widetilde{w}} > \phi(i)$ for $i \in \widehat{N}$ or

$$\frac{\widetilde{w}(j)}{\widetilde{w}} > \phi\left(\pi^{-1}(j)\right), \tag{32}$$

for $j \in \widehat{N}$.

There are two implications of this results:

(i) since we know that by definition $\frac{1}{j} \geqslant \frac{\widetilde{w}(j)}{\widetilde{w}}$, wealth inequality puts an upper bound on the level of $j \in \widehat{N}$ that satisfies the condition (32), namely $\frac{1}{w(1)/w} > j$.

(ii) if there exists a J such that the share of wealth in the hands of top J parents is above certain threshold, $\Phi(J) = \sum_{1 \leqslant j \leqslant J} \phi\left(\pi^{-1}(j)\right)$, then inheritances become wealth inequality-increasing since there exists a j $1 \leqslant j \leqslant J$ for which the condition (32) holds. We showed that if inequality is increasing in this series — that is the top share of inheritance is increasing — then there is a threshold where inheritances become wealth inequality-increasing.

Step eight - As the last step, we provide a separate proof for the claim that if inheritances reduce the share of wealth in the hands of the wealthiest individual, then it does so also if we set intergenerational mobility at full mobility, keeping the wealth and inheritance distributions the same. We prove by contradiction that when inheritances reduce the share of wealth in the hands of top wealthy individuals, then it does so also if we replace mobility by full mobility, keeping the wealth and inheritance distribution the same. Equation 25 implies that if inheritances reduce wealth inequality under mobility $\pi(.)$ but not under full mobility, then for all $i \in \widehat{N}$ we have

$$w(1)\frac{w+\widetilde{w}}{w} > w(i) + \widetilde{w}(\pi(i))$$

but there exist a $j \in \widehat{N}$ so that

$$w(j) + \widetilde{w}(N-j+1) > w(1)\frac{w+\widetilde{w}}{w}.$$

This implies that for all $i \in \widehat{N}$,

$$w(j) + \widetilde{w}(N-j+1) > w(i) + \widetilde{w}(\pi(i)).$$

This implies that for all $i \leqslant j$, we have $\widetilde{w}(N-j+1) > \widetilde{w}(\pi(i))$ or equivalently $\pi(i) > N-j+1$ for all $i \leqslant j$, which not possible. Q.E.D. □

Proposition 6. *Inheritances reduce a top-bottom Kuznets ratio - the ratio of the wealth of the wealthiest over the poorest individual- keeping wealth distribution $w(.)$ constant, if one of the following is true*

i- inheritance inequality is lower than wealth inequality

ii- inheritance inequality is higher than wealth inequality and mobility is higher than a threshold which is a function of inheritance inequality

iii- intergenerational wealth mobility $\pi(.)$ is high

iv- intergenerational wealth mobility $\pi(.)$ is low and inheritance inequality is higher than a threshold which is a function of wealth mobility

Proof. The top-bottom kuznets ratio is reduced if

$$\frac{w(1)}{w(N)} > \frac{w(m) + \widetilde{w}(\pi(m))}{w(m') + \widetilde{w}(\pi(m'))}, \tag{33}$$

where

$$m' = \arg\min_{r} w(r) + \widetilde{w}(\pi(r)).$$

i- If inheritance inequality is lower than wealth inequality, $\frac{w(1)}{w(N)} > \frac{\widetilde{w}(1)}{\widetilde{w}(N)}$, then condition (33) always holds, no matter the wealth mobility since

$$\frac{\widetilde{w}(1)}{\widetilde{w}(N)} \geqslant \frac{\widetilde{w}(i)}{\widetilde{w}(j)} \, \forall i, j \in .$$

Moreover, consider a wealth and inheritance distribution for which no wealth mobility function leads to a wealth inequality-increasing inheritance. The mobility that maximizes the right hand side of inequality (33) is when $\pi(1) = 1$ and$\pi(N) = N$. In this case, inequality (33) is equivalent to $\frac{w(1)}{w(N)} > \frac{\widetilde{w}(1)}{\widetilde{w}(N)}$.

ii- If inheritance inequality is higher than wealth inequality, $\frac{w(1)}{w(N)} < \frac{\widetilde{w}(1)}{\widetilde{w}(N)}$, then there exist two child-parent pairs for whom, if they are matched, the post-inheritance Kuznets ratio is below the pre-inheritance one. Let us denote that by A. More precisely

$$A \equiv \left\{ \left(i, j, i', j'\right) | \frac{w(1)}{w(N)} > \frac{w(i) + \widetilde{w}(j)}{w(i') + \widetilde{w}(j')} \right\}$$

This set is not empty since $(N, N, 1, 1) \in A$, and it is not complete since $(1, 1, N, N) \notin A$. Importantly, note that this definition does not dependent on intergenerational wealth mobility, $\pi(.)$.

We characterize A as

$$A = \left\{ \left(i, j, i', j'\right) | j > \overline{\pi}\left(i | i', j'\right) \right\},$$

where $\overline{\pi}_1(i)$ is the wealthiest parent who makes the child i not too wealthy so that her post-inheritance $(i, j) - \mathrm{ratio}$ is smaller than pre-top top-bottom kuznets ratio. More precisely

$$\overline{\pi}\left(i | i', j'\right) \equiv \min\{j | \phi(i) > \widetilde{w}(j)\},$$

where

$$\phi\left(i | i', j'\right) \equiv \frac{w(1)}{w(N)} \left(w\left(i'\right) + \widetilde{w}\left(j'\right)\right) - w(i).$$

$\overline{\pi}(.)$ is an decreasing function since $\phi(i)$ is increasing. Condition (33) holds if and only if $(m, \pi(m), m', \pi(m')) \in A$. This is equivalent to $(i, \pi(i), i', \pi(i')) \in A$ for all $i, i' \in \widehat{N}$. Or $\pi(i) > \overline{\pi}(i | i', j')$ for all $i, i', j' \in \widehat{N}$. This is equivalent to having a mobility level high enough so that each individual have parent with lower rank than certain threshold.

iii- The proof of this part is by construction. The distribution of inheritance that leads to an increase in wealth inequality should maximize the right hand side of equation (33).

If $\pi(N) > \pi(1)$, i.e., the parent of the poorest heir has less wealth than the parent of wealthiest heir, then the inheritance distribution that divides estates equally among the top $\pi(1)$ heirs maximizes the right-hand-side of equation (33). Under this inheritance distribution, inheritance flows increase wealth inequality, as:

$$\frac{w(1)}{w(N)} < \frac{w(1) + \widetilde{w}/\pi(1)}{w(N)} = \frac{w(m) + \widetilde{w}(\pi(m))}{w(m') + \widetilde{w}(\pi(m'))}, \tag{34}$$

If $\pi(N) < \pi(1)$ and no inheritance distribution leads to a reduction of wealth inequality, then we need that

1) for all k so that $\pi(k) < \pi(N)$, we have $w(k) + \frac{\widetilde{w}}{\pi(k)} < w(1)$, that is $w(k) < w(1) - \frac{\widetilde{w}}{\pi(k)}$

2) for all k so that $\pi(1) < \pi(k)$, we have $\frac{w(1) + \frac{\widetilde{w}}{\pi(1)}}{w(k)} < \frac{w(1)}{w(N)}$, that is $\left(1 + \frac{\widetilde{w}}{w(1)} \frac{1}{\pi(1)}\right) w(N) < w(k)$.

These conditions require a high level of mobility. More precisely, they require that heirs with parents who are more (less) wealthy than a given level are relatively poor (wealthy). In particular, they hold when there is high mobility, i.e. when $\pi(N) = 1$ and $\pi(1) = N$. Q.E.D. □

Finally, we visit the case where inequality is measured as the coefficient of variation. This measure is less appealing than the previously discussed measures — Kuznets ratio and top shares — since the wealth and inheritance distributions are skewed. The skewed distribution constitutes a reason for why the literature does not use this measure for wealth inequality. However, we prove similar proposition than Proposition 1 for the coefficient of variation, for the sake of completeness.

Proposition 7. *The coefficient of variation of the wealth distribution is reduced upon receiving inheritance iff*

$$S_I < S_W \Phi(\alpha)$$

where $\Phi(\alpha)$ is a decreasing function of the correlation between wealth and inheritance, and $\Phi(1) = 1$.

More precisely,

$$\Phi(\alpha) \equiv \frac{1}{1-\mu}\left[\left(1-\left(1-\alpha^2\right)\mu^2\right)^{1/2} - \alpha\mu\right]$$

where μ is the share of total wealth in the hand of heirs, i.e. the non-inherited share of post-inheritance wealth, $\mu = \frac{E(W)}{E(W+I)}$.

In particular, this implies that

The coefficient of variation of the wealth distribution is reduced upon receiving inheritance if inheritance inequality is smaller than wealth inequality, $S^I < S^W$, independent of the degree of intergenerational wealth mobility.

The coefficient of variation of the wealth distribution is increased upon receiving inheritance if inheritance inequality is large than a constant multiplier of wealth inequality, $S^I > \left(\frac{1-\mu}{1+\mu}\right)^{1/2} S^W$, independent of the degree of intergenerational wealth mobility.

Proof. Using the law of total variance, the coefficient of variation of sum of two random variables can be written as

$$cv(x+y)^2 = cv(x)^2 \mu(x)^2 + cv(y)^2 \mu(y)^2 + 2cor(x,y)\,cv(x)\,cv(y)\,\mu(x)\,\mu(y) \tag{35}$$

where $\mu(x) = \frac{E(x)}{E(x+y)}$ and $\mu(x) + \mu(y) = 1$. We are interested at the condition $S^W_{after} < S^W$ or $cv(W+I) < cv(W)$, i.e. the coefficient of variation of the wealth distribution is reduced upon receiving inheritance. Using the equation 35, $S^W_{after} < S^W$is equivalent to

$$(S_W)^2 \mu^2 + (S_I)^2 (1-\mu)^2 + 2\alpha S_I S_W \mu (1-\mu) < (S_W)^2$$

where $\mu \equiv \frac{E(W)}{E(W+I)}$

Rearranging the terms, this is equivalent to

$$\left(\frac{S_I}{S_W}\right)^2 + 2\alpha\frac{\mu}{1-\mu}\frac{S_I}{S_W} - \frac{1+\mu}{1-\mu} < 0$$

This condition holds iff

$$\frac{S_I}{S_W} < \frac{1}{1-\mu}\left[\left(1-\left(1-\alpha^2\right)\mu^2\right)^{1/2} - \alpha\mu\right] \tag{36}$$

The right hand side is decreasing in mobility, α. If there is perfect mobility, i.e. $\alpha = 0$, then the condition 36 is equivalent to

$$S_I < \left(\frac{1-\mu}{1+\mu}\right)^{1/2} S_W,$$

inheritance inequality needs to be higher than a multiplier of wealth inequality. The multiplier depends on the relative size of total wealth in two generations. In one extreme case, when the total amont of inherited wealth is tiny, $\mu \simeq 1$, then the inheritance inequality should be tiny relative to wealth inequality $\frac{S_I}{S_W} \simeq 0$. In the other extreme case, when the total inherited wealth is very large, $\mu \simeq 0$, then the inheritance inequality should be smaller than wealth inequality $S_I < S_W$.

In case of no mobility, i.e. $\alpha = 1$, the threshold is at one and the condition 36 is equivalent to $S_I < S_W$. Q.E.D. □

B The Measurement of Wealth, Savings and Inheritances

B.1 Wealth Tax Register versus the Household Balance Sheets

This section compares our individual-level wealth definition with that of the household balance sheets from National Accounts. The cross-walk of the asset types between the two sources is straightforward, with one exception: insurance savings in the Household Balance Sheets includes endowment policy, life insurance and pension insurance, while in the individual-level records it includes endowment policy only.

The microdata do not contain information on pension wealth, but we see withdrawals as they are subject to income taxation as well as contributions to individual retirement accounts (see Section 5.3 for a detailed account on how we deal with this).

Asset class	Micro data	National Accounts	Share of National account included in micro data	Share of National account accounted for after adjustments
	(1)	(2)	(3)	(4)
1. Cash and bank	9.5%	8.2%	74.7%	100%
2. Bonds	1.5%	1.6%	67.8%	67.8%
3. Listed equity	8.8%	6.1%	91.6%	91.6%
4. Unlisted equity	0	5.1%	0%	96.6%
5. Funds	7.6%	5.8%	85%	85%
6. Insurance savings	2.3%	7.9%	19.0%	100%
7. Private pension savings	0	17.3%	0%	100%
Total financial assets	**29.8%**	**52%**	**36.8%**	95.8%
1. Housing and land	59.1%	40%	95.0%	95.0%
2. Tenant-owned apartments	11%	8%	88.4%	88.4%
Total non-financial assets	**70.2%**	**48%**	**93.9%**	**93.9%**
Total assets	**5147744**	**8020432**	**64.2%**	94.9%
Liabilities	**1533096**	**1628872**	**94.1%**	94.1%
Net Wealth	**3614647**	**6391561**	**56.5%**	95%

Table B.1: Comparison between micro wealth data and National Accounts

Note: This table presents aggregate average values over 1999-2007 of all households' ownership in different asset classes. Percentages in columns (1)-(2) refer to shares of total assets, while numbers denote current million SEK. Column (1) uses the individual-level wealth data used in this paper, while column (2) offers the counterpart from the National Account's Household Balance sheet data. The third column shows the share of assets in the microdata relative to that in the National Accounts. Column (4) shows the share of national account wealth that we capture in the microdata and through our adjustments, described in Section 5.3. Bank accounts are adjusted according to an imputation strategy described in Appendix Section B.2. Unlisted equity are computed using the capitalization technique described in Appendix Section B.3. At the heir-level, we observe changes in retirement wealth and insurance holdings through tax-deductible retirement contributions (see Appendix Section B.4), through changes in labor supply (contributions are indexed against labor income) and through changes in consumption (withdrawals of retirement savings are taxable and therefore part of after-tax income which is used to construct our post-tax consumption measure). Non-financial assets include land, dwellings, vacation homes and apartment houses. Liabilities include mortgages, student loans and financial debt (issued options).

B.2 Imputing the Value in Bank Accounts

As mentioned in Section 5.3, our data do not capture bank holdings completely. During our sample period, money in bank accounts were taxable, but not always reported by the third parties (banks) to the tax authorities. For 1999-2005, money in bank accounts were required to be reported by third-parties if the total annual interest paid by the third-party exceeded 100 SEK. In 2006, the reporting requirement changed to having a balance of at least 10 thousand SEK at the end of the year. This extensively increased the reporting of bank accounts in 2006-2007. As a result, for the 1999-2005 period, we observe the bank holdings of around 45% of the population, amounting to 60-75% of the aggregate bank holdings in the Financial Accounts. The equivalent numbers in 2006-2007 are 67.5% of the population and 86-89% of total bank holdings.

To illustrate this, Appendix Figure B.1 plots the fraction of bank accounts that pay interest below the reporting threshold against bank value. The dashed and solid series correspond to 2005 and 2006, i.e. right before and after changing the requirements, respectively. The difference between the two series illustrates the issue of unreported bank values. For instance, out of all reported bank accounts with a value of 100 kSEK, around 10% generated less than 100 SEK of interest in 2005. In 2006, the corresponding share was above 20%.

Three facts worth mentioning about this figure. First, the fraction of bank accounts with interest received below 100 SEK is positive in 2005, even though reporting of these accounts was not required. Second, the share of low-interest accounts rises dramatically after the reporting regime shift in 2006. Third, the fraction of low-interest accounts for bank values below 10 thousand SEK (i.e. for those accounts where no change in reporting requirement occurred) is constant over time suggesting that the interest rate on those accounts was constant between 2005 and 2006. In sum, reporting requirement in the period of 1999-2005 leads a majority of, but not all, bank holdings with small interest to be missing in the data.

This shortcoming might imply that we do not capture the inheritance effect on wealth correctly. The bias can go either way: it could lead to an underestimation of the inheritance effect if part of the inherited wealth ends up in unreported bank accounts. It could alternatively generate an overestimation of the inheritance effect since inherited wealth can increase the likelihood that a bank account got reported. The implication of the shortcoming for the dynamic effects is also a priori ambiguous.

We propose two solutions to the issue of censored bank holdings . Our first approach compares the short-term effect of receiving inheritance on wealth using our empirical strategy, to the actual value of recorded inheritance recorded in the inheritance data. A higher actual value in the inheritance data would be consistent with unreported bank values biasing our estimate downwards while a lower value represents an upward bias. Appendix Figure B.2 displays the direct, mechanical effect of losing a parent on wealth against inheritance for each heir-wealth decile in 1999. Each observation represents a moment, indicated by the shape of the marker, and a wealth decile, indicated by the number next to the marker. The graph reveals that the short-term effect of receiving inheritance on wealth using our empirical strategy (i.e. the mechanical effect) is at least as large as the inheritance. Importantly, this is true also in the lower heir-wealth deciles, in which censored bank values are more of a concern.

The caveat of the first approach is that it does not address the potential consequences of censored bank values on the dynamic effects of inheritance on wealth. Our second approach speaks to this issue by imputing bank values for individuals whose deposits are not reported. For 7% of the total population who face interest payments below 100 SEK and thus are not meeting the bank-reporting requirement in 1999-2005, bank values are still reported. We use the information on bank accounts from this subset to infer and impute values for the censored ones.[55]

Our imputation strategy is valid if the reported bank values are representative of those without bank holdings in the data. It is likely that retail banks either reported all accounts or only those above the threshold. To test whether this conjecture is true, we exploit the reporting regime change in 2006 described above. The new rules increased the total number of accounts reported. If some banks were already reporting all accounts, we should expect no increase in the number of accounts from those banks but increases from others.

Panel A of Appendix Figure B.3 shows the number of accounts per year for the ten largest banks in Sweden. For six out of the ten, the number of accounts is relatively constant, while the number of reported accounts increases dramatically for others. We thus conclude that there is a set of individuals who did not meet the requirement for reporting but for whom reported bank values exist anyway, because some of the major banks reported all their customers' bank values independent of the balance.

We impute bank values from similar individuals who received interest below the threshold but had their bank values reported anyway. More precisely, we define cells of similar individuals and then we assign the mean bank value for the subpopulation below the threshold with reported bank holdings to those without. Our imputation strategy is valid if there are no systematic differences in the customer base across the major banks.

As a validity check, we impute bank holdings for the total population and compare the aggregate values with the total bank values in the Household Balance Sheets of the National Accounts. Here we define cells by calendar year, birth cohort (5-year intervals) and being within the top 10% of the wealth distribution. We inflate the bank holdings by a factor of 1.2 to ensure that we match the aggregate bank values. Appendix Panel B of Figure B.3 shows the aggregate time series of bank wealth in the hands of households, when imputing and not imputing missing bank values. Appendix Panel C of Figure B.2 presents the difference between the adjusted and unadjusted bank values as a fraction of unadjusted bank values against wealth decile for the total population. This adjustment increases the value of average bank holdings by a factor of 10 for individuals with low wealth, but does not have a large relative effect for top deciles.

To assess the impact of missing bank values on our dynamic inheritance effects, we define cells by the year of parental death, birth cohort (5-year intervals), calendar year, parent's wealth being within the top 10% (computed in the year prior to death, within year-of-death cohort) and own wealth being within the top 10% (in the year prior to the parent's death). For each cell, we assign the mean bank value for the subpopulation below the threshold with reported bank holdings to those without.[56]

[55] An alternative imputation strategy uses the bank values of individuals with interest payments just above the threshold. If bank values are monotonically increasing in the interest paid, this would constitute an upper bound on bank holdings for those with interest below 100 SEK. Unfortunately the alternative reporting regime in place during the years 2006-2007 reveals that large bank deposits can generate interest payments of zero, violating that monotonicity-assumption.

[56] Our results are robust to taking the median within each cell instead. We have also tried different cell definitions for the imputation. For instance, defining cells by parental year of death, birth cohort (5-year intervals) and calendar year only gives similar results. Importantly, our strategy does not suffer from the problem of empty cells. We do not have cells that

Appendix Figure B.4 shows the impact of the imputations on mean and median bank holdings and wealth, respectively, within our analysis population. Panel A shows that the method has a positive impact on average bank values in our data and Panel B confirms that the effect is concentrated in the lower part of the wealth distribution, shifting the median by a larger amount than the mean. For wealth, our main outcome of interest, the imputation has a much more limited effect – it increases average wealth by at most 5% – because bank accounts represent only a small fraction of total wealth. Panels C and D show that average and median wealth are barely affected, suggesting again, that missing values for bank holdings are more of a concern in the lower end of the wealth distribution.

Another procedure would have been to follow Calvet et al. (2007)and regress the bank balance on age and age squared of the household head as well as on income and financial wealth outside bank accounts, for the subsample of individuals whose bank values are reported even though their interest income is below 100 SEK. Using the estimated coefficient we could predict the balance using that sample. We abstain from this approach for two reasons. First, such a regression imposes strong parametric assumptions about the relationship between holdings and the regressors. Second, imputing bank values this way adds a much smaller amount of wealth to individuals with missing bank accounts.

Panel A of Appendix Figure B.5 shows the effect of losing a parent on wealth when imputing (dashed series) and not imputing (solid) missing bank holdings. The dynamic effects of inheritances are largely unaffected by the imputation. Panel B instead displays the proportional effects on wealth. Even in this case, where the imputation method presumably has a greater impact (Panel C, Appendix Figure B.3), the difference between the adjusted and original series is small.

We thus conclude that the missing information on bank holdings has a marginal impact on our point estimates. We nevertheless use our adjusted wealth series when studying inequality series, where using the adequate measurements across the entire wealth distribution is key.

include only individuals with zero bank holdings.

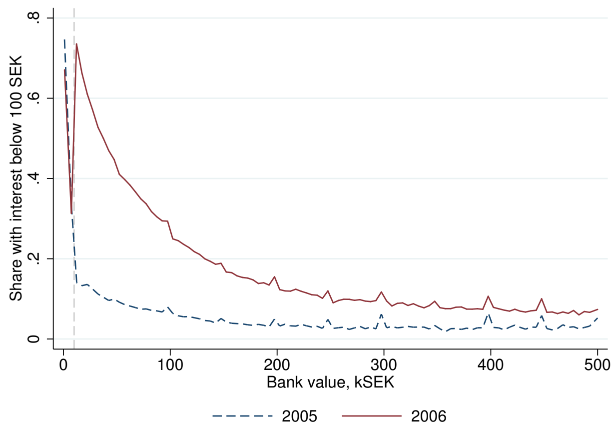


Figure B.1: Share of low-interest bank accounts across bank holdings before and after the reporting shift

Note: The figure shows the fraction of bank accounts that pay interest below 100 SEK against bank account value before the reporting regime change, in 2005 (dashed line), and after, in 2006 (solid line). During the period 1999-2005, bank values were reported automatically by third-parties to the Tax Agency if the interest received amounted to 100 SEK, while values were reported if the balance exceeded 10 thousand SEK for the period 2006-2007. This 10k-threshold is demarcated by the vertical grey line. We winsorize bank values above 500 thousand SEK (above the 97th percentile in the bank value distribution over those years) for expositional purposes.

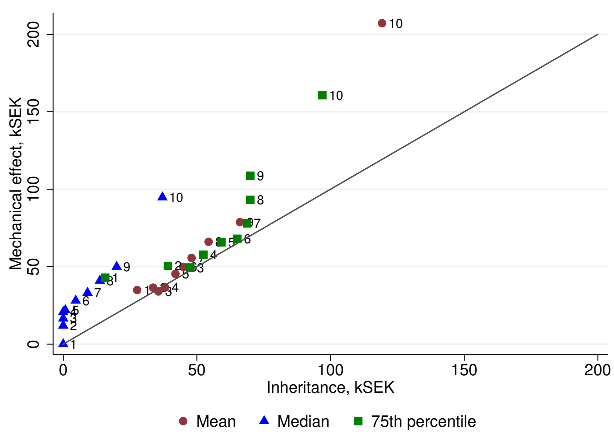


Figure B.2: Short-term effect of receiving inheritance on wealth *against reported inheritance*

Note: The figure shows the direct, mechanical effect of losing a parent on wealth against inheritance for individuals who lose a parent in 2000-2004. To construct this graph, we first divide heirs with non-negative wealth into ten equally-sized groups based on their wealth in 1999. Within each decile, we estimate the mean, median and 75th percentile mechanical effect, defined as the taxable wealth difference between treatment and control group (comprising year-of-death cohorts 2008-2012) in event-year one, net of the difference in the year before the event. Children's birth cohorts and four-digit education levels are reweighed to match the distribution of those who lose a parent in year 2002. Within each decile, we also compute the mean, median and 75th percentile inheritance for the treatment group, from the inheritance data. The red circled series show the estimated average mechanical effect against the average inheritance within each decile. The labels next to each observation indicate the corresponding heir-wealth decile.

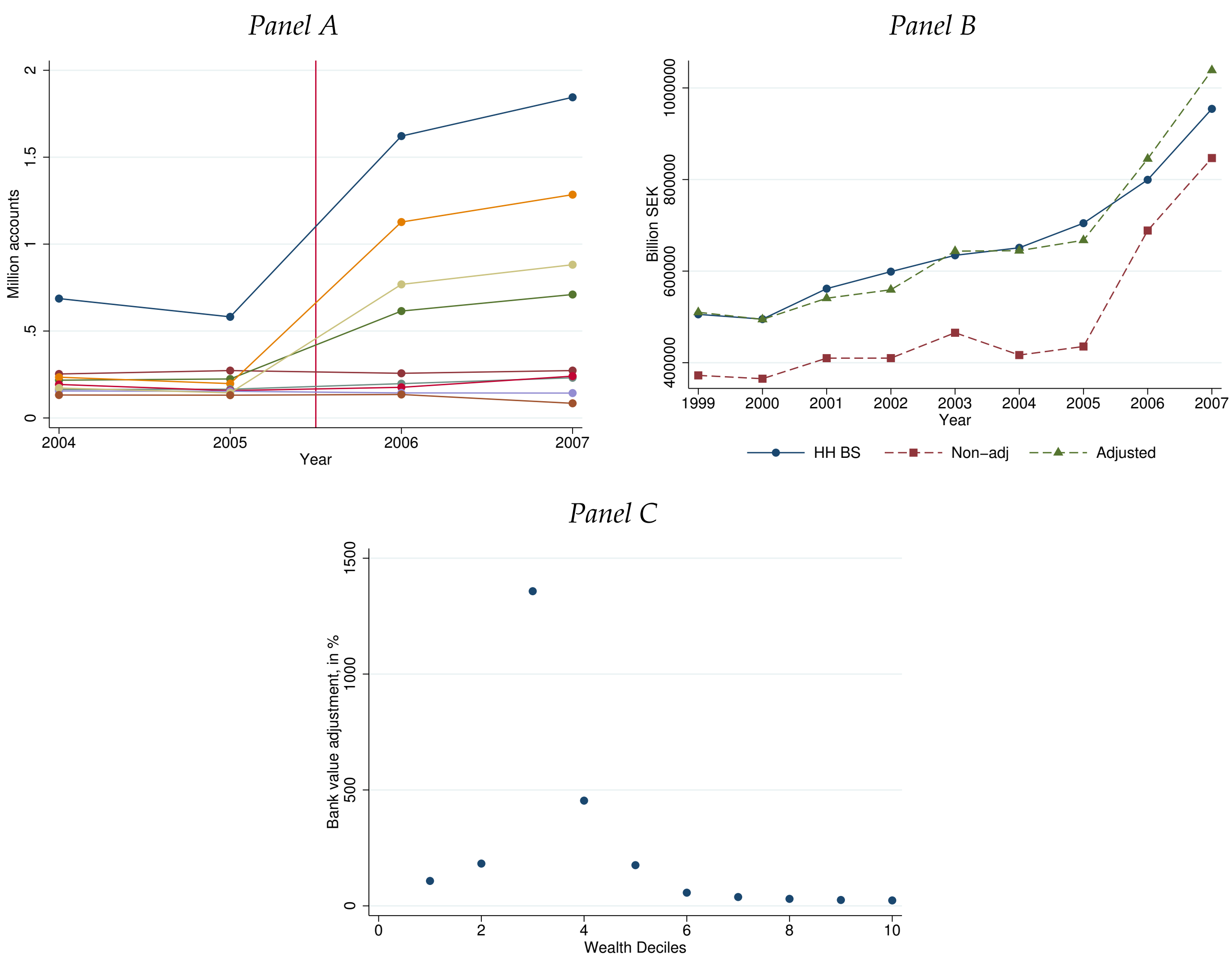


Figure B.3: Imputation of the value of bank holdings

Note: This figure is for the total population and not our estimation sample. Panel A shows the number of accounts over time for the ten largest banks in 2005. Panel B reports the total value of households' bank values over time in the National Accounts (circled solid series) as well as in the micro data when not imputing and when imputing missing bank values (squared dashed series and triangled dashed series, respectively). The imputed series are constructed as follows. We create cells defined by year of birth, calendar year and being in the top decile of the wealth distribution (within year and year-of-birth). For each cell, we compute the average bank value for the subpopulation who do not meet the requirement for bank value reporting but who report anyway. We assign that value to those who do not meet the requirement and have no bank value and multiply the resulting bank holdings by a factor of 1.2. Panel C presents the difference between adjusted and unadjusted averages of bank values, divided by the unadjusted bank value against wealth decile.

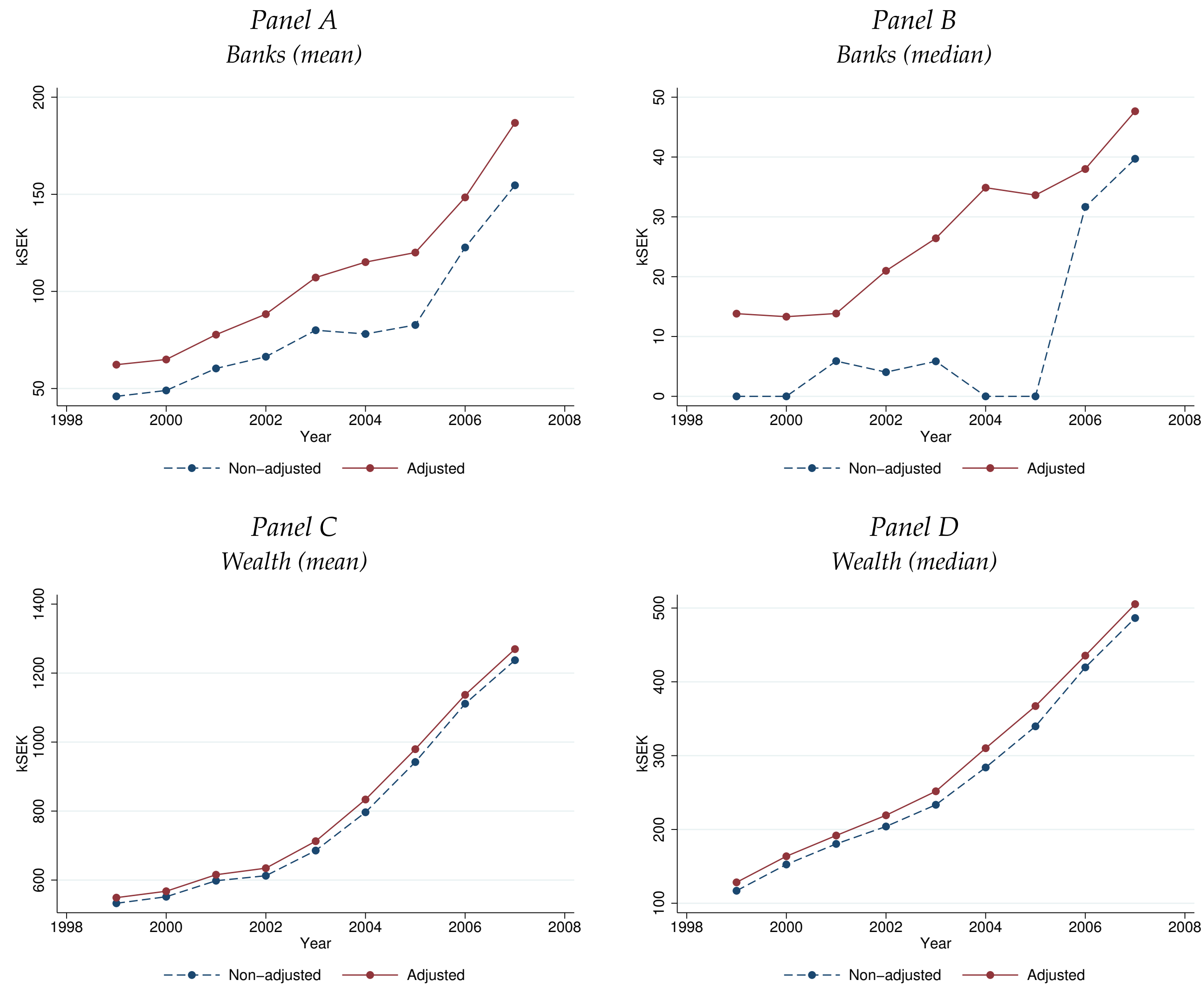


Figure B.4: Comparison of bank values and total wealth before and after the imputation

Note: The figure shows adjusted series of the value of bank holdings (Panels A and B) and wealth (Panels C and D) before and after adjusting for missing bank values, corresponding to the dashed and solid lines, respectively. We define cells by parental death year, cohort (5-year intervals), calendar year, parental wealth being in the top 10% in the year prior to death (within year-of-death cohort), and heir wealth (excluding bank values) being in the top 10% in the year prior to parent's death. For each cell, we compute the value of average bank holdings for the subpopulation who do not meet the requirement for reporting but whose bank holdings are reported anyway. We assign that value to the population who do not meet the requirement and have have no bank value and multiply the resulting bank values by 1.2 to arrive at a bank variable that matches the aggregate data (see Figure B.3). Panels A and C display the average series and Panels B and D the median series for both non-adjusted and adjusted bank and wealth measures.

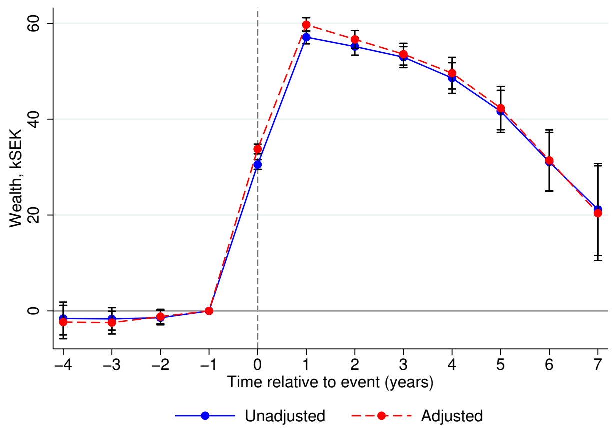


Figure B.5: The effect of inheritance on wealth after imputation of bank holdings

Note: The graph shows the effects of inheritance on wealth not adjusting (blue solid series) and adjusting (red dashed series) for missing bank values. We define cells by parental death year, calendar year, parental wealth being in the top 10% of the wealth distribution (within year-of-death cohort) in the year prior to death and heir wealth (excluding bank values) being in the top 10% of the wealth distribution (within year-of-death cohort) in the year prior to parent's death. For each cell we compute the value of average bank holdings for the subpopulation who do not meet the requirement for reporting but whose bank holdings are reported anyway. We assign that value to the population who do not meet the requirement and have missing values. We multiply the adjusted bank values by 1.2 to arrive at a bank variable that matches the aggregate data (see Appendix Figure B.3). All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level.

B.3 Capitalization Method

In order to construct longer wealth series and address the problem of missing wealth data on unlisted companies, we capitalize the capital return series which cover a longer period than the wealth data, 1995-2012 as opposed to 1999-2007. The idea is to divide the concept of wealth into subcomponents and then, within each component, map total individual flows in tax returns to aggregate household-level balance sheets, provided by the Financial Accounts, as in Saez and Zucman (2016). The general assumption behind the capitalization method is that the rate of return is constant across individuals within each asset class. In our research design, explained in Section 2.3, the assumption is weaker, namely that the average rate of return for an asset class is the same in treatment and control groups. When capitalizing property taxes, we assume that average taxes, measured as taxes paid divided by the market value of properties held, are constant across the treatment and control groups within each property type.

Upon dividing wealth into subcomponents, we construct capitalization factors as the ratio of total wealth to tax return income, which we use to construct each individual's wealth in the different subcomponents. The general assumption behind the capitalization method is that the rate of return is constant across individuals within each asset class, an assumption that we can test using wealth at the micro level.

We start from individuals' capital income, as reported in the tax forms, which include the five subcategories: interest income from bank accounts; dividends; fixed income claims; business income and mortgage interest payments. Panel A of Appendix Figure B.7 shows the distribution of total positive capital income in the four categories that capture positive transfers to the individuals in 2010.[57]

We map the five subcategories between the tax files to the Financial Accounts as follows:

- Interest income (in tax files): Transferable and other deposits (in Financial Accounts)
- Fixed-income claims: Debt securities
- Dividends: Listed equity and stock funds
- Business income: Unlisted shares
- Interest payments: Liabilities

The wealth of individual i in subcategory j at time t is then estimated as follows: $\hat{a}_{i,j,t} = R_{i,j,t}/\bar{r}_{j,t}$, where $R_{i,j,t}$ is capital income of individual i in asset category j at time t and $\bar{r}_{j,t} = R_{j,t}/a_{j,t}$. By construction, total capitalized wealth in these components match the financial accounts aggregates perfectly.

An inherent issue of the capitalization method is that not all assets deliver capital income, e.g. properties. For real estate, we either use direct ownership, observable during the period 1999-2011 or capitalize property taxes paid by the individual (1995-1998). For the former, we observe holdings together with associated property tax prices. We convert those to market values using estimated ratios of transaction prices to tax values that vary across years, property type and geographic location (provided by Statistics Sweden). For the latter, $\hat{a}_{i,j,t} = T_{i,j,t}/\bar{\tau}_{j,t}$, where $T_{i,j,t}$ is tax paid by individual i in asset category j (housing) at time t and $\bar{\tau}_{j,t} = T_{j,t}/a_{j,t}$ where $a_{j,t}$ is obtained from the Swedish National Wealth Database (Waldenström, 2016).

The definition of wealth in the capitalization approach differs slightly from the baseline concept. It exclude capital insurance vehicles and tenant-owned apartments, since the former do not deliver taxable capital income and the latter is not subject to the property tax. It does, however, include closely-held businesses. Panel B of Appendix Figure B.7 shows average wealth in the population, retrieved from the wealth register, according to the baseline definition (blue series) and the capitalization definition excluding closely-held businesses (red series).

We use these capitalized wealth series and apply the same empirical strategy to estimate inheritance effects. Appendix Figure B.8 below presents the coefficients using both the wealth series and the capitalized wealth, respectively. First, we see that the effect on capitalized wealth is smaller in magnitude. Second, there is a small delay in the mechanical effect in the capitalized wealth series. This is because it takes time before inheritances generate capital income. Third, the dynamic patterns are very similar across the series.

A further advantage of our capitalization approach is that we can correct our baseline wealth definition with information that is missing. In Appendix Figure B.6, we add ownership in unlisted companies, obtained using the capitalization approach, to our definition of wealth.

[57] The shares in different classes vary slightly over time.

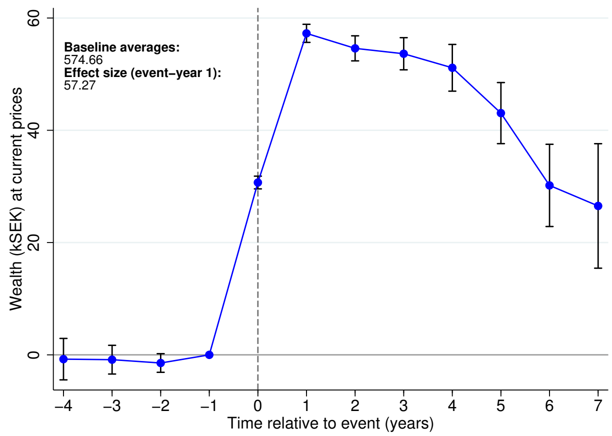


Figure B.6: The effect of inheritance on children's wealth, adding capitalized unlisted companies

Note: This figure presents coefficient estimates on wealth in thousand Swedish kroner (kSEK), defined as our baseline wealth definition plus ownership in unlisted companies. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figure display 95%-confidence intervals.

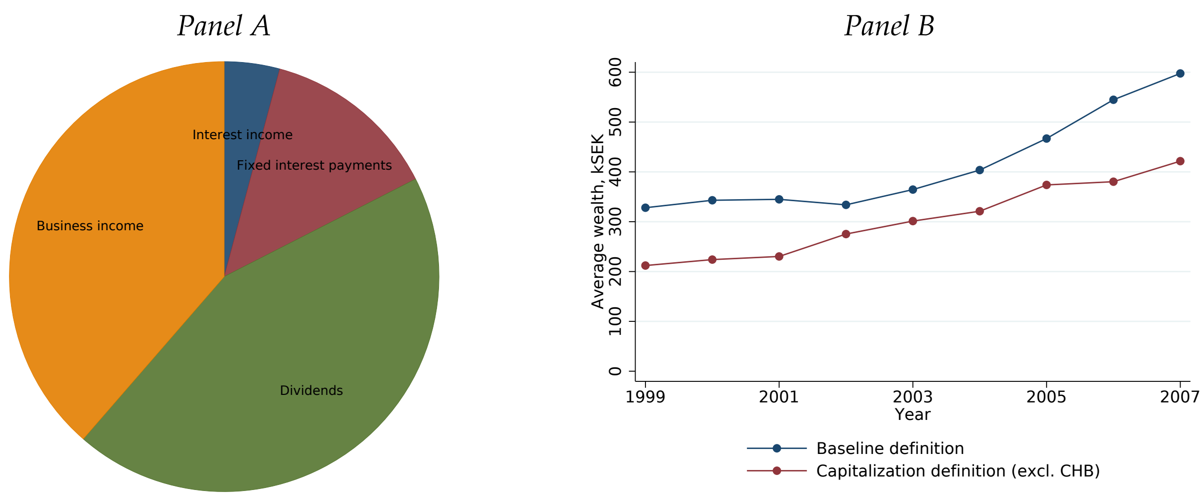
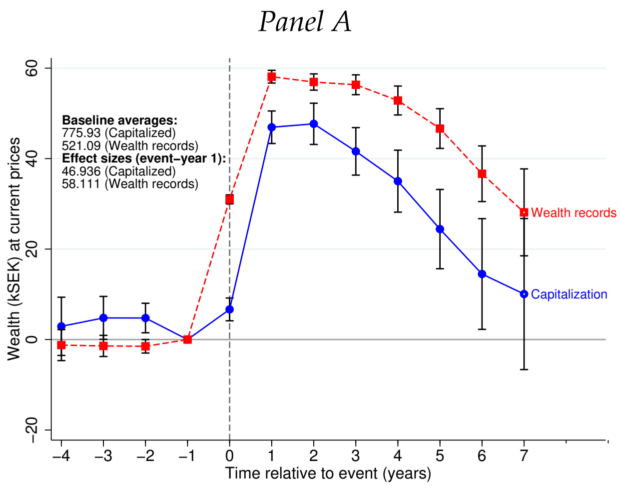


Figure B.7: Capital Income Components

Note: Panel A shows the fraction of individuals' total capital income on tax returns in business income; interest income from bank accounts; fixed-income claims and dividends in 2010. Panel B depicts average wealth according to the baseline definition (blue series) as well as that of the capitalization definition (red series), retrieved using the wealth records. The latter is not exactly identical to the wealth definition used for capitalization, as the latter includes closely-held businesses.



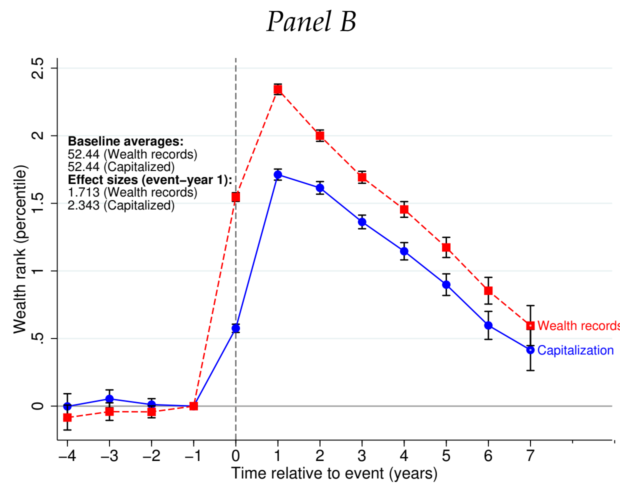


Figure B.8: The effect of inheritance on children's wealth, baseline measure and capitalized wealth

Note: This figure presents coefficient estimates of Equation 6 on our baseline wealth definition and wealth obtained using the capitalization method. In Panel A, we focus on wealth in levels defined by thousand Swedish kroner (kSEK). In Panel B, we focus on percentile ranks, created within the total Swedish population and cohort, i.e. not in our subsample of children who lose a parent. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95%-confidence intervals.

B.4 Savings

This section describes how we construct a measure of annual savings. Let wealth change, $\Delta A_t = \sum_j p_{jt}q_{jt} - p_{jt-1}q_{jt-1}$, where p_{jt} is the price of asset j at time tand q_{jt} is the quantity of asset j held at time t.Wealth growth can be divided into two distinct components:

$$\Delta A_t = \sum_j \underbrace{p_{jt}(q_{jt} - q_{jt-1})}_{\textbf{Active}\text{ changes: saving}} + \underbrace{q_{jt-1}(p_{jt} - p_{jt-1})}_{\textbf{Passive}\text{ changes: Capital gain}},$$

where the active component is savings. In constructing our measure of savings, we take advantage of the detailed wealth data, reported at the individual-asset-year level by third-parties to the Tax Agency. By observing both the assets, q_{jt}, and prices, p_{jt} we overcome the problems faced in Browning and Leth-Petersen (2003), in which only individuals' total values in different asset classes are observed and therefore assumptions on what portfolios individuals hold within each category have to be imposed. As we only observe snapshots of wealth once per year, we have to make assumptions on when the individuals rebalance their portfolios. In decomposing wealth growth above, we assume that rebalancing takes place at the end of the year, but our results are robust against this assumption. In more detail, the components of our measure of savings:

$$\tilde{S}_t = \sum_j p_{jt}(q_{jt} - q_{jt-1})$$

are classified into different categories and computed within asset class as follows:

Financial assets

Stocks and funds: We obtain end-of-year prices on listed stocks and funds from financial databases, such as Bloomberg, Datastream, Factset, Morningstar and OMX Stockholm. These are matched with the wealth data asset-by-asset using each asset's International Securities Identification Number (ISIN). We price the change in quantity of asset *j* from December 31 in year *t-1* to *t* using prices as of December 31 in *t*. In case the asset ceased to exist during year *t* so the price for December 31 of year *t* does not exist, we resort to the price of December 31 in year *t-1*. As unreported robustness exercises, we have priced the change in quantity using both prices as of December 31 year t-1 as well as the average of the two.

One may be worried that stock splits generate spuriously large fluctuations in savings. To deal with this we generate alternative savings measures by first pricing the quantities held in each year and then multiplying the value in time *t-1* by the *split-adjusted* return of each stock, also obtained from the financial databases mentioned above. Then we simply take the value in December 31 of year *t* minus the return-adjusted value in *t-1*. The results using this adjustment are similar to the ones reported above.

Bonds and quoted options: Bonds and quoted options are reported to the tax authorities by third-parties along with prices as of year *t* as well as position (short or long) and we use those to value active savings in these components. This assumes that rebalancing of the portfolio takes place on December 31 of year *t*. As with stocks and funds, we have performed robustness exercises.

Checking and savings accounts: Savings in such accounts are measured as the difference in balance between year *t* and *t-1*.

Debt issuance/repayment: We capture repayments of existing debt and issuing new loans as the difference in total debt between year *t* and *t-1*. Our liability measure includes student loans and mortgages.

Capital insurance: We observe the total value of capital insurance products, which is a tax-favored savings vehicle, but not the allocation of these assets. In our benchmark definition of savings, we take the difference in the value between the years *t* and *t-1* and add it to savings.

Real estate

Housing and land: We observe all transactions of housing and land together with the tax value of those properties since 2002. From Statistics Sweden, we obtain average ratios of market to tax values by year, geographical region and property type (e.g. agricultural property, country house, owner-occupied house, industrial building), where the market value stems from actual transactions. We inflate the tax values of the observed transactions using these ratios.

For active changes for the years 2000 and 2001, we take the value of the real estate holdings at the end of the year minus the corresponding value the year before. From that we subtract the return, which is measured as price changes for small owner-occupied houses, retrieved from Statistics Sweden. An alternative strategy would be to interact the change in value with an indicator for moving residence (as we do for tenant-owned apartments, described below). The caveat of this approach is that land property and holiday homes are included in these data, and sales and purchases are not proxied well by a moving indicator.

Tenant-owned apartments: For each individual, we take the market value of wealth in such apartments in year *t* and subtract the value in *t-1*. That difference captures both active and passive changes. To isolate the former component, we interact the difference with an indicator that the individual moved residency that year. The Swedish residential regulation prevents investors to own apartments and sublet them for investment purposes, which means that moving residency is a good predictor of active changes.

Inheritance Effects on Retirement Savings

Appendix Figure B.9 displays the effect of inheritance on retirement contributions. We see a statistically significant increase in retirement contributions, but the effect is small relative to the baseline inheritance. Nevertheless, retirement contributions are included in our measure of savings.

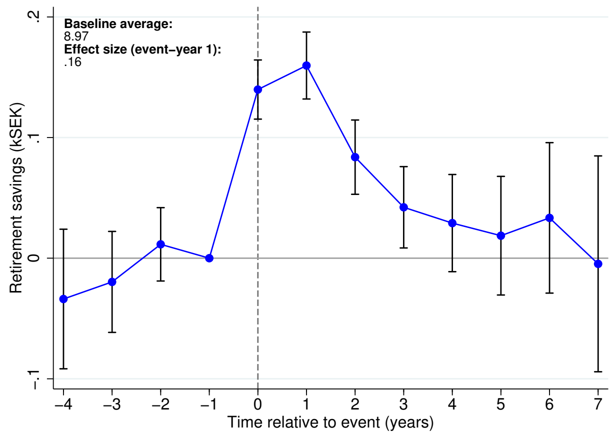


Figure B.9: The effect of inheritance on retirement contributions

Note: The figure shows coefficient estimates of Equation 6 for annual retirement savings in thousand Swedish kroner (kSEK) as outcome variable. The analysis sample comprise children of parents who die during 2000-2004. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figure display 95%-confidence intervals.

B.5 Robustness of the Mechanical Effect of Inheritances on Wealth

This section compares the estimated magnitude of the direct inheritance effect on wealth with two benchmarks.

First, we compare the magnitude of the mechanical effect of inheritance using wealth reigster to the direct information on inheritances in the Inheritance and Estate tax register. These data include the inheritance and the inheritance tax at the deceased- and heir-level and are almost complete for the years 2002-2004. Small estates are not liable for full inheritance declaration which means that 99% of our population who lose a parent during those years are also present in the inheritance data. However, we replicate our empirical analysis on this wealthier sample of individuals who lose a parent in 2002-2004 in Appendix Figure B.10.

Since inheritances are denoted at tax values (typically lower than the market values) and our baseline wealth measure is expressed at market values, the replication employs tax values . We find a direct effect of losing a parent of 52.17 kSEK. This should be compared with an average inheritance net of taxes at 55.8 kSEK according to the Inheritance and Estate Tax Register. A small difference between the two sources might be due to the fact that the estate is self-reported while wealth is mainly third-party reported or due to a slight difference in tax bases of inheritances and wealth taxes, in particular regarding durable goods, unlisted firms and pension wealth.[58]. We conclude from this exercise that the order of magnitude of the estimated mechanical effect is similar to the inheritance reported for the inheritance tax.

Second, we compare the mechanical wealth effect to the implied inheritance from parents' wealth one year before death. As opposed to the first comparison, this exercise only uses the Wealth Tax Register and is therefore immune to differences in tax reporting or the tax base mentioned above. By observing each parent's wealth in the year before death, the number of siblings, and the average share of the estate that is transferred to children, we impute inheritances. The last component is measured using the Inheritance and Estate Tax Register. More precisely, the imputed inheritance is constructed as: $inh_{i,j} = ch * max(A_{j,t-1} - c, 0)/n_j$. The inheritance of child i of parent j is given by j's wealth in the year before death, $A_{j,t-1}$, minus funeral costs, c (typically paid by the estate). If the parent's net wealth (including funeral costs) is negative, the imputed inheritance is zero as one cannot inherit net liabilities. We then multiply the transferable wealth with, ch, the average share of the estate that is transferred to children (computed using the Inheritance and Estate register) and then divide by n_j, the parent's number of children.

According to the Organization of Funeral Agencies (Sveriges Begravningsbyråers Förbund), 94% of all deceased have a funeral ceremony. Summing the total sales of all funeral agencies in firm-level data provided by Statistics Sweden provides an average cost of 20 thousand SEK per funeral. Appendix Figure C.2 shows the share of the estates allocated to different heir-types within our sample population matched to the Inheritance and Tax Register. We measure the share transferred to children at 43.2 %. We arrive at an imputed average inheritance at tax values of 60.26 thousand SEK. Subtracting the average inheritance tax of 5 thousand SEK we arrive at a number which is close to the estimated inheritance effect of 52.17 thousand SEK.

This approach does not use the default rules in the inheritance division law. Instead, it directly measures how much of estates are transferred to children. As opposed to the first comparison, this approach uses the wealth registers only, and is therefore immune to differences in tax reporting or the tax bases mentioned above.

Although these numbers are aligned, our estimated marginal propensity to consume out of inheritances will be biased if there are wealth components that are transferred across generations which are not observed in either the wealth or the inheritance data. One such example is pension wealth, which is a component that we do not observe and which comprises 17% of household balance sheets.[59] Following the discussion on the implications of this drawback in Section 5.3, the true mechanical effect would amount to 61 thousand SEK as opposed to the estimated 58 thousand SEK.

[58] Despite some differences in the tax bases, there was extensive harmonization in the bases across the two taxes. For instance, properties were generally taxed at 75% of the assessed market value. Shares in listed equity were taxes at 80% of the end-of-year market value according to the wealth tax (with the exception of young firms that were listed on a particular branch of the Stockholm Stock Exchange) while their tax value was 75% of the market value in the inheritance tax. Bank holdings were taxed at 100% of their value.

[59] This number could be larger among the deceased simply because pension wealth is more important among the elderly. On the other hand, the average age at death is 80, which means that some of the pension wealth has been decumulated. Depending on whether the propensity to consume out of wealth for retired individuals is different for pension wealth compared to other wealth, this number could be different.

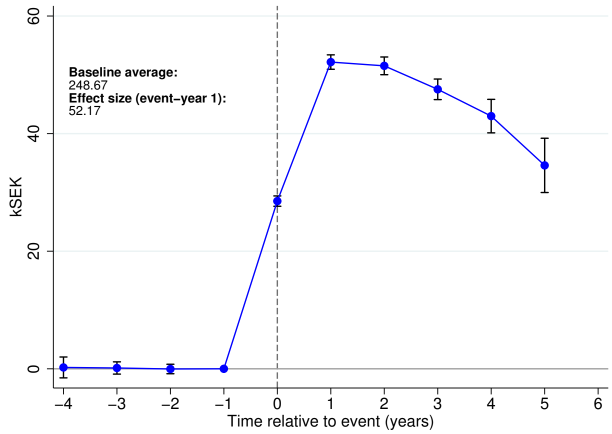


Figure B.10: The effect of inheritance on children's wealth, children in Inheritance and Estate tax register

Note: This figure presents coefficient estimates of Equation 6 on wealth, measured in thousand Swedish kroner (kSEK) at tax values, for the subsample of children who appear in the Inheritance and Estate tax register during the years 2002-2004 (i.e. lose a parent in those years and are present in the Inheritance and Estate tax register). All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figure display 95%-confidence intervals.

C Empirical Extensions and Robustness Exercises

C.1 Descriptive Statistics

Table C.1: Summary Statistics, Means

Year of death	2000	2001	2002	2003	2004	2008-2012
Parents						
Age	77.27	77.02	76.79	76.47	76.17	74.45
Age at death	78.27	79.02	79.79	80.47	81.17	85.38
Number of children	2.94	2.94	2.93	2.95	2.93	2.90
Average labor income 1991-1999	20.44	21.38	21.91	22.44	23.58	27.32
Wealth	431.33	486.12	507.65	508.86	511.29	551.27
Wealth rank	41.15	43.57	44.17	44.86	45.45	47.46
Wealth rank, year before death	41.15	42.40	42.10	42.48	42.44	41.58
Average taxable wealth 1991-1993	167.45	163.40	170.24	172.79	174.97	178.74
Observations	65619	66727	68367	67507	66361	345463
Children						
Age	46.50	46.50	46.50	46.50	46.50	46.50
Age at death	47.50	48.50	49.50	50.50	51.50	57.43
Sibling order	1.97	1.96	1.93	1.93	1.90	1.77
Highest education						
Unknown or primary school	0.31	0.31	0.31	0.31	0.31	0.31
High school	0.40	0.40	0.40	0.40	0.40	0.40
Short tertiary (vocational)	0.13	0.13	0.13	0.12	0.13	0.13
Longer tertiary	0.15	0.15	0.15	0.15	0.15	0.15
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 rank	52.25	52.15	52.25	52.21	52.11	52.24
Wealth rank, year before death	52.25	52.23	52.43	52.77	52.46	53.48
Wealth, year before death	496.98	580.38	907.81	574.38	629.34	1213.57
Average taxable wealth 1991-1993	167.45	163.40	170.24	172.79	174.97	178.74
Observations	137642	140624	144332	144236	141810	751481

Note: This table presents descriptive statistics for our main estimation sample. The columns marked 2000-2004 present variable means for each of our treatment cohorts, respectively, and the last column presents the means for the control group, i.e. parental death years 2008-2012. All variables are measured in 1999, unless differently stated. Monetary variables are measured in thousands of current SEK. Labor income is measured gross of taxes and transfers. Wealth percentile ranks are created within the total Swedish population and birth cohort. For ties, we take the average rank. We reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of birth-years of children receiving inheritance in 2000.

Table C.2: Summary Statistics, Medians

Year of death	2000	2001	2002	2003	2004	2008-2012
Parents						
Age	79	79	79	79	78	77
Age at death	80	81	82	83	83	87
Number of children	3	3	3	3	3	3
Average taxable wealth 1991-1993	87.87	88.17	89.40	90.10	90.97	96.80
Wealth	107.86	136.54	144.53	154.10	164.12	196.83
Wealth rank	36.61	40.12	41.02	42.12	43.17	46.28
Wealth rank, year before death	36.61	38.27	37.55	38.30	38.14	35.55
Average labor income 1991-1999	0	0	0	0	0	0
Observations	65619	66727	68367	67507	66361	345463
Children						
Age	48	48	48	48	48	48
Age at death	49	50	51	52	53	59
Sibling order	2	2	2	2	2	1
Labor income	183.70	183.70	184.20	184.90	183.90	186.00
Labor income (cond. on positive)	199.50	199.40	199.90	200.20	199.70	201.20
Wealth	142.79	140.59	144.08	141.97	140.44	144.41
Wealth rank	53.83	53.51	53.86	53.73	53.59	53.90
Wealth rank, year before death	53.83	53.65	53.82	54.29	53.84	55.36
Wealth, year before death	142.79	176.38	202.81	222.84	239.54	560.72
Average taxable wealth 1991-1993	87.87	88.17	89.40	90.10	90.97	96.80
Observations	137642	140624	144332	144236	141810	751481

Note: This table replicates Table C.1 for median values. The columns marked 2000-2004 present median values for each of our treatment cohorts, respectively, and the last column presents the median for the control group, i.e. parental death years 2008-2012. All variables are measured in 1999, unless differently stated. Monetary variables are measured in thousands of current SEK. Labor income is measured gross of taxes and transfers. Wealth percentile ranks are created within the total Swedish population and birth cohort. For ties, we take the average rank. We reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of birth-years of children receiving inheritance in 2000.

Table C.3: Regression Coefficients

Event year	Wealth	Unearned income	Net consumption	Labor earnings
-4	-0.0840			0.0260
	(0.047)			(0.024)
-3	-0.0410	0.0640	0.159	-0.0240
	(0.033)	(0.069)	(0.062)	(0.021)
-2	-0.0420	-0.0650	0.00500	-0.0160
	(0.022)	(0.062)	(0.053)	(0.016)
-1	0	0	0	0
0	1.547	1.877	0.668	-0.350
	(0.016)	(0.056)	(0.048)	(0.016)
1	2.343	2.638	1.134	-0.449
	(0.020)	(0.055)	(0.048)	(0.021)
2	2	2.052	1.188	-0.417
	(0.021)	(0.054)	(0.046)	(0.024)
3	1.693	1.852	1.204	-0.339
	(0.023)	(0.054)	(0.046)	(0.026)
4	1.455	1.696	1.156	-0.254
	(0.030)	(0.057)	(0.051)	(0.028)
5	1.174	1.638	1.146	-0.167
	(0.038)	(0.061)	(0.057)	(0.029)
6	0.854	1.385	0.979	-0.0660
	(0.050)	(0.070)	(0.066)	(0.031)
7	0.596	1.261	0.877	0
	(0.076)	(0.090)	(0.089)	(0.032)
Treated individuals	712,270	712,270	712,270	712,270
Observations	6,376,500	5,603,060	5,603,060	14,469,717

Note: This table presents regression coefficients of Equation 6 using the following outcome variables: wealth (at current market values), unearned income, consumption of goods and labor earnings, all measured as ranks in the birth cohort. The treatment group is defined as individuals losing a parent in the years 2000-2004. Each row denotes an event-time year where -1 is the omitted category. For wealth, unearned income and consumption, we apply the fixed-control method while labor earnings employs the fixed-delta method (see Section **??**). All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. Standard errors are clustered at the heir level.

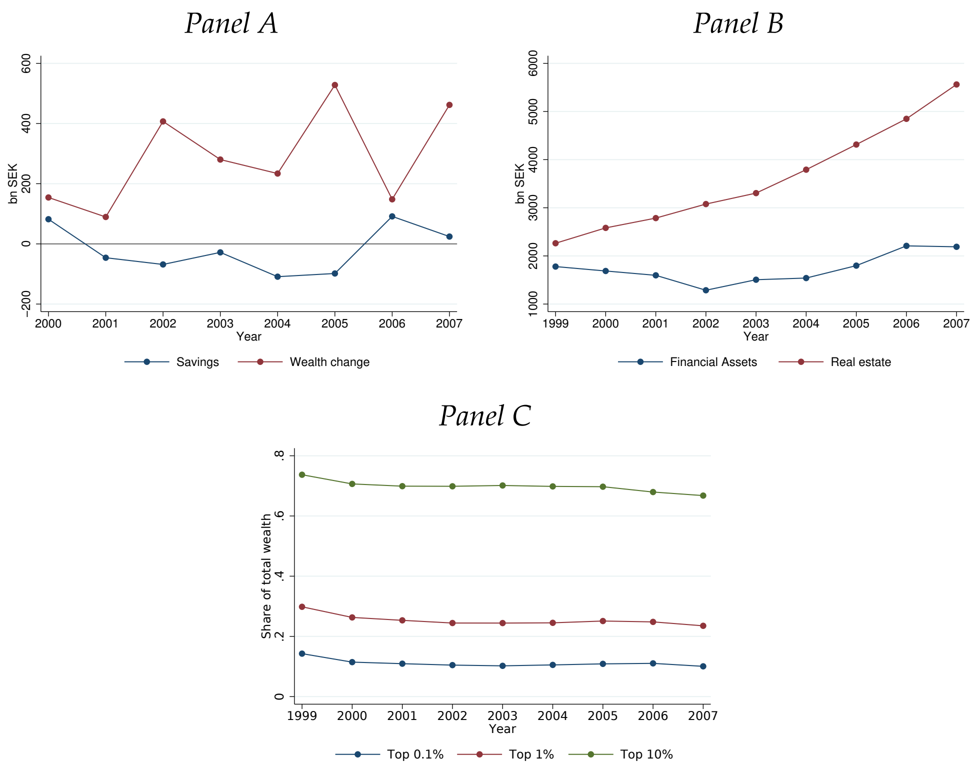


Figure C.1: Aggregate patterns in savings and wealth

Note: Panel A depicts households' total wealth change (red series) and the change in wealth due to savings (blue series), expressed in billion SEK for the Swedish population. We describe the savings measure in Section 2.2 and in Appendix Section B.4. However, note that the underlying wealth definition is slightly different from the baseline definition. We exclude capital insurance products here, as we only know the balance at the end of each year and not the composition. The increase in savings in 2006 is mainly due to the change in the reporting of bank account values, see Appendix Section B.2. Panel B displays total real estate values, including owner- and tenant-occupied housing assets as well as land, and total financial asset values, including banks, bonds, listed equity, funds, options and capital insurance. All series are denoted at market values. Panel C shows the share of total wealth in the hands of top quantiles of the wealth distribution over time.

Panel A *Panel B*

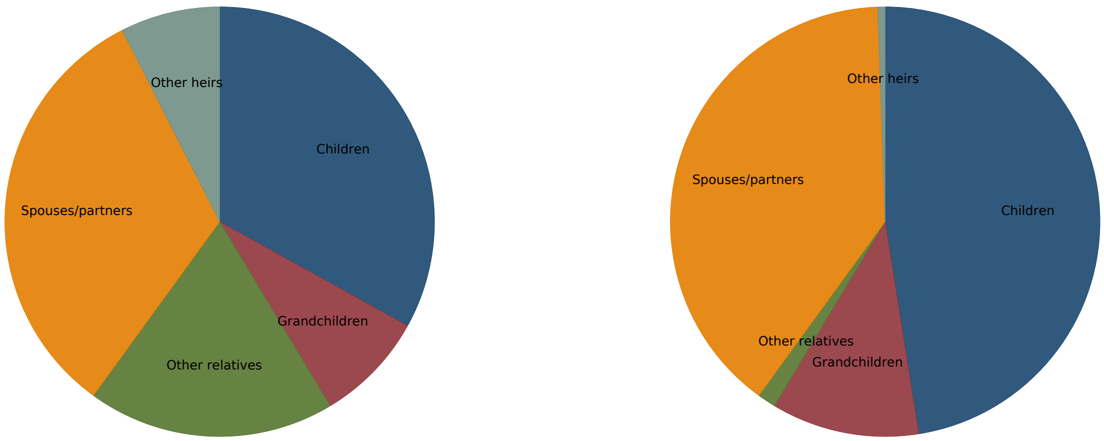


Figure C.2: Share of bequest flows to different groups

Note: Panel A depicts the share of total bequest flows allocated to different individuals, grouped into five categories, calculated using the data on taxable inheritances over time for individuals who die during 2002-2004. *Children* covers biological and adopted children, while step- and foster-children are included in the *Other relatives* category. *Spouses/partners* include married, cohabiting as well as registered partners. The bequest flow includes inheritance and taxable insurance, gross of the inheritance tax. Inter vivo gifts are not included. Panel B replicates Panel A, but focuses on deceased individuals with children, i.e. our analysis population.

C.2 Additional Empirical Results

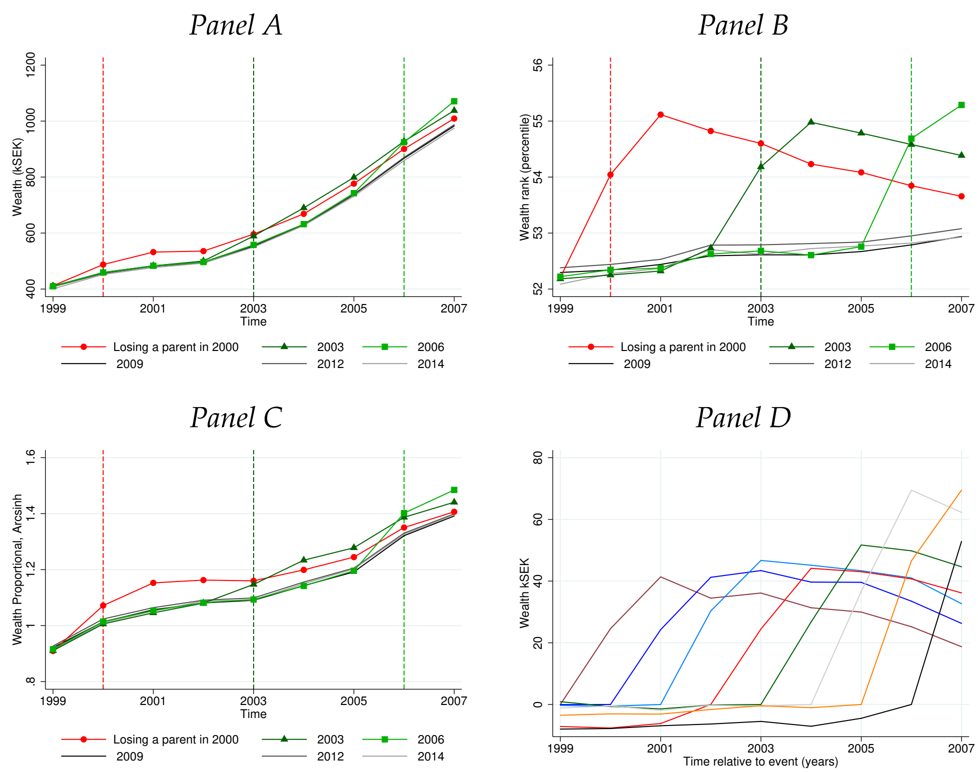


Figure C.3: Illustrating the empirical design using alternative wealth measures

Note: Panel A shows the average wealth in thousand Swedish kroner (kSEK) for children whose parents die in 2000, 2003, 2006, 2009, 2012 and 2014, respectively. In Panel B, we present the time series of within-cohort percentile ranks for the same population. Finally, Panel C shows the time-series of the mean of the inverse hyperbolic sine transformation of nominal wealth. Panel D shows the normalized difference between median treatment and control groups but varies the treatment group. We reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000.

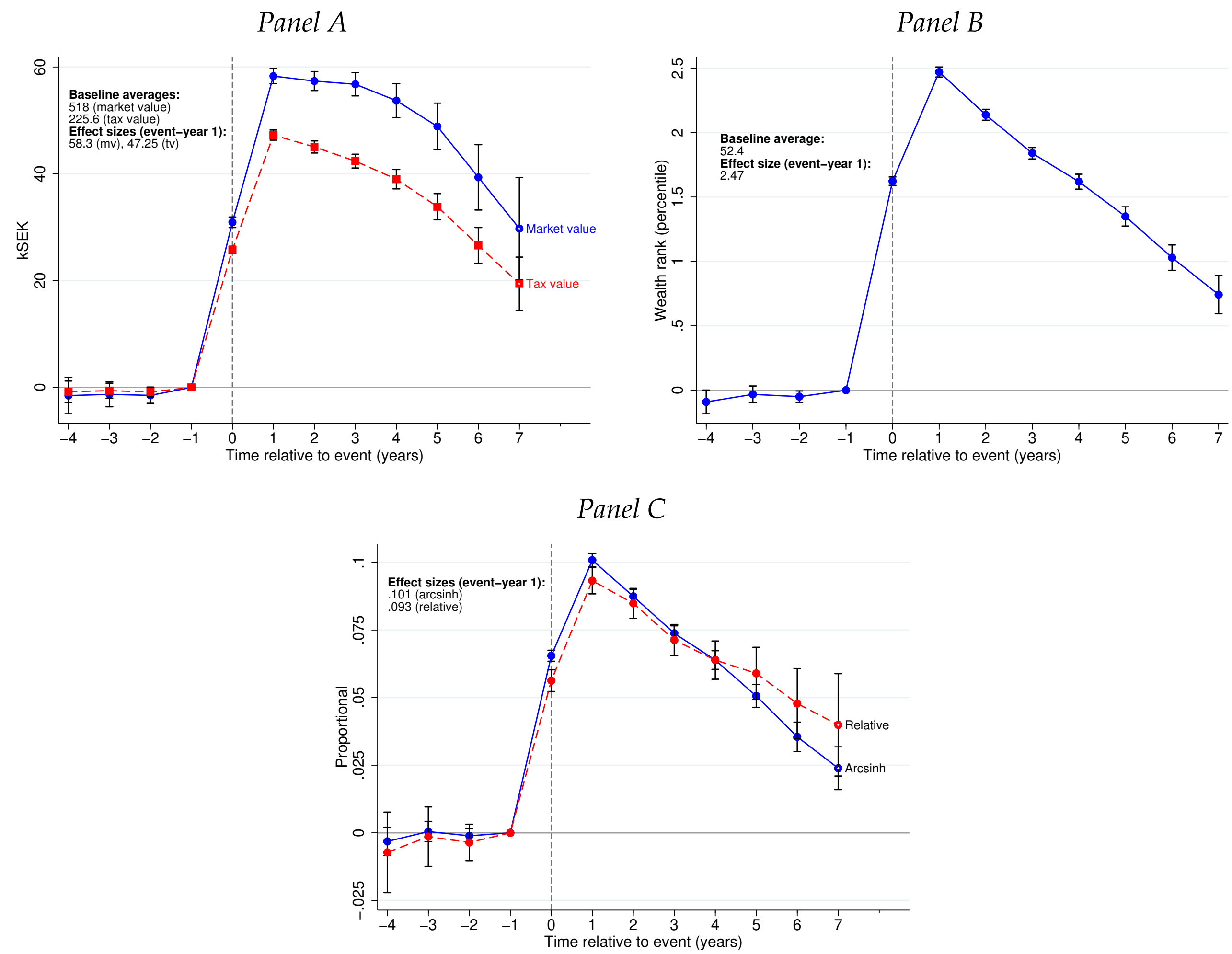


Figure C.4: The effect of inheritance on children's wealth, alternative specification

Note: This figure replicates the estimations presented in Figure 3 and Panel B of Figure B.8, but instead of using a fixed control group (children who lose a parent in 2008-2012), we here apply the fixed-delta method, as explained in Section 2.3. Our treatment group comprises individuals losing a parent in 2000-2004. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

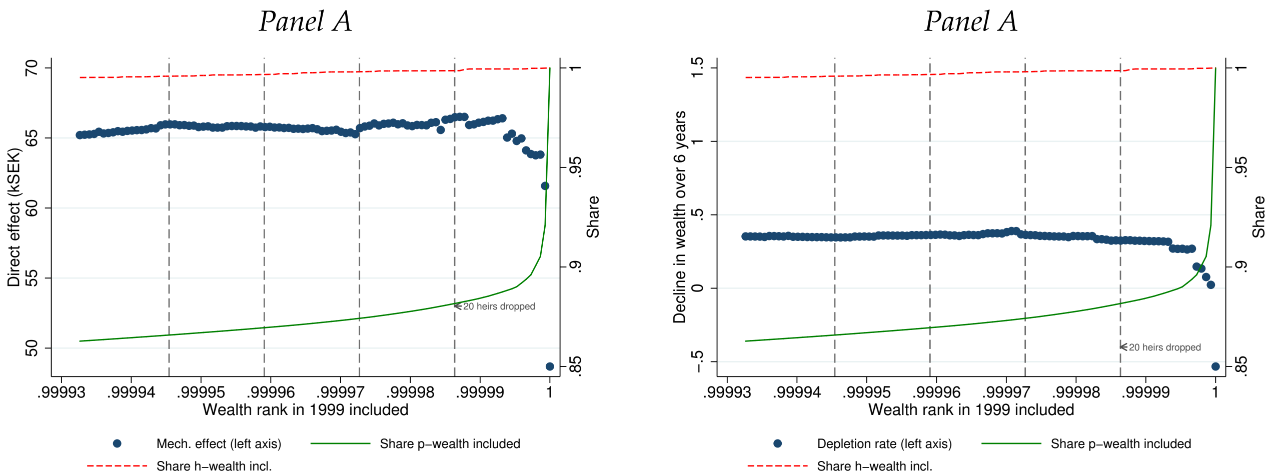


Figure C.5: Sensitivity to outliers

Note: This figure displays estimated direct effects in thousand Swedish kroner (kSEK) (Panel A) and depletion rates of wealth over six years after parent death (Panel B) when excluding top-wealth individuals from the analysis sample according to their wealth in 1999. For Panel A, the left y-axis represents the direct effect (measured in event-time 1) of inheritance on wealth. In Panel B, the left y-axis displays the difference between the mechanical inheritance effect on wealth (coefficient of event-time 1), obtained from the estimates of Equation 6, minus the coefficient for event-time 6, divided by the mechanical effect. In words, here the (left) y-axis represents the depletion rate, or the fraction of the mechanical effect that disappears over six years. We show the direct effect and the depletion rate against the fraction of children included. To be precise, each dot represents the depletion rate and the share of children included when dropping wealthy heirs. The first dot from the right is the estimated depletion when including all children. The next dot from the right represents the depletion rate and the share of children included when dropping the wealthiest heir in 1999 and so on. The graphs also display on the right y-axis the fractions of parental wealth (solid line) and heir wealth (dashed line), both measured in 1999, that we keep in the analyses when excluding the top-wealth heirs.

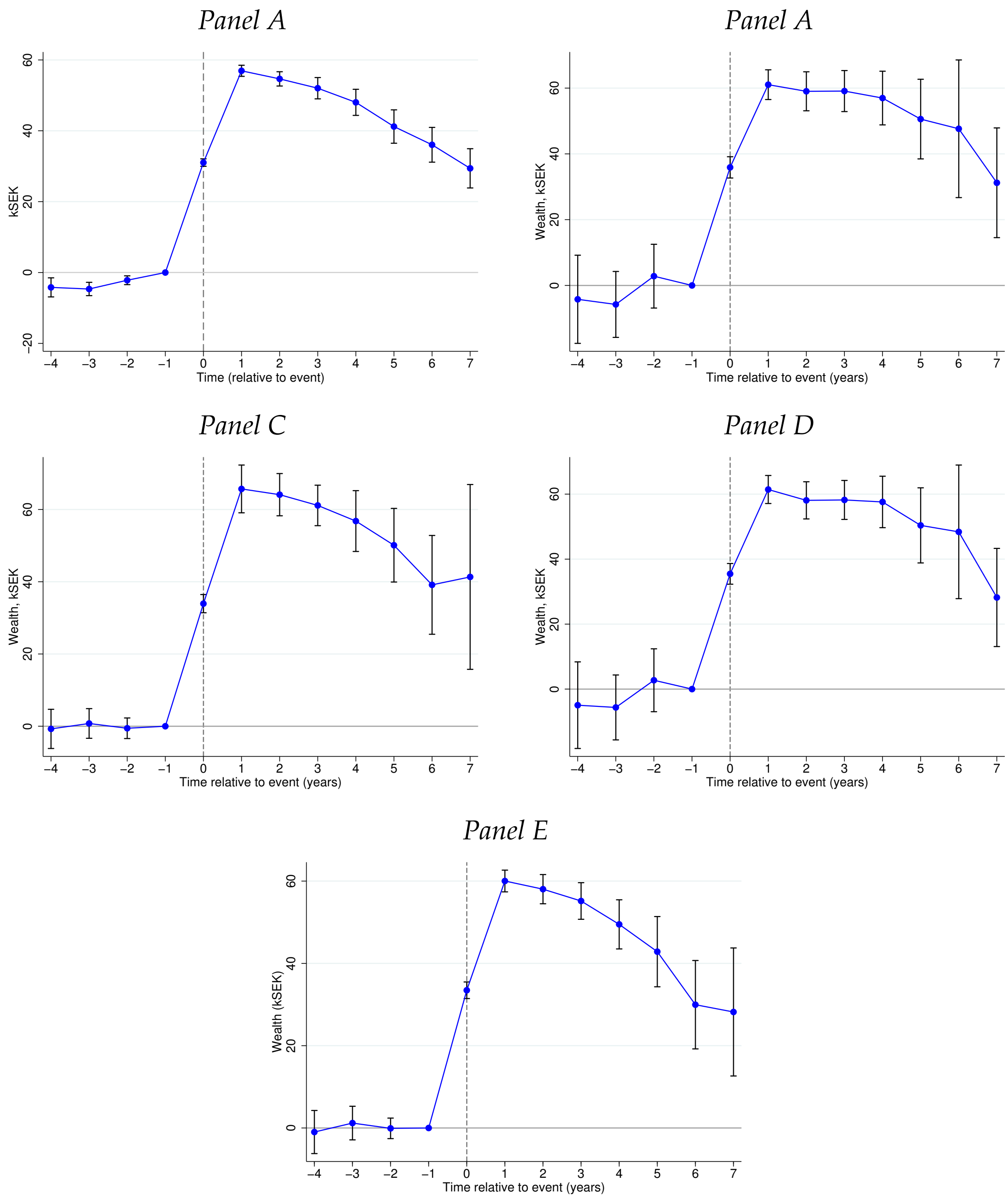


Figure C.6: The effect of inheritance on children's wealth, different subsamples

Note: This figure shows coefficient estimates when estimating Equation 6 on wealth in thousand Swedish kroner (kSEK) for different subsamples that adjust for outliers of the wealth distribution in different ways. These graphs display effects of inheritance on wealth when excluding or adjusting a select few individuals from the top of the wealth distribution. In Panel A, we restrict attention to heirs whose wealth is never winsorized in the main winsorization in the paper, which is at the 0.1 and 99.9th percentiles, by year. In Panel B, we drop the 100 heirs with the largest wealth growth during 1999-2007. To construct Panel C, we rank heirs according to their wealth in 1999 and drop the 100 wealthiest heirs in 1999, irrespective of when they receive inheritance. To account for the fact that heirs whose parents die in different years during the 2000-2012 period may be differently wealthy in 1999, Panel D ranks heirs according to their wealth in 1999 within parental year-of-death cohort, and drops the 20 wealthiest heirs within each cohort. In Panel E, we adjust the wealth of the 10 wealthiest individuals wealth so that the distribution of wealth in each treatment year matches that of the control group. We illustrate this pattern in more detail in Figure C.28.

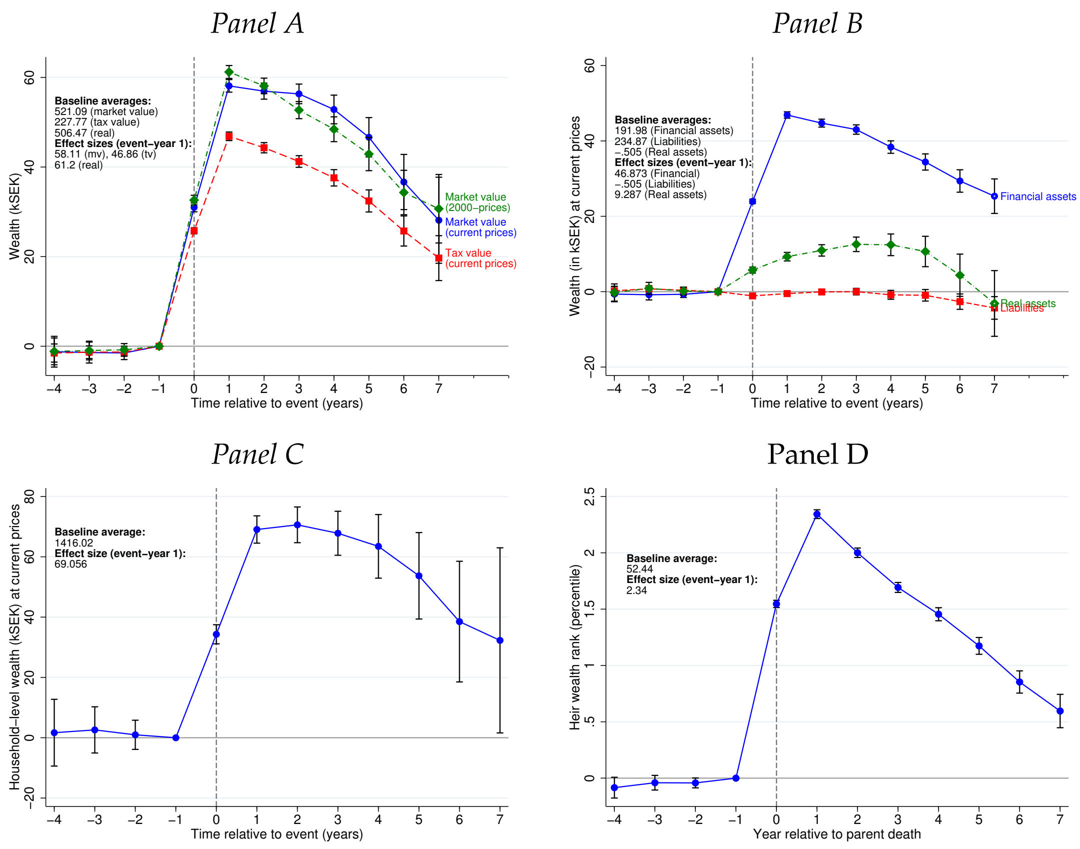


Figure C.7: The effect of inheritance on children's household-level wealth and wealth components

Note: This figure shows coefficient estimates when estimating Equation 6 on different outcomes. In Panel A, we replicate Figure 3, but add effects on wealth at tax prices. Panel B presents estimates on child's wealth by subcomponents. In Panel C, we show effects on household-level wealth measured in thousand Swedish kroner (kSEK) at current prices. The household is defined as the child's children and spouse (by marriage or by cohabitation, in case they have common children). In Panel D, we show the effects on heirs' wealth rank (within-cohort). All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

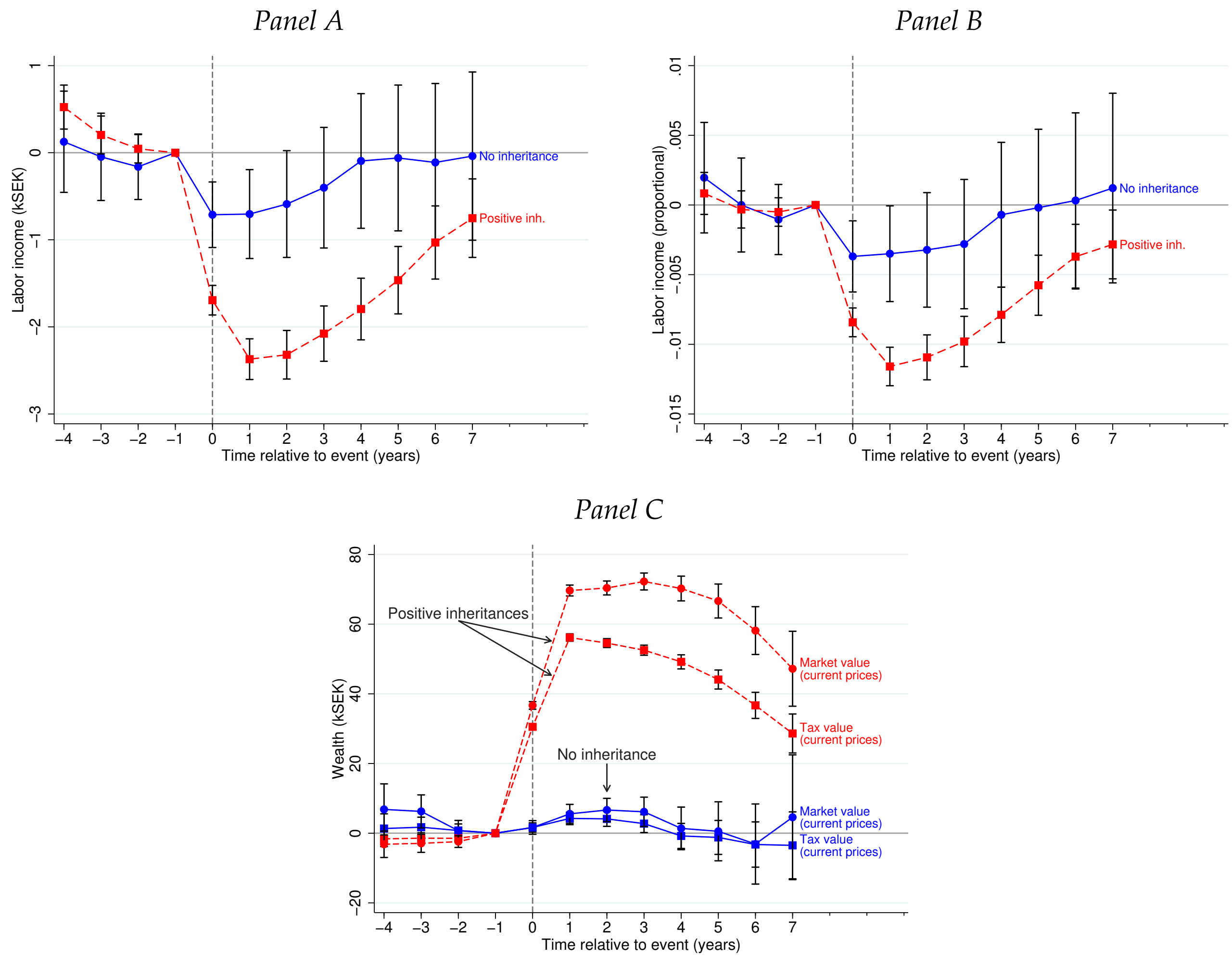
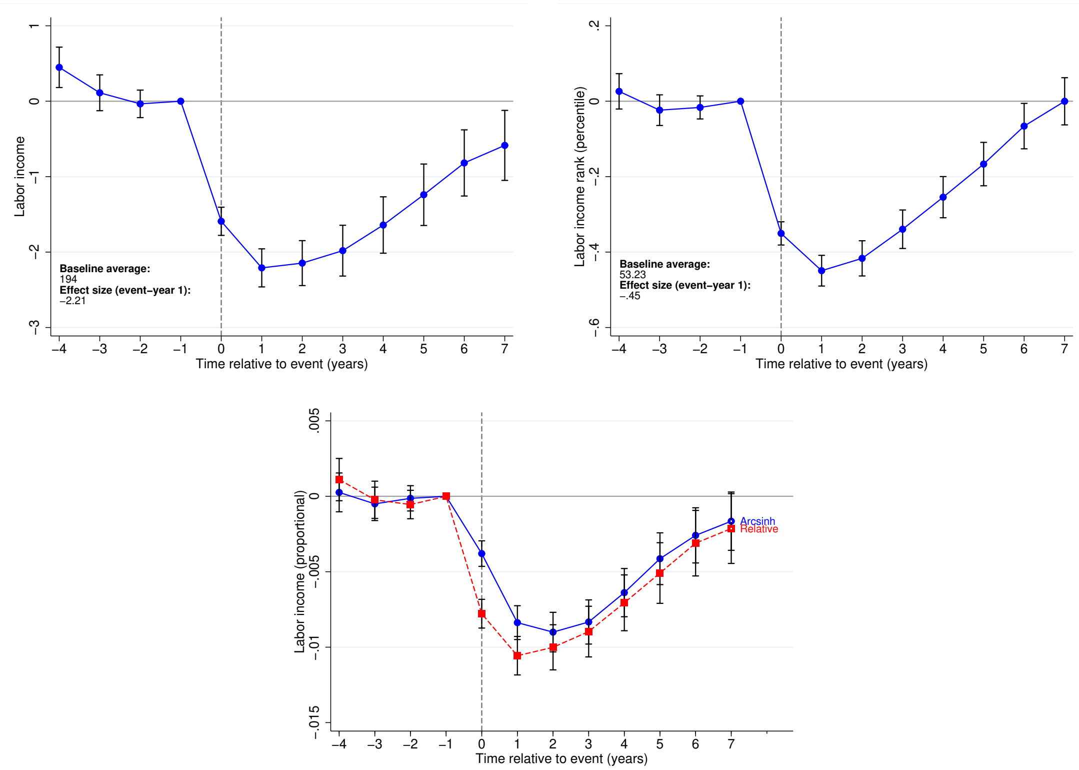


Figure C.8: The effect of inheritance on labor supply and wealth of heirs, by parents' wealth

Note: This figure shows the effect of inheritance on labor income for heirs who receive no inheritances (14% of all heirs) and heirs who receive positive inheritances. In Panel A, we show the effect on labor income in thousand Swedish kroner (kSEK) while Panel B shows the proportional effect, constructed by dividing the outcomes with the control group averages. Panel C shows wealth effects for the two groups. We employ the fixed-delta method (see Section 2.3) and define heirs by parents' wealth in event-year -1 (for both treatment and control groups) as having zero wealth in the wealth registers. The treatment group comprises children of parents who die during 2000-2004. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death cohort non-parametrically to match the distribution of birth-years of children who lose a parent in 2000. We reweigh control to treatment separately within each parental wealth group. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

Panel A



Panel B

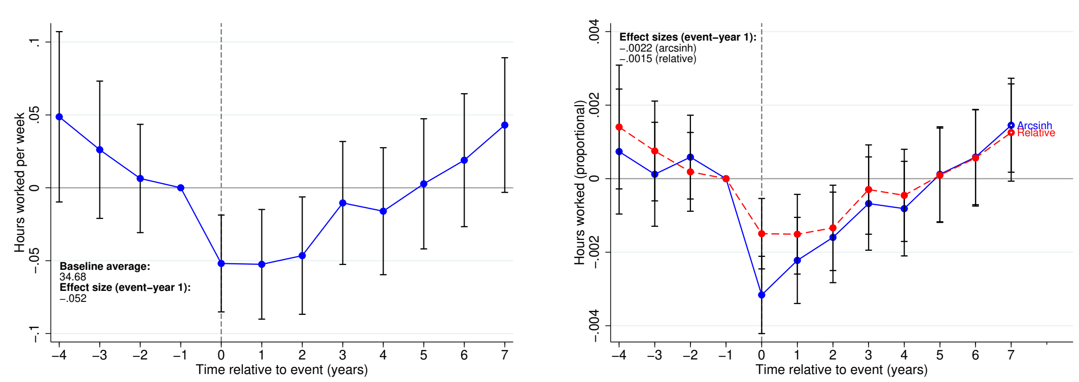


Figure C.9: The effect of inheritance on labor supply of heirs, additional results

Note: Panel A of this figure shows the effect of inheritance on heirs' labor income, measured in thousand Swedish kroner (kSEK), labor income rank, defined within birth cohort and relative measures of labor income. Panel B focuses on hours worked per week and relative measures of hours worked. The *"Arcsinh"* is the inverse hyperbolic sine function, defined as in Section 3.1 (footnote 31), while the relative effects are constructed by dividing outcomes by the control group average. All regressions use the fixed-delta method, discussed in Section 2.3, where the treatment group comprises children of parents who die during 2000-2004. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

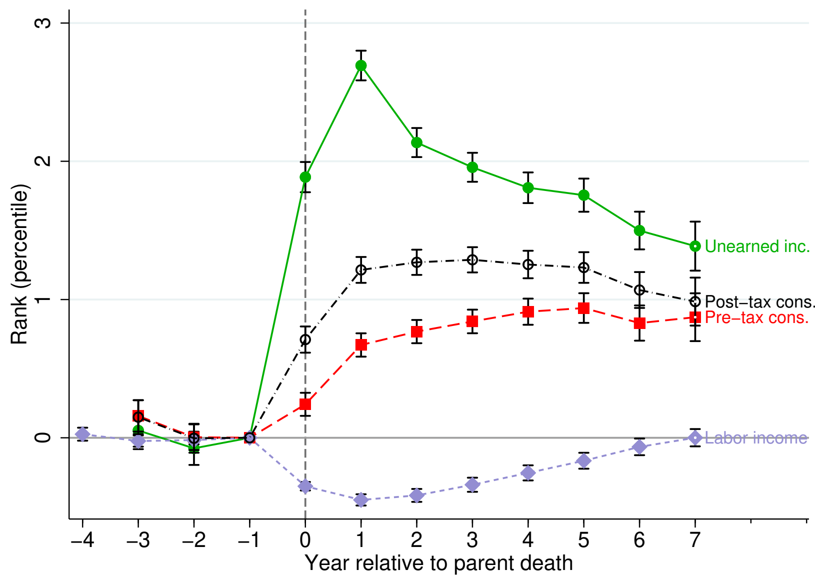


Figure C.10: How heirs spread inheritances across time (MAR) and their responses (MPC/MPE), ranks

Note: This figure reports estimates of how inheritances are used over time, applying within-cohort ranks as outcomes. The circled, green series display effects on unearned income (MAR: marginal allocation of resources). The hollow, circled, black series indicate how these extra resources are used to consume more post-tax goods (MPC) over time. The squared, red series show corresponding estimates for pre-tax MPC over time. The diamond-shaped series show corresponding estimates for labor supply (MPE). Labor income effects are obtained by using the fixed-delta method and others by using the fixed-control strategy. 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. kSEK = thousand Swedish kronor.

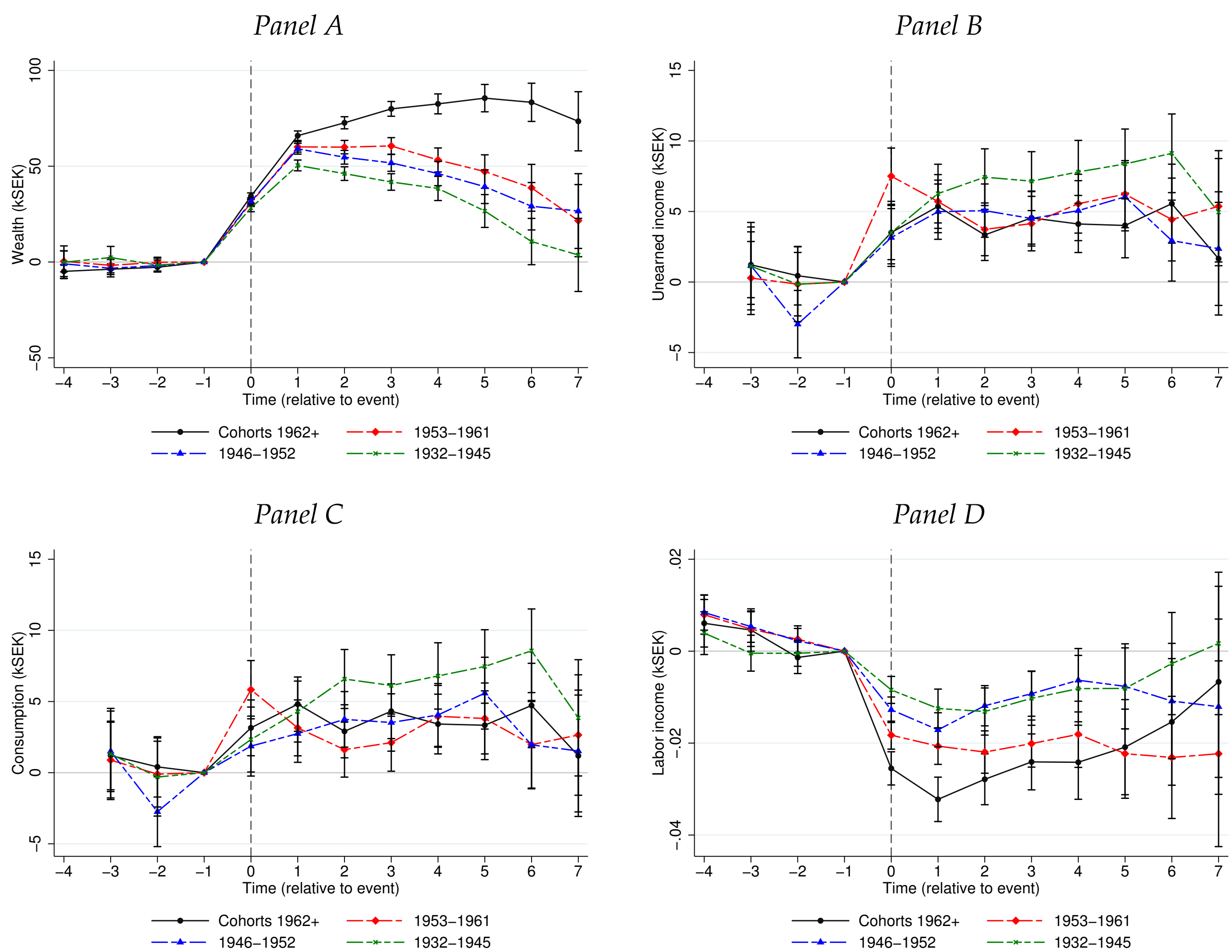


Figure C.11: The effect of inheritance by age, levels

Note: This graph shows the effects of inheritance on wealth (Panel A), unearned income (Panel B), consumption (Panel C) and labor income (Panel D) by the heirs' birth cohorts. The unit is thousand Swedish kroner (kSEK). We apply the fixed-control group method and use children who lose a parent in 2008-2012 to demean outcomes while our treatment group comprise children of parents who die during 2000-2004. The age groups are constructed to form four equal-sized groups. Heirs belonging to the treament group and to the 1962+ group lose their parent at age 42 or younger. All regressions reweigh the birth-year distribution as well as education level (4 categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000, separately for each age group. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

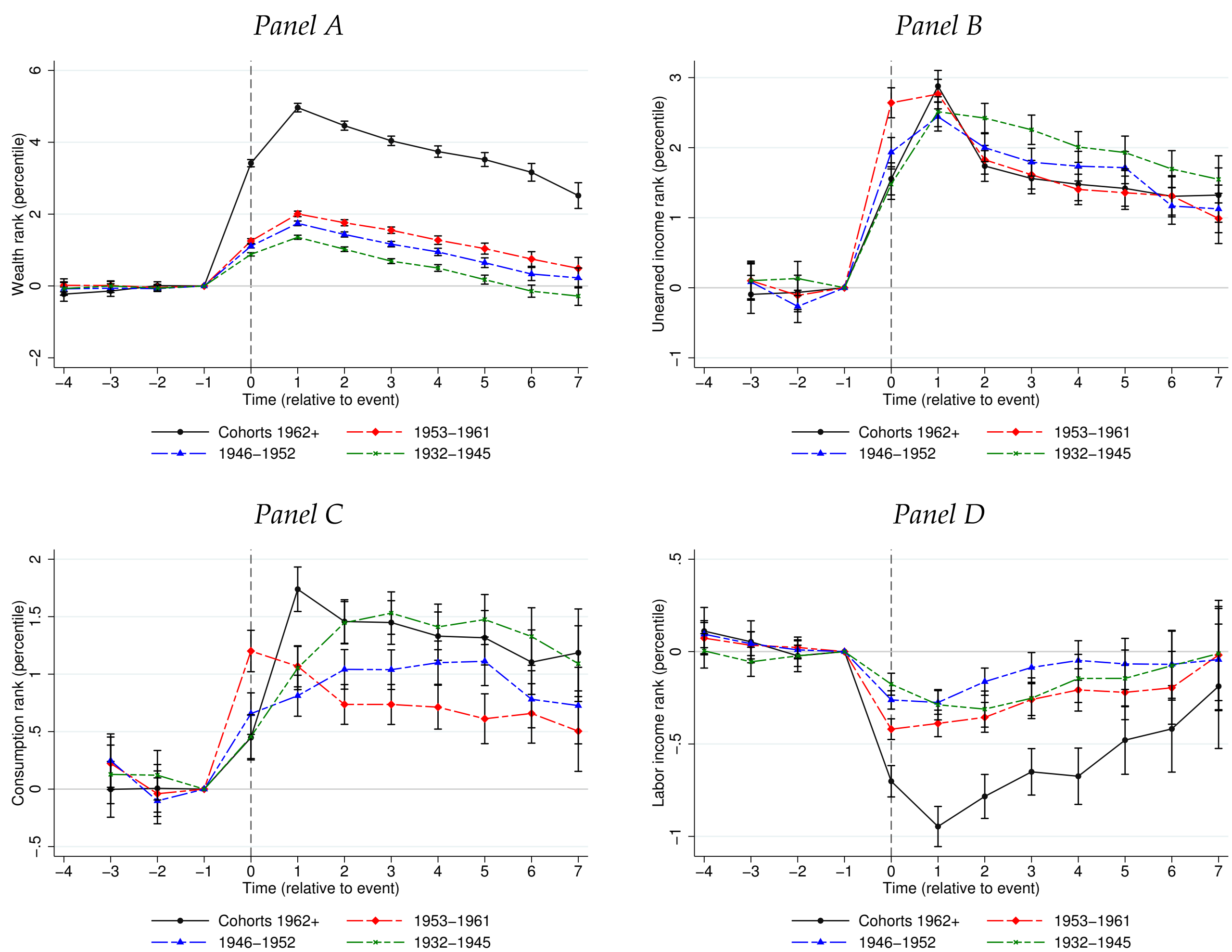


Figure C.12: The effect of inheritance by age, ranks

Note: This figure replicates Figure C.11, but shows coefficients for ranks instead. Ranks are defined within birth cohort.

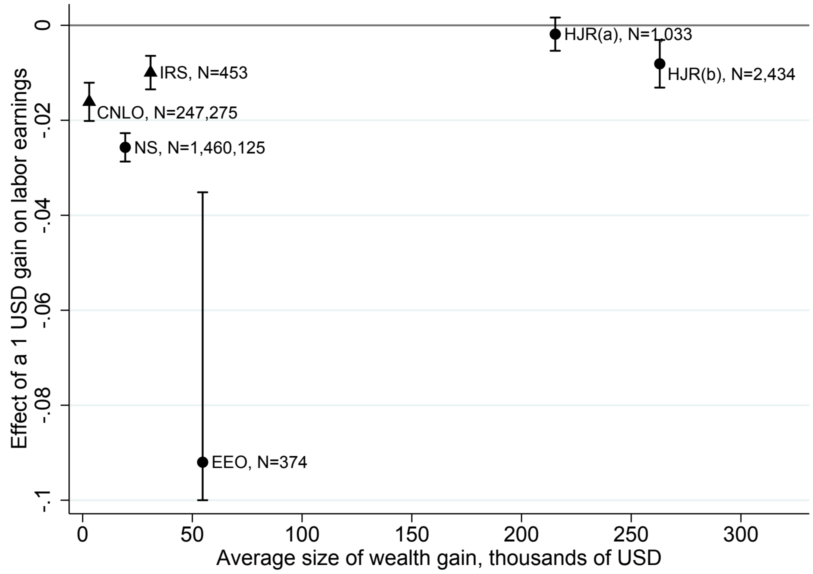


Figure C.13: The effect of wealth gains on short-run labor earnings, across different studies

Note: This figure displays a meta-analysis of the short-run labor earnings response to a wealth gain. The y-axis exposes the effect of an additional one USD of wealth on labor earnings shortly after wealth receipt. This is sometime interpreted as marginal propensity to earn (MPE), but a better term is "dynamic MPE" as we argue in this paper (see Section 1). The x-axis measures the average size of the wealth gain in 2018 USD. The three estimates from Sweden (CNLO, EEO and NS) are converted to US dollars with an exchange rate that corresponds to the time of treatment. 95% confidence intervals are presented, and bottom-coded at -0.1 for expositional reasons. Our choices of studies follows Chetty et al. (2013), Cheng and French (2000) and Chetty (2006).. Labels refer to the initials of authors names and also include the sample sizes used in each study. CNLO refers to the estimate of a 1.61 SEK reduction for a 100 SEK lottery price in the second year after receipt, representing the coefficient in Figure 1 of Cesarini et al. (2017). EEO is obtained from Table 2, Column 1 on page 17, in Elinder et al. (2012). IRS marks the estimated drop in labor earnings of 0.094 one year after the wealth gain, obtained from Table 4, Specification VII (VIII), page 789 in Imbens et al. (2001). We convert this estimate to an MPE, by translating the twenty annual lottery installments into its net present value using a discount rate of 10%. HJR refers to the estimates in Holtz-Eakin et al. (1993). Table V, Columns (2) and (4) on page 432 provide labor supply elasticity estimates (obtained with controls) with respect to inheritances for singles (denoted (a) in the figure) and joint tax filers (denoted (b)) in the US, respectively. Average inheritances are computed using the averages in different subgroups in Table 1 and Table 2 (page 419 and 421 for singles and joint filers respectively). Average earnings are computed using the average earnings of each subgroup, reported on page 429 (text for joint returns and footnote 16 for singles) together with the relative size of each group (obtained from Table 1 and Table 2). NS refers to our estimate from Section 3.3. Standard errors are converted from the original studies using the delta method. Our estimates suggest that an inheritance of one million SEK reduces labor earnings by 26 thousand SEK in the year after the inheritance receipt. The corresponding estimates in Cesarini et al. (2017) and Imbens et al. (2001) using lotteries are 10 and 16 thousand SEK, respectively, while the ones in Holtz-Eakin et al. (1993) exploiting inheritances amount to 1.9 for singles and 8.1 SEK for joint filers. All these estimates are substantially smaller than those found in Elinder et al. (2012) (92 thousand SEK) using inheritances.

C.3 Empirical Results on Short-Run Wealth Inequality

Table C.4: Intergenerational wealth mobility

		Parents			
		Top 1%	Bottom 99%	Share wealth	Average wealth
	Panel A:	**Measured as inheritance**			
Children	Top 1%	9.87	90.13	30.02	22019
	Bottom 99%	0.91	99.09	69.98	445
	Share wealth	23.78	76.22		
	Average inheritance	1410	46		
	Panel B:	**Measured one year before death**			
Children	Top 1%	10.45	89.55	30.02	22016
	Bottom 99%	0.90	99.10	69.98	445
	Share wealth	25.46	74.54		
	Average imputed inh.	2358	70		
	Panel C:	**Measured in 1991**			
Children	Top 1%	10.45	89.55	30.02	22016
	Bottom 99%	0.90	99.10	69.98	445
	Share wealth	20.34	79.66		
	Average wealth	685	27		
	Panel D:	**Measured in 1991-1993**			
Children	Top 1%	10.77	89.23	30.02	22016
	Bottom 99%	0.90	99.10	69.98	445
	Share wealth	20.61	79.39		
	Average wealth	736	29		

Note: This table presents the intergenerational wealth mobility measured as the probability that a parent's wealth belongs to the top 1% or the bottom 99% of the wealth distribution conditional on the child's wealth belonging to the top 1% and the bottom 99%, respectively. In addition, the columns marked "Share wealth" and "Average wealth" denote the share of wealth held by children in the the top 1% and the bottom 99%, respectively, as well as the average wealth in kSEK. The rows labelled "Share wealth" and "Average inheritance" denote the shares of inheritance held among the top 1% (bottom 99%) and averages within those groups. The population is defined as children who lose a parent in 2002-2004 and are in the Inheritance and Estate Tax register. Within this population, we construct wealth ranks of children in the year before losing a parent, within each year-of-death cohort. The difference across panels is when we measure the parents' wealth. Panel A ranks the inheritance (gross of inheritance tax). In Panel B, we calculate the inheritance of each child using the last wealth report of parents before death. We do this by multiplying the total wealth with the share of inheritances transferred to children (obtained from the Inheritance and estate register and measured for each parent), dividing by the number of children to arrive at an imputed inheritance. We in addition set negative inheritances to zero as one cannot inherit net liabilities. Panels C and D instead use wealth in 1991 and the avereage wealth over 1991-1993 to rank children with. These are the only years prior to 1999 when we have wealth measures that encompass the population.

Table C.5: Intergenerational wealth mobility

		Parents			
		Top 10%	Bottom 90%	Share wealth	Average wealth
	Panel A:	**Measured as inheritance**			
Children	Top 10%	22.13	77.87	63.99	4342
	Bottom 90%	8.65	91.35	36.01	252
	Share wealth	68.03	31.97		
	Average inheritance	404	21		
	Panel B:	**Measured one year before death**			
Children	Top 10%	22.36	77.64	63.99	4342
	Bottom 90%	8.63	91.37	36.01	252
	Share wealth	71.40	28.60		
	Average imputed inh.	660	30		
	Panel C:	**Measured in 1991**			
Children	Top 10%	24.74	75.26	63.99	4342
	Bottom 90%	8.36	91.64	36.01	252
	Share wealth	66.38	33.62		
	Average wealth	224	13		
	Panel D:	**Measured in 1991-1993**			
Children	Top 10%	25.28	74.72	63.99	4342
	Bottom 90%	8.30	91.70	36.01	252
	Share wealth	66.21	33.79		
	Average wealth	237	14		

Note: This table replicates Table C.4 for the top 10% and the bottom 90% instead.

Table C.6: Intergenerational wealth mobility

		Parents			
		Top 20%	Bottom 80%	Share wealth	Average wealth
	Panel A:	**Measured as inheritance**			
Children	Top 20%	32.35	67.65	81.90	2735
	Bottom 80%	16.91	83.09	18.10	143
	Share wealth	85.25	14.75		
	Average inheritance	253	11		
	Panel B:	**Measured one year before death**			
Children	Top 20%	32.12	67.88	81.90	2735
	Bottom 80%	16.97	83.03	18.10	143
	Share wealth	88.67	11.33		
	Average imputed inh.	410	13		
	Panel C:	**Measured in 1991**			
Children	Top 20%	35.60	64.40	81.90	2735
	Bottom 80%	16.10	83.90	18.10	143
	Share wealth	86.29	13.71		
	Average wealth	146	6		
	Panel D:	**Measured in 1991-1993**			
Children	Top 20%	35.98	64.02	81.90	2735
	Bottom 80%	16.00	84.00	18.10	143
	Share wealth	86.01	13.99		
	Average wealth	154	6		

Note: Note: This table replicates Table C.4 for the top 20% and the bottom 80% instead.

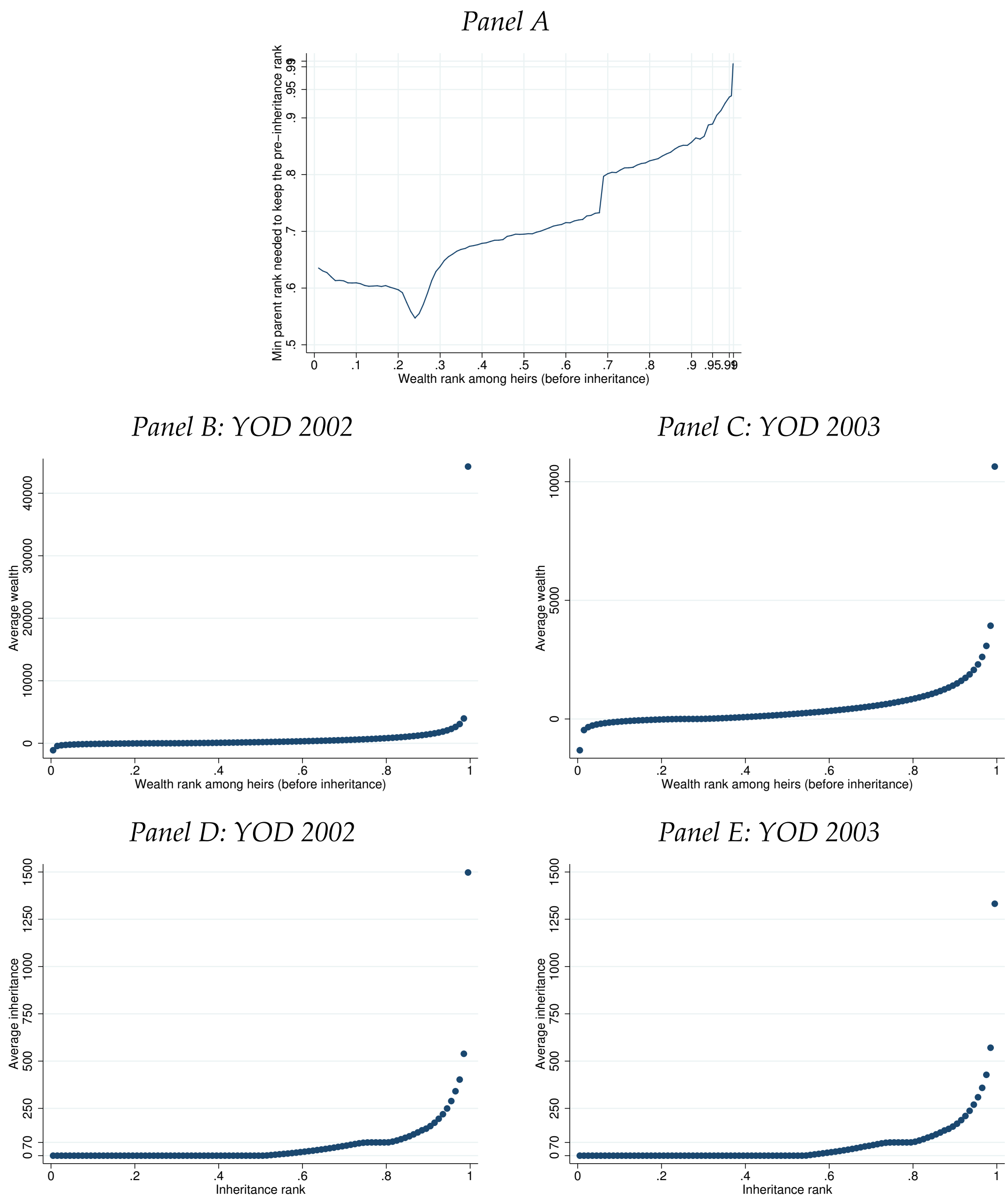
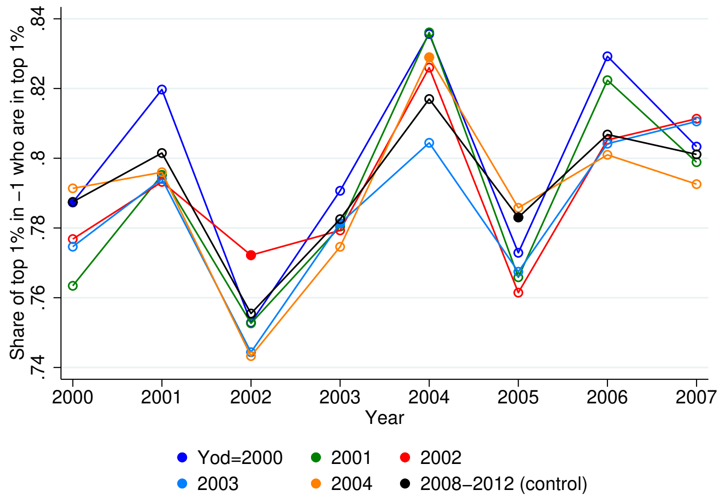


Figure C.14: Relation between inheritances and wealth

Note: Panel A of this figure shows the minimum inheritance rank needed to keep the heir's pre-inheritance wealth rank in the post-inheritance wealth distribution, against wealth rank for heirs who lose a parent, in 2003. In Panel B and C, we show average wealth in thousand Swedish kroner (kSEK) against wealth rank (percentiles) among heirs before receiving inheritances for heirs receiving inheritances in 2002 and 2003, respectively. The values on the y-axis represent the average value in each percentile. Panels D and E display average inheritances in kSEK against inheritance ranks.

Panel A



Panel B

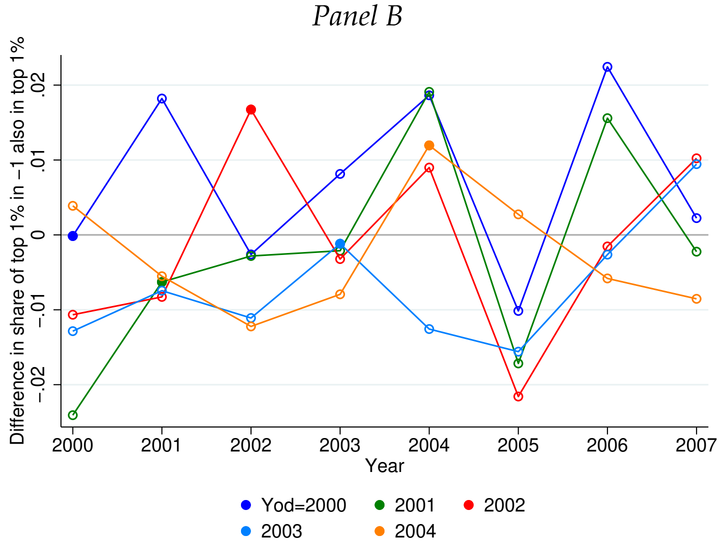
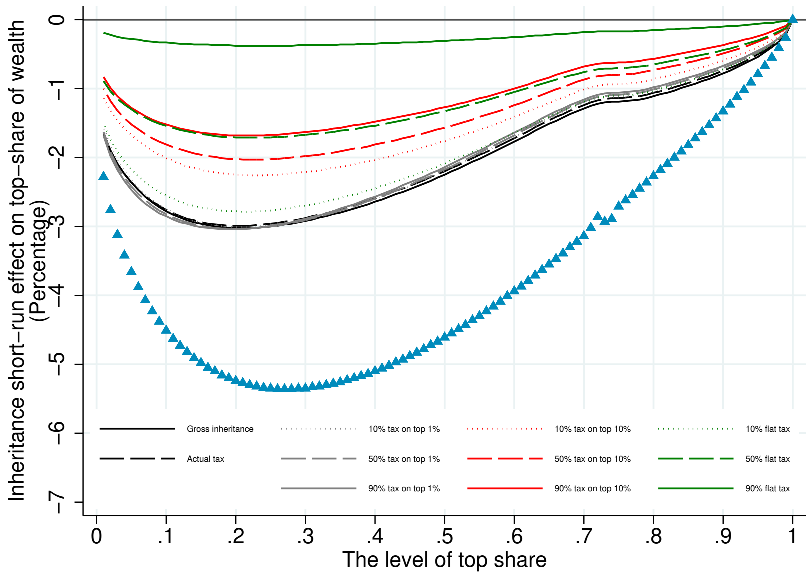


Figure C.15: Stability of wealth rank and the inheritance effect on it

Note: Panel A of this figure displays the likelihood of staying in the top 1% of the distribution of wealth, measured within birth cohort, conditional on being among the top 1% in the year before. We plot this figure for children in our sample who lose a parent at different points in time (year of death), indicated by the legends. Panel B instead focuses on the difference in staying in the top-group between various inheritance years and the control group (2008-2012).

Panel A: Taxing without redistributing



Panel B: Taxing with redistribution

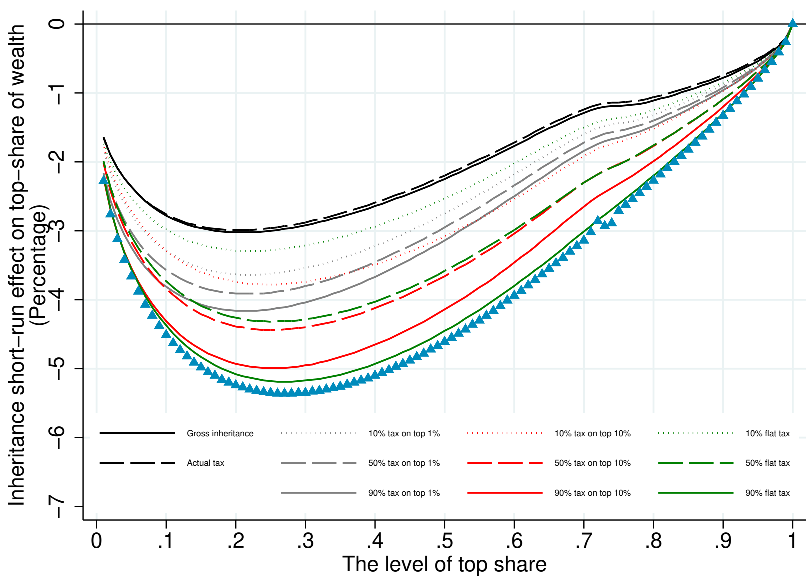


Figure C.17: The role of unexpected tax on inheritance short-run effect on wealth inequality

Note: This figure plots the inheritance short-run effect on top wealth share among heirs under different inheritance tax systems. These figures should be interpreted as illustrating the effects on the short-run inheritance effect of the introduction of an *unexpected* inheritance tax, i.e. they are constructed only using on the *mechanical* effects of the tax, without taking into account any behavioral responses. Panel A illustrates the case where the tax is introduced *without* redistribution, i.e. when tax revenues are not distributed back to the individuals. Panel B in turn illustrates the case where the tax is introduced *with* redistribution, i.e. when tax revenues are *uniformly* distributed back in a revenue-neutral way back to the whole population. The blue triangular series in both panels represent the hypothetical case of inheritance equality, borrowed from Panel B of Figure 7.

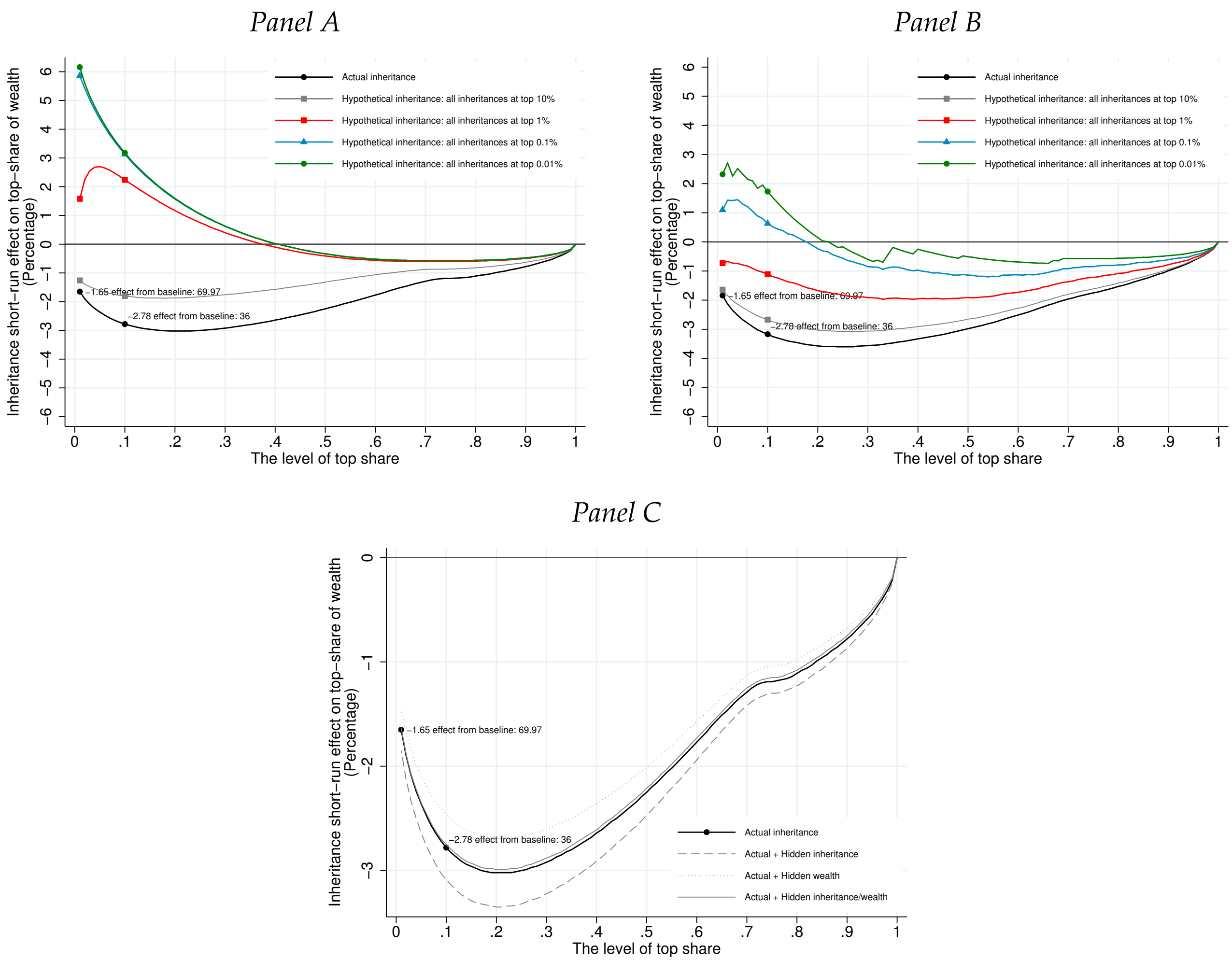


Figure C.16: The short-run effect of inheritance on wealth inequality under different cases of extreme inheritance inequality

Note: This figure replicates Panel B of Figure 7, but considers different cases of extreme inheritance inequality in each panel. Panel A shows the effect on top shares, when assuming that the top 10%, 1%, 0.1% or 0.01% of the inheritance distribution receive all inheritances in proportion to their actual inheritances. Panel B is similar to Panel A but focuses on the effect of inheritances on the wealth share of the wealthiest heirs defined before inheritances, i.e. the rank on the x-axis is fixed for all curves and is the pre-inheritance wealth rank (defined one year before parent's death). Panel C shows the inheritance effects in cases where we take into account hidden wealth of donor and/or heir generations. To do this, we allocate the estimated hidden shares of wealth over the wealth distribution according to the estimates in Alstadsæter et al. (2019) to both heirs' and donors' wealth.

C.4 Empirical Results on Long-Run Wealth Inequality

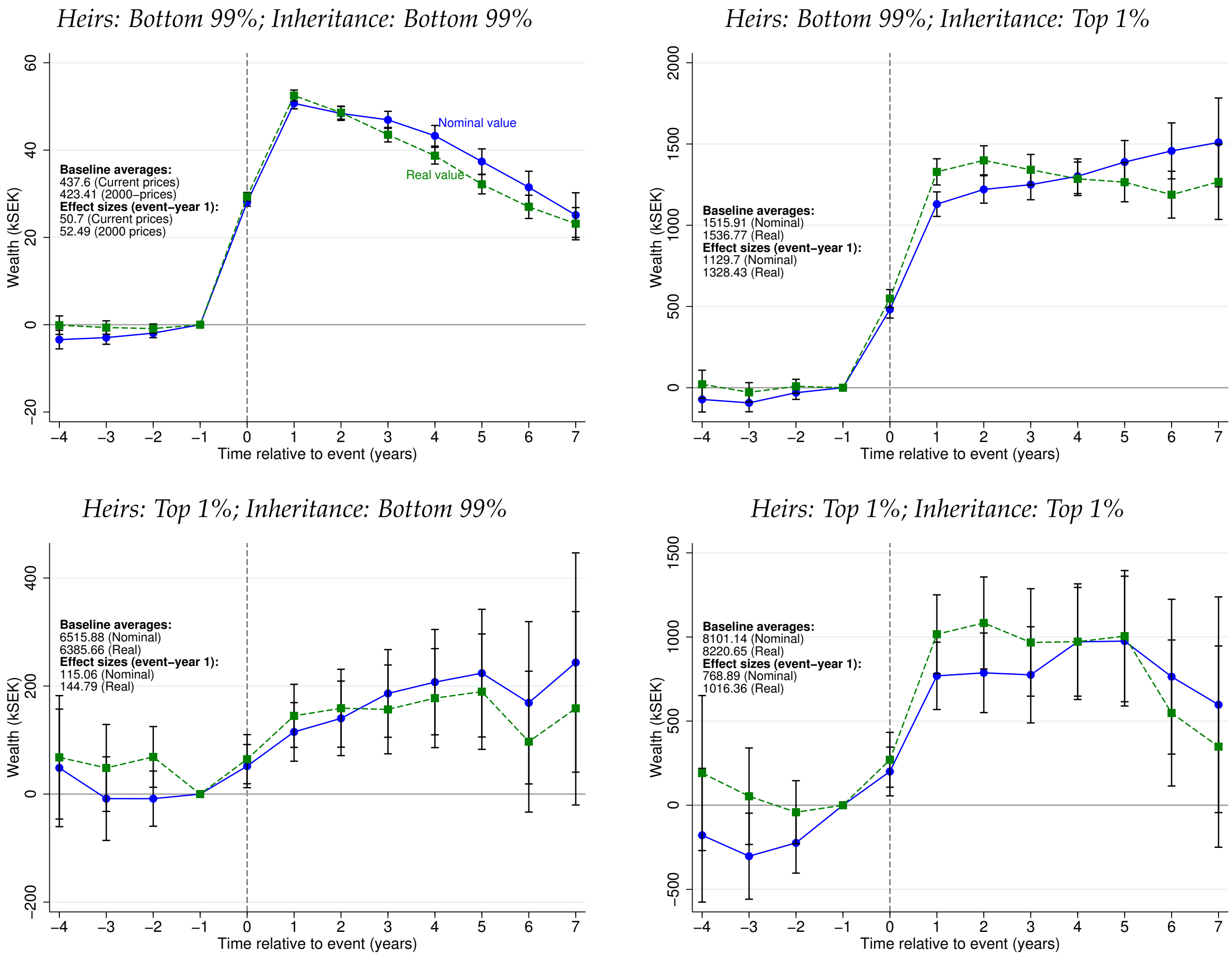


Figure C.18: The effect of inheritance on wealth by heir and parents' wealth

Note: This figure shows effects of inheritances on wealth in thousand Swedish kronor (kSEK) for four subsamples by heir and parent wealth. The estimates in each panel are based on separare and independent regressions. For example, the top left panel focuses on children who belong to the bottom 99% of the wealth distribution with the bottom 99% inheritance (both computed in 1999). The fraction of heirs in the different categories is, reading from the top left, 98.47%; 0.54%; 0.87% and 0.0012%. We compute expected inheritances as follows. We take the parent's wealth in 1999, multiply it with the share of the estate that goes to children and divide by the number of children. For 2002-2004, when we know the actual inheritances, we compute the child-share directly at the individual level, but for the oother inheritance cohorts (2000-2001 and 2008-2012), we impute the child-share from the 2002-2004 generation as the average child-share within cells defined by wealth quantile and an indicator of having a surviving spouse. These estimates are based on the fixed-control method where our treatment (control) group comprises children who receive inheritances in 2000-2004 (2008-2012). All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death cohort non-parametrically to match the distribution of children lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

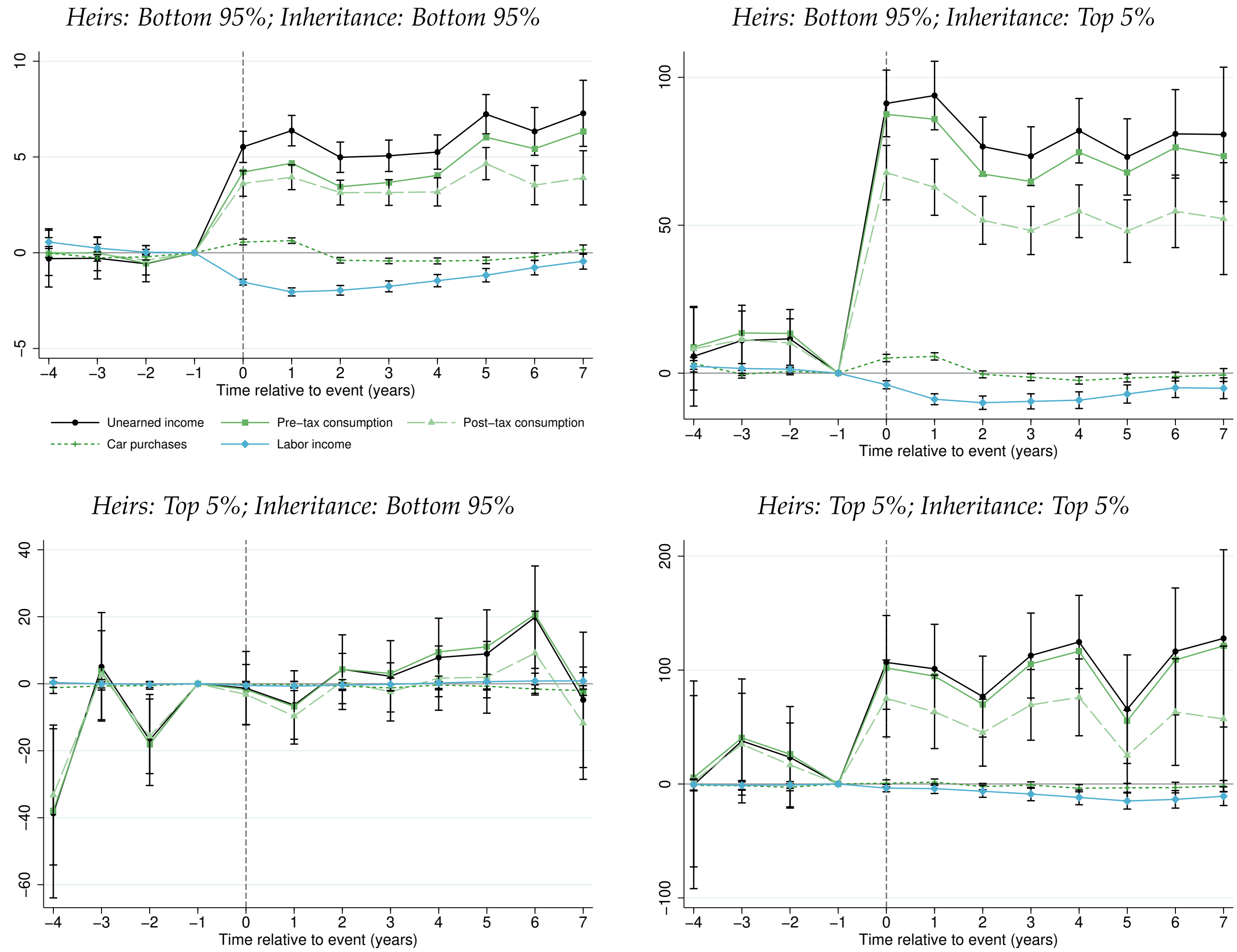


Figure C.19: How heirs spread inheritances across time (MAR) and their consumption/leisure (MPC/ MPE), by heir and parent wealth

Note: This figure shows effects of inheritances on the MAR, MPC, MPE in thousand Swedish kronor (kSEK) for four subsamples by heir and parent wealth. The estimates in each panel are based on separare and independent regressions. For example, the top left panel focuses on children who belong to the bottom 95% of the wealth distribution with the bottom 95% inheritance (both computed in 1999), repeating Figure 5. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death cohort non-parametrically to match the distribution of children lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

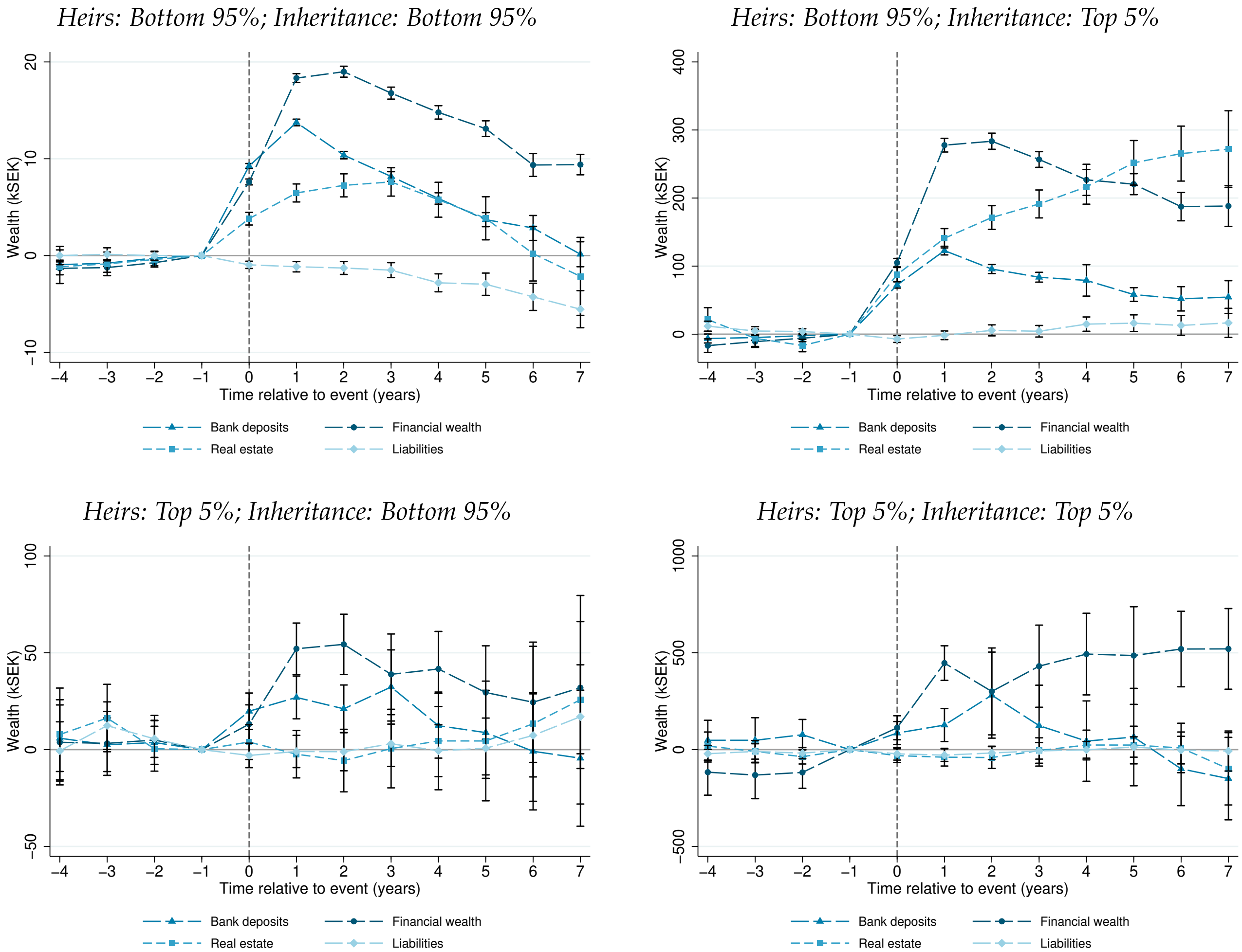


Figure C.20: The effect of inheritances on wealth components, by wealth groups

Note: This figure shows effects of inheritances on wealth in different categories in thousand Swedish kronor (kSEK) for four subsamples by heir and parent wealth. The estimates in each panel are based on separare and independent regressions. For example, the top left panel focuses on children who belong to the bottom 95% of the wealth distribution with the bottom 95% inheritance (both computed in 1999), repeating Figure 5. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death cohort non-parametrically to match the distribution of children lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

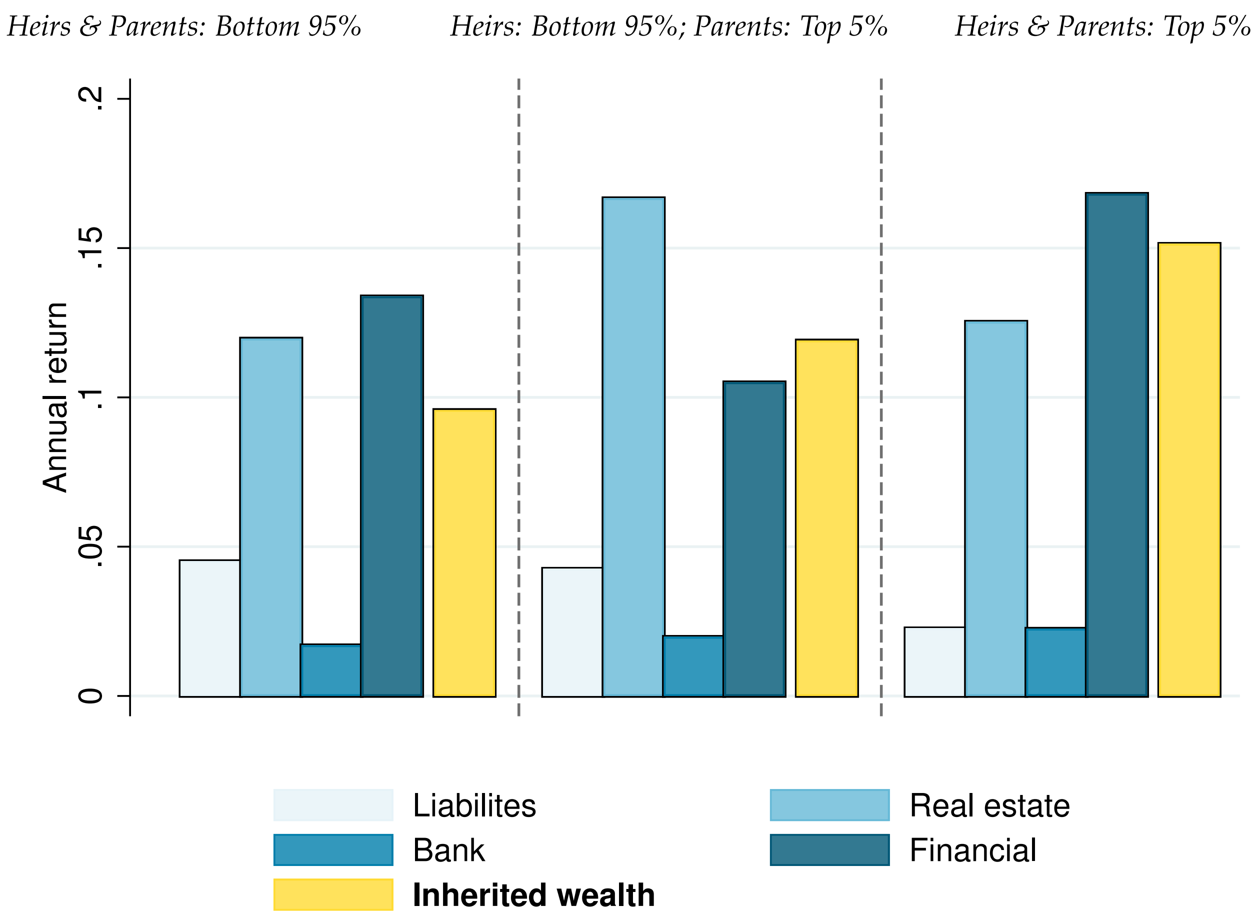


Figure C.21: The average return on inherited wealth, by wealth groups

Note: This blue bars in this figure show the average annual return per asset class within heir groups, calculated over the period 2001-2007 (event-years 1-7). Heir groups are defined as in Figure 5. The annual return is calculated for total wealth (not just inherited) and include both capital gains and capital income. For liabilities, we compute the return as interest payments divided by the size of the debt. Note that these asset classes are more coarse than those we use for capitalization of wealth. A discrepancy in the annual return across heir groups within, say, financial wealth, is both due to differences in the share of financial wealth held in stocks, bonds, funds and options and to differential returns within finer asset classes. We then compute a total return on inherited wealth by weighting together the blue bars according to the average share of inherited wealth held in each asset class. Concretely, we compute the average estimate from Figure C.20 over event-years 1-7, within heir-group and asset class. We then compute the share of inherited wealth held in each asset class as the ratio of that average to the sum of all averages, within heir group. The yellow bar shows the average annual return on inherited wealth. It assumes that the return on inherited wealth within heir-group and asset class is the same as that of self-made wealth. A difference across heir groups is both due to different returns on asset classes and different portfolio compositions.

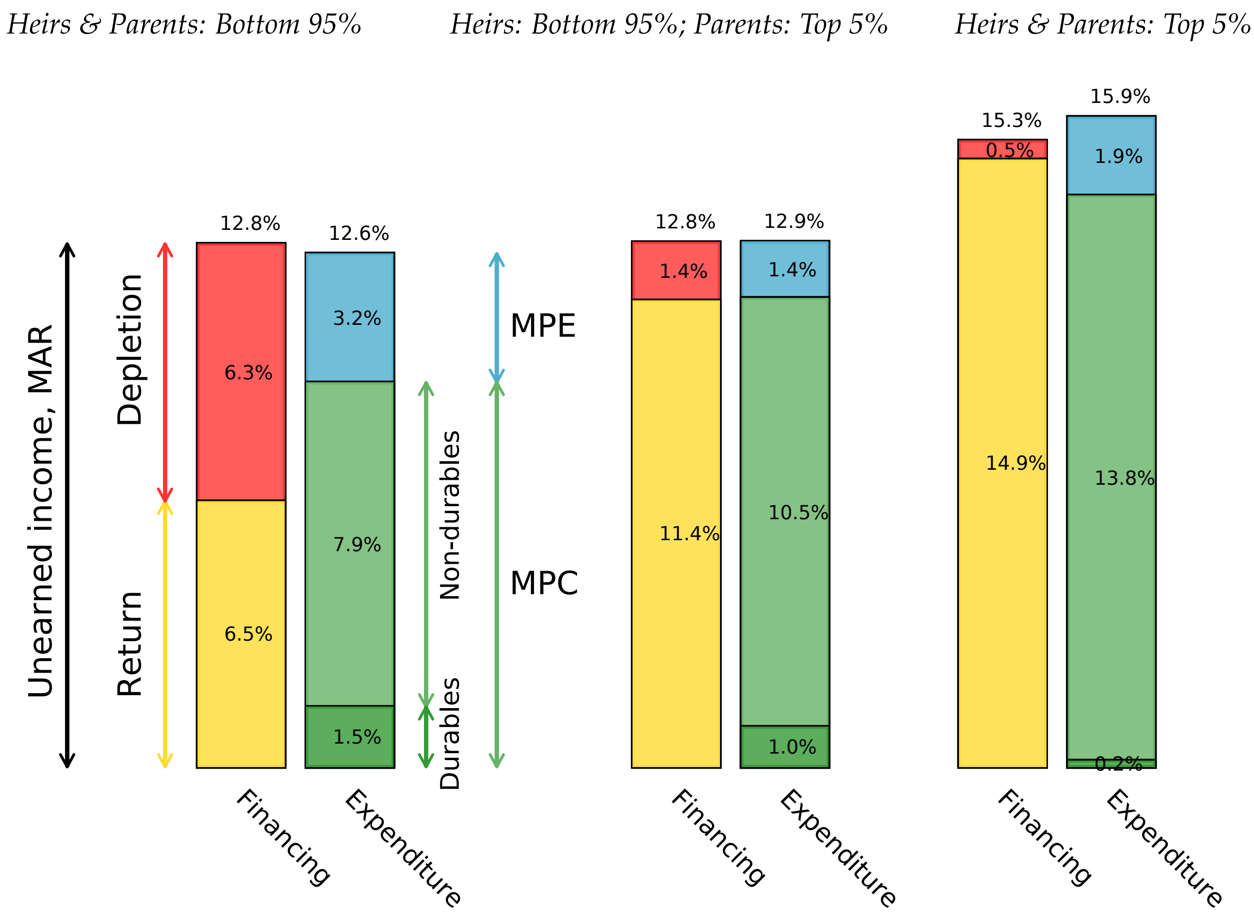


Figure C.22: Heterogenous responses and returns to inheritances by heirs' and parents' wealth

Note: This figure shows heterogeneity in how depletion of inheritances and the extra return on inheritances (the LHS of the equation above) finance increased consumption and reduced labor income due to inheritance (RHS). The height of the bars corresponds to the average effect of inheritances on unearned income (the middle part of the equation). This leads to a small discrepancy between the height of the expenditure and financing-bars within each group, which we abstract from in the version of this figure in the main text (Figure 6). All numbers reported are estimated using our research strategy (Section 2.3). The equation above replicates Equation (3). $T = 7$. The groups are definition is similar to Figure 5, e.g. the top left panel focuses on children who belong to the bottom 95% of the wealth distribution with bottom 95% inheritances (both computed in 1999).

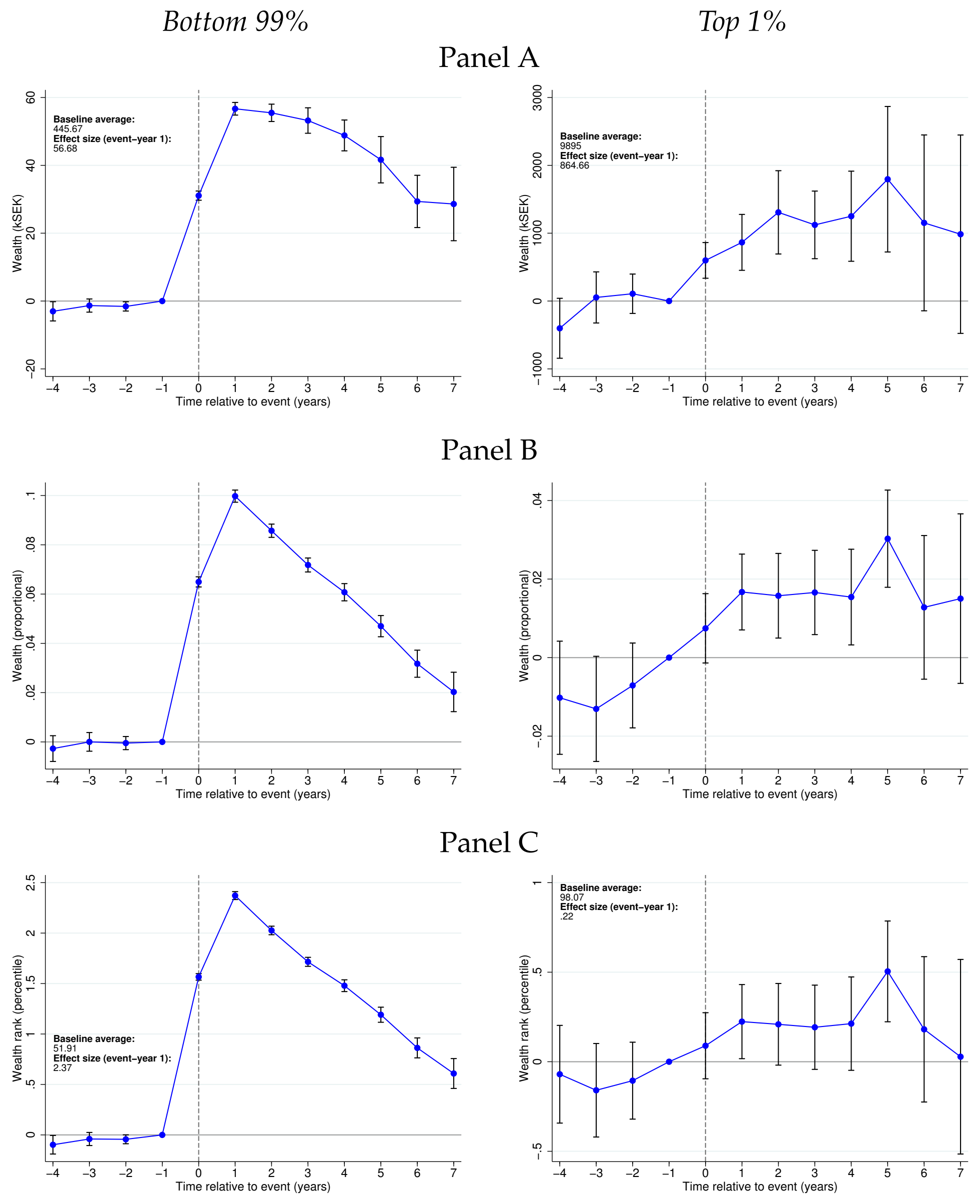


Figure C.23: The effect of inheritance on wealth by heir wealth

Note: This figure shows the effect of inheritance on market-level wealth in thousand Swedish kroner (kSEK) (Panel A), proportional wealth (arcsinh) (Panel B) and wealth ranks (Panel C) for two groups, defined by the heirs' wealth. In Panel A, we adjust the Pareto tail of the wealth distribution of the treatment years (2000-2004) to match that of the control group. The left graphs depict coefficients for heirs within the bottom 99% of the wealth distribution in calendar year 1999 while the right graph focuses on heirs within the top 1% of the wealth distribution. We use the fixed-control group method with children who lose a parent in 2008-2012 to demean outcomes while our treatment group comprise children of parents who die during 2000-2004 and demeaning is done within each group separately. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

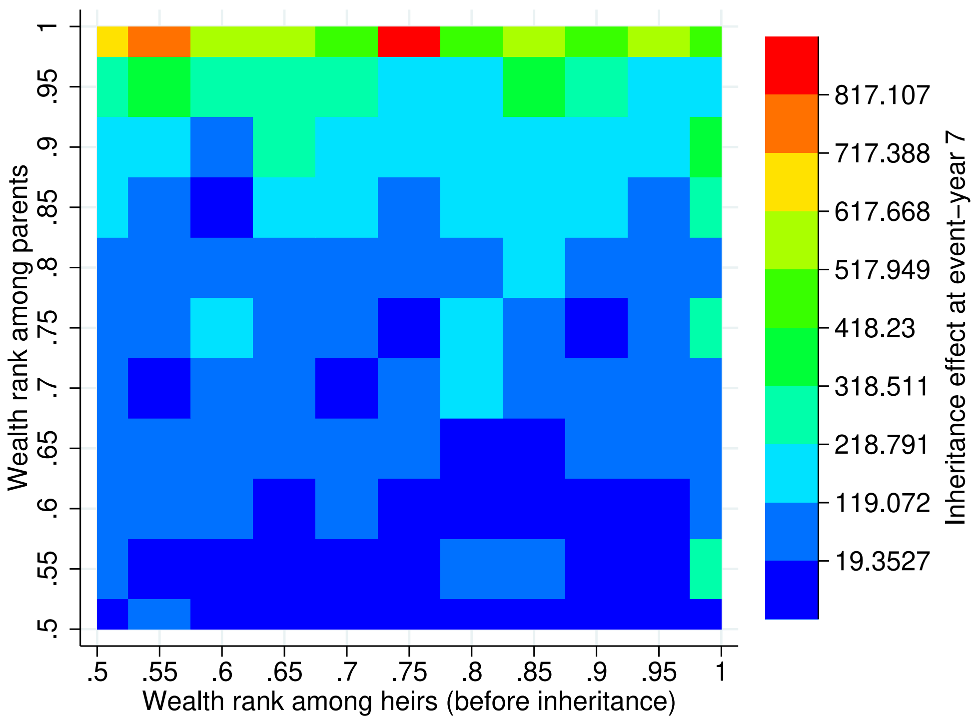


Figure C.24: The effect of inheritance on wealth at event-year seven, by parent- and heir- wealth

Note: This figure shows a heatmap of the effect of inheritance on market-level wealth in thousand Swedish kroner (kSEK) at event-year seven against parent wealth before death (y-axis) and heir wealth before death (x-axis). As in Figure C.18, we divide children into groups by own wealth in 1999 and an expected inheritance computed as follows. We take parent's wealth in 1999, multiply it with the share of the estate that goes to children and divide by the number of children. For 2002-2004 when we know the actual inheritances, we compute the child-share directly at the individual level, but for the other inheritance cohorts (2000-2001 and 2008-2012), we impute the child-share from the 2002-2004 generation as the average child-share within cells defined by wealth quantile and the indicator of having a surviving spouse. We divide heirs into cells of five-percent-intervals and estimate the dynamic inheritance effect in each cell, reweighting the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We lump together heirs who are at or below the 50th percentile in either own or parent wealth into larger cells. For example, the cell of heir wealth 50% and parent wealth 70% comprises all heirs with own wealth at or below the 50th percentile and parental wealth between the 70th and 75th percentiles.

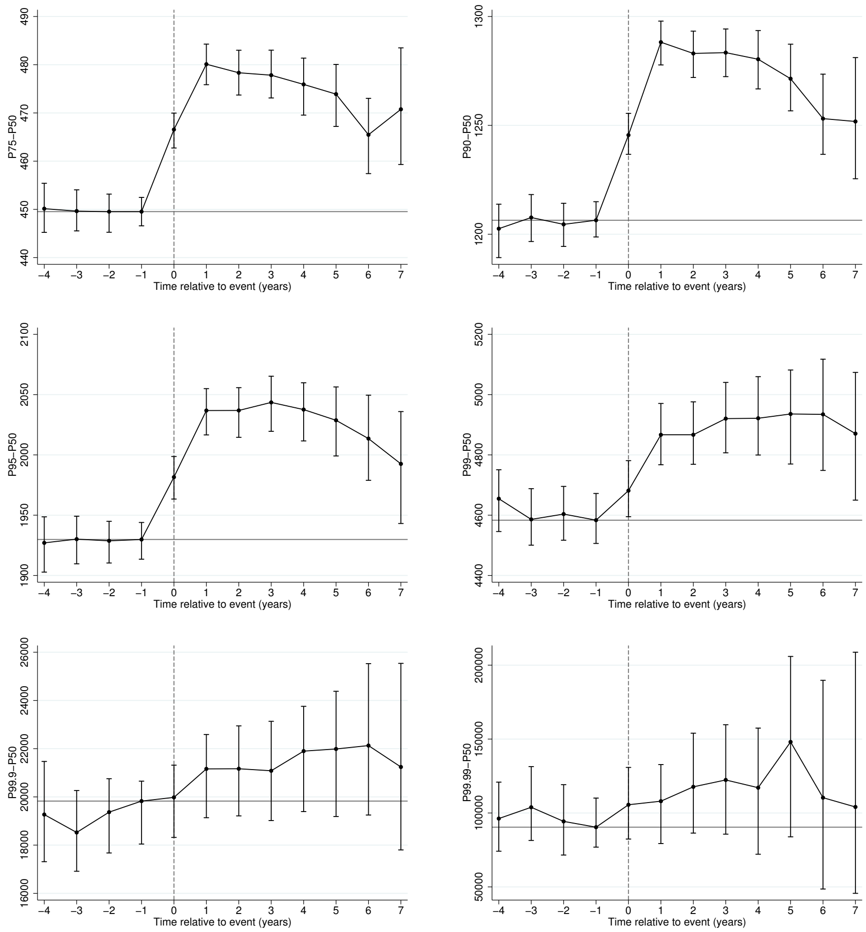


Figure C.25: Inheritance effect on wealth dispersion

Note: This figure plots the effect of inheritances on wealth dispersion, defined as the difference between different percentiles of the distribution. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death cohort non-parametrically to match the distribution of children who lose a parent in 2000. Wealth dispersion measures are defined separately for each year and each year-of-death and education cell. Standard errors are from 1000 bootstraps and the figures display 95% confidence intervals.

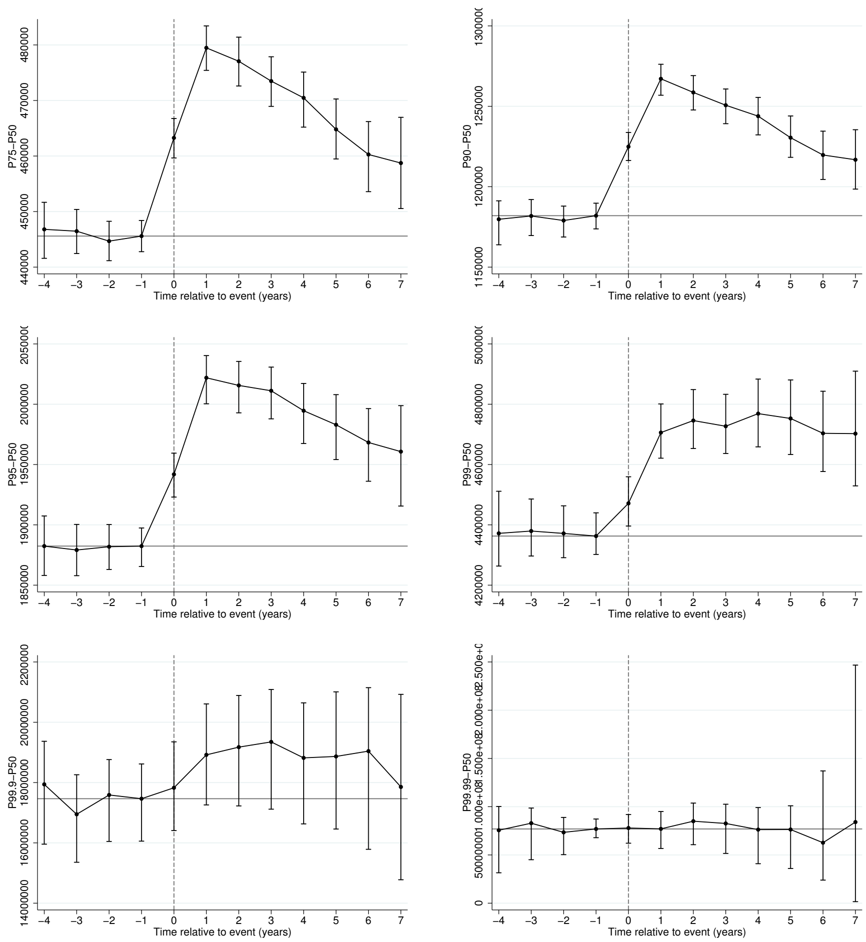


*Figure C.26: Inheritance effect on **real** wealth dispersion*

Note: This figure replicates Figure C.25, plotting the effect of inheritances on wealth dispersion where asset prices are fixed in 2000. More specifically, we hold the values of housing, bonds and stocks constant at their levels in 2000. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. Wealth dispersion measures are defined separately for each year and each year-of-death and education cell. Standard errors are from 1000 bootstraps and the figures display 95% confidence intervals.

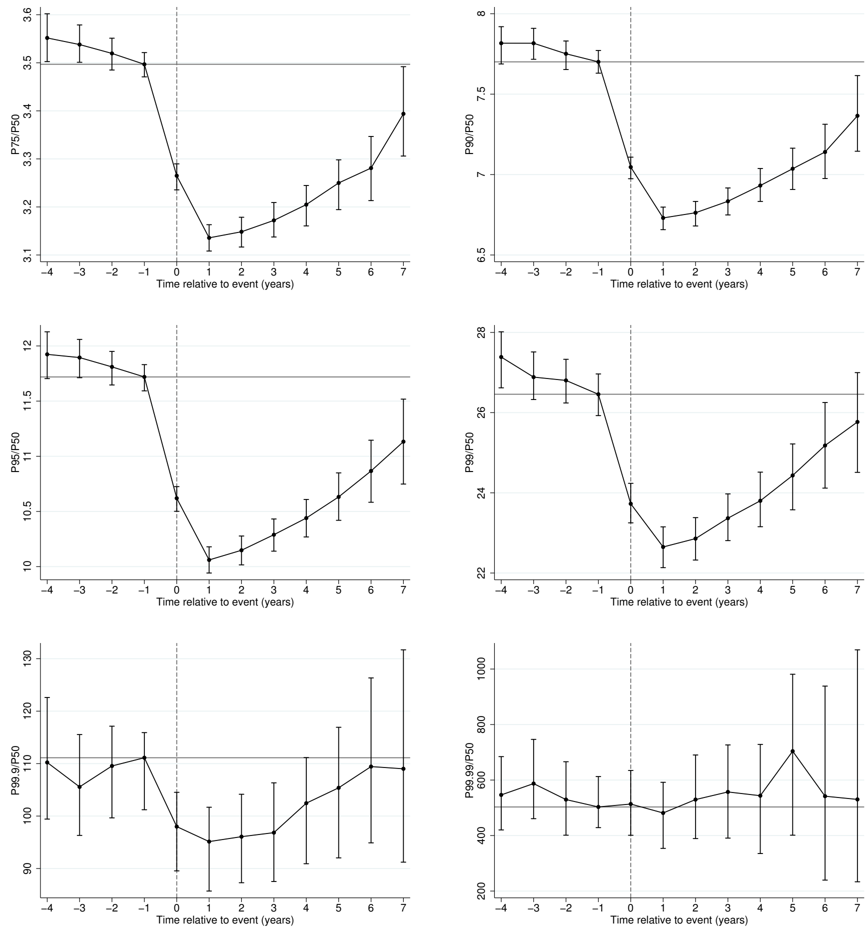


Figure C.27: The effect of inheritance on Kuznets ratios

Note: This figure plots inheritance effects on different Kuznets ratios (percentile ratios) of the heir wealth distribution, defined by the y-axes. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. All Kuznets ratio measures are defined separately for each year and each year-of-death and education cell. Standard errors are from 1000 bootstraps and the figures display 95% confidence intervals.

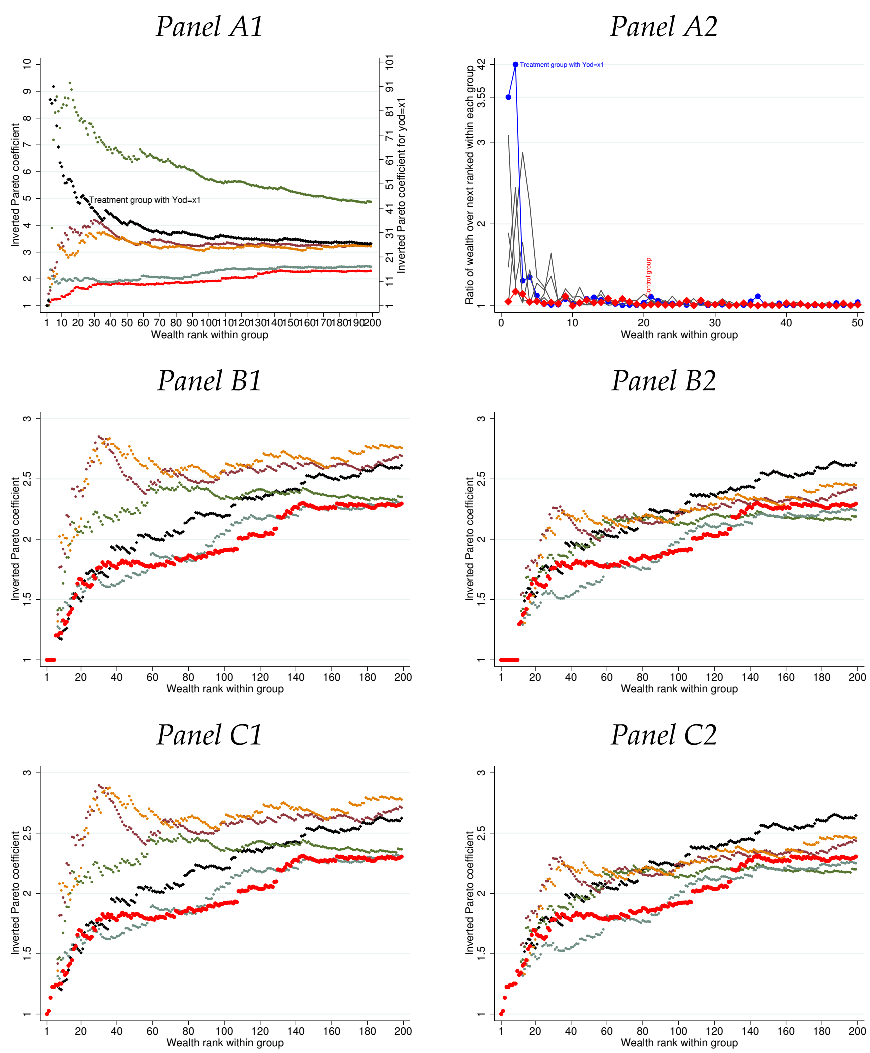


Figure C.28: Pareto tail of wealth distribution

Note: Panels A1 and A2 present the anomalies in the tail of the wealth distribution for the year 1999 in the treatment groups (parent death years 2000-2004) and the control group, while the other panels show how we solve them. In order to respect the confidentiality of our data, we do not provide any legends. The label "Treatment group with yod=x1" in Panel A1 helps the reader to see the connection between Panels A1 and A2 in the absence of the legend. Panel A1 displays inverted Pareto coefficients for the five treatment groups and the control group, while Panel A2 shows the ratio of the wealth of a given individual over the wealth of the next-ranked individual, defined within each treatment/control group. The inverted Pareto coefficient is defined as the ratio of average wealth of individuals with wealth above a certain level to that level of wealth (Atkinson et al., 2011). Panels B1 and B2 do the same but after replacing the wealth of top 5 and 10 individuals, respectively, with a fixed amount (namely, the inverted Pareto coefficient for the next-ranked individual in the control group). Panels C1 and C2 adjust the wealth level of the top 5 and 10 individuals in the treatment groups, respectively, so that they obtain the same Pareto coefficient as the control group. We apply this correction procedure when analyzing long-run inequality effects (see Section 4.2).

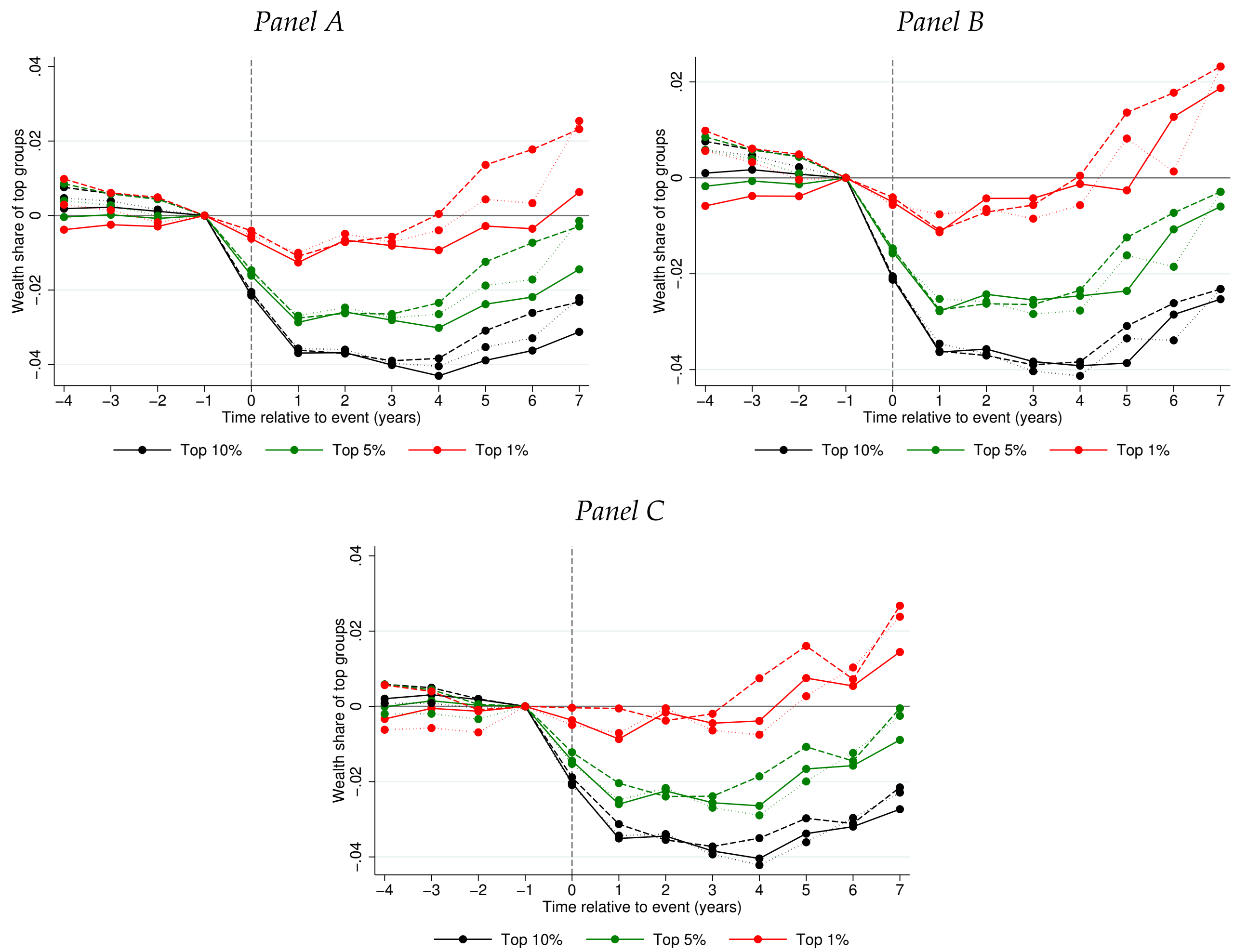
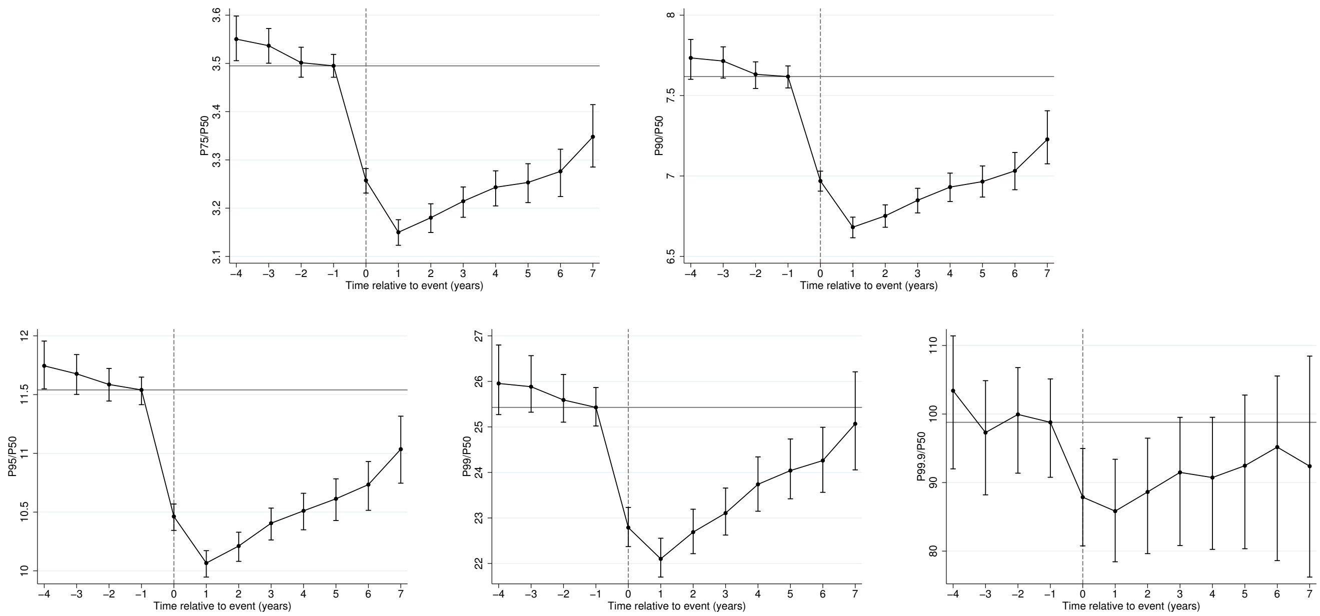


Figure C.29: Robustness of long-run inequality effect

Note: This figure shows effects of inheritances on long-run wealth inequality when adjusting the wealth of top individuals in different ways. Panel A shows the effects when we replace the wealth of top individuals by an equal amount (as in Panels B1 and B2 of Figure C.28). The adjustment is done in three levels: for top 10, top 5 and top 1 individuals demarcated by the solid, dotted and dashed lines, respectively. In Panel B, we instead drop those top individuals altogether. Panel C instead corrects the Pareto tail using the control group as benchmark (similar to Panels C1 and C2 in Figure C.28).

Panel A



Panel B

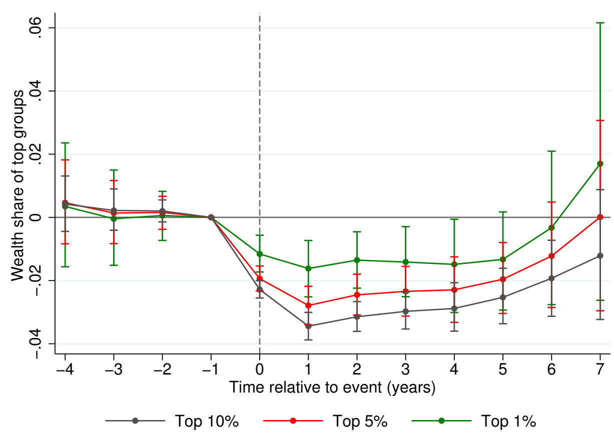


Figure C.30: The effect of inheritance on long-run ***real*** *wealth inequality*

Note: This figure replicates Figure C.27 for real wealth, i.e. wealth denominated in 2000 prices. See the notes to Figure 2 for an explanation of this procedure. Panel A shows effects on various Kuznets ratios as in Figure C.27, while Panel B shows effects on the wealth shares of the top 1%, 5% and 10% of the heir wealth distribution as in Figure C.29.

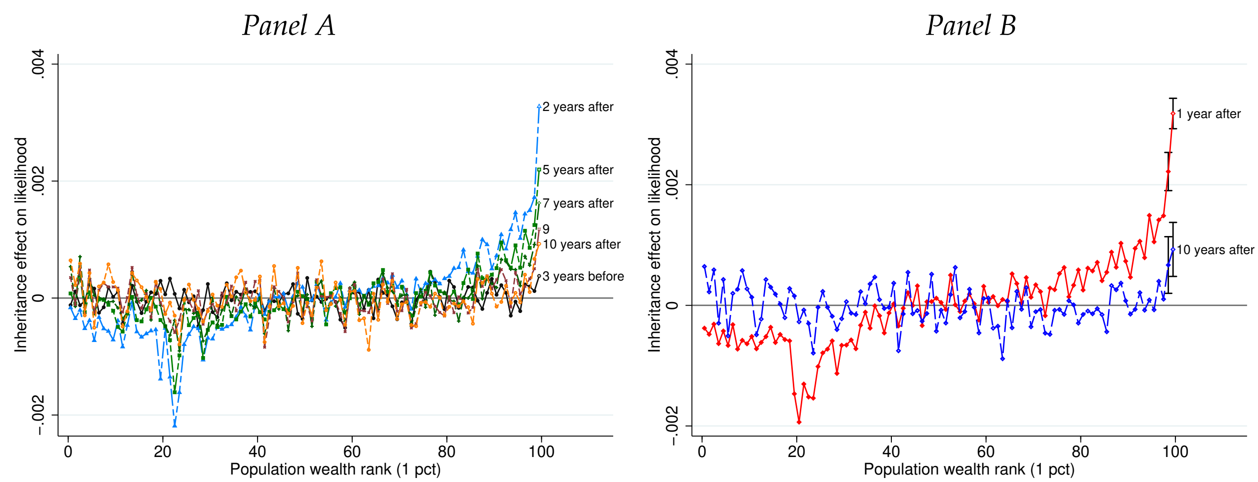


Figure C.31: The inheritance effect on the likelihood of being in each percentile of the population wealth distribution, ***capitalized wealth***

Note: This figure replicates Figure 8, Panels A and B, using capitalized wealth instead of wealth records, allowing us to estimate the effect ten years after inheritance receipt. Panel A plots the effect of inheritance on the likelihood of heirs being in each percentile bin of population capitalized wealth distribution 2,5,7,9 and 10 years after inheritance receipt and 3 years before inheritance receipt as a placebo. Panel B only focuses on the effect one and ten years after. For illustrative purposes, we show confidence intervals for the effects of the top two percentiles only. We apply the fixed-control-group method with cohorts who lose a parent in 2011-2015 as a control group.

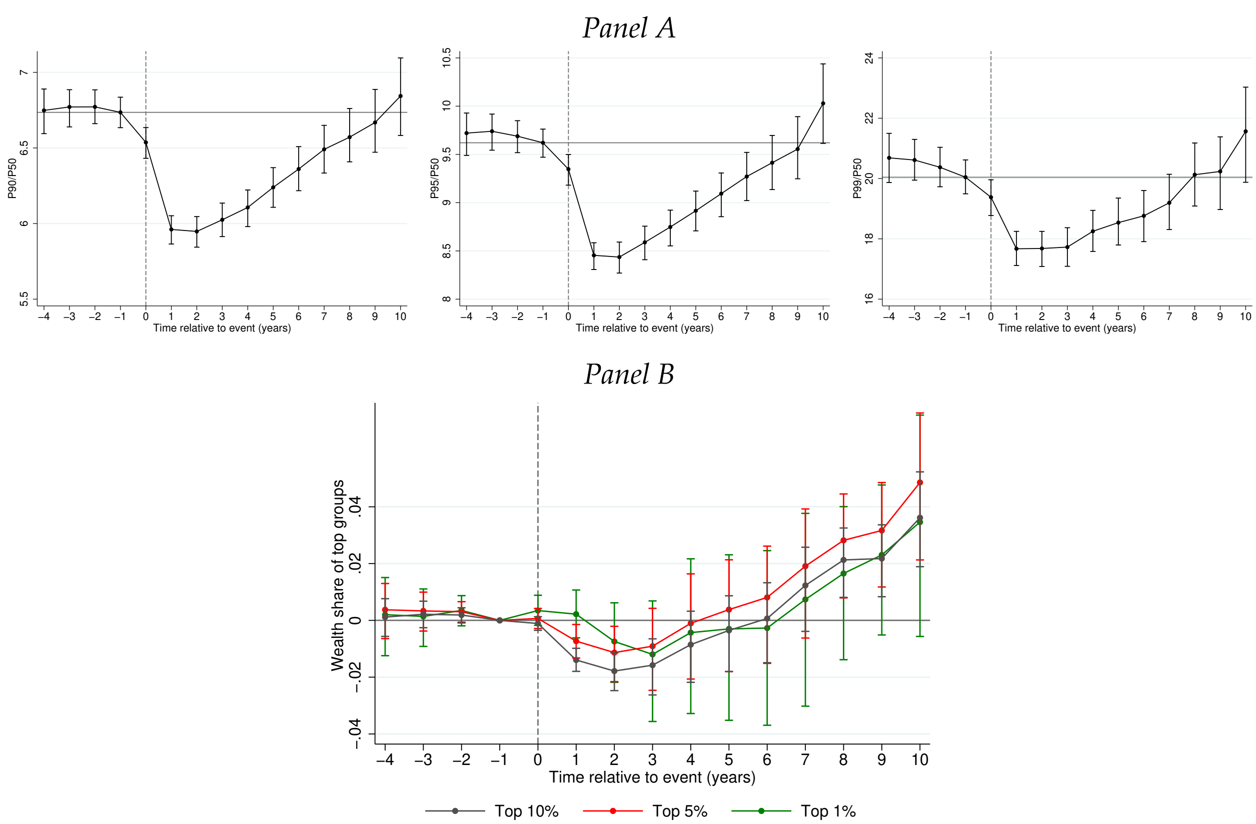


Figure C.32: The effect of inheritance on long-run wealth inequality, ***capitalized wealth***

Note: This figure replicates Figure 8, Panels C and D, using capitalized wealth instead of wealth records. Panel A plots the effect of inheritances on Kuznets (percentile) ratios. Panel B focuses on the share of wealth in the hands of the wealthiest individuals. All estimates reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of birth-years of children who lose a parent in 2000. We omit event-time minus one as the reference period. The figures display 95%-confidence intervals from 1000 bootstraps.

C.5 Inter-Vivo Gifts

Our empirical design – using the randomness of the timing of death – does not allow us to measure the impact of inter-vivo transfers. This section sheds some light on the importance of gifts by investigating their overall magnitude and heterogenous importance across the wealth and age distribution. We use the Inheritance and estate tax register, which includes information on the reported gifts over the 2002-2004 period.[60]

Appendix Figure C.33, Panels A and B present descriptive statistics on gifts over the wealth distribution from the donors' and the recipients' side, respectively. Within the total Swedish population, annual gifts amount to only around 261 SEK on average (demarcated by the solid horizontal lines in Panels A and B), which corresponds to about 0.06% of average wealth.[61] The distribution of gifts is skewed, with the top wealth decile transferring about four times as much wealth compared to the second highest decile. In fact, its skewness is similar to that of the distribution of wealth so that the relative importance of gifts (the ratio of gifts over donor wealth) is fairly constant across the distribution.

In parallel to the case for donors, gifts are disproportionately falling into the hands of the very wealthy in nominal terms. However, relative to baseline wealth, more affluent individuals receive *less*.[62] This pattern is similar to that of inheritances (see Appendix Figure C.34), suggesting that gifts, like inheritances, have an equalizing short-run effect on the wealth distribution (see Appendix Figure C.35C). We also document that emitted gifts are low until the age of 60, and rising in importance with age after that (Appendix Figure C.34C).

This analysis augments that of Appendix Figure C.35, where we only focus on gifts from parents to children within our population. The patterns are consistent, with gifts increasing nominally in wealth for children, but decreasing relatively. We also find that most gifts occur close to death, which is consistent with Panel C, where we find that gifts rise in importance with age.

These pieces of evidence should be interpreted as a lower bound on the importance of gifts because of tax evasion and avoidance. Nevertheless, since the evidence on inter-vivo gifts is scarce, these facts constitute a contribution to the literature.

[60] See Section 2.1 for the institutions related to inter-vivo gift taxation.

[61] These numbers may seem at odds with tax revenues from inheritances and inter-vivo gifts reported by the government, equal to 2,643 million SEK and 332 million SEK, respectively. These numbers imply that gift tax revenue amounts to 12.6% of inheritance tax revenue. There are two things to note here. First, the average tax rate on gifts (14%) is higher than on inheritances (8%) due to a lower exemption threshold,. Otherwise, in a given year the share of total inter-vivo transfers over inheritances is around 8.5%. Second, in a given year the emitted inter-vivo transfers stem from a younger generation than inheritances bequeathed. Since the younger generations are relatively more wealthy, this mechanically creates a lower share than the share of gifts over inheritances within the same generation.

[62] There is a slight increase in gifts over wealth for the top deciles of the wealth distribution before inheritances, suggesting that the effect of gifts on wealth inequality within the total population may be different depending on which top shares that one considers. Nevertheless, this slighly increasing pattern is much less pronounced than the declining pattern between the third and the seventh percentile.

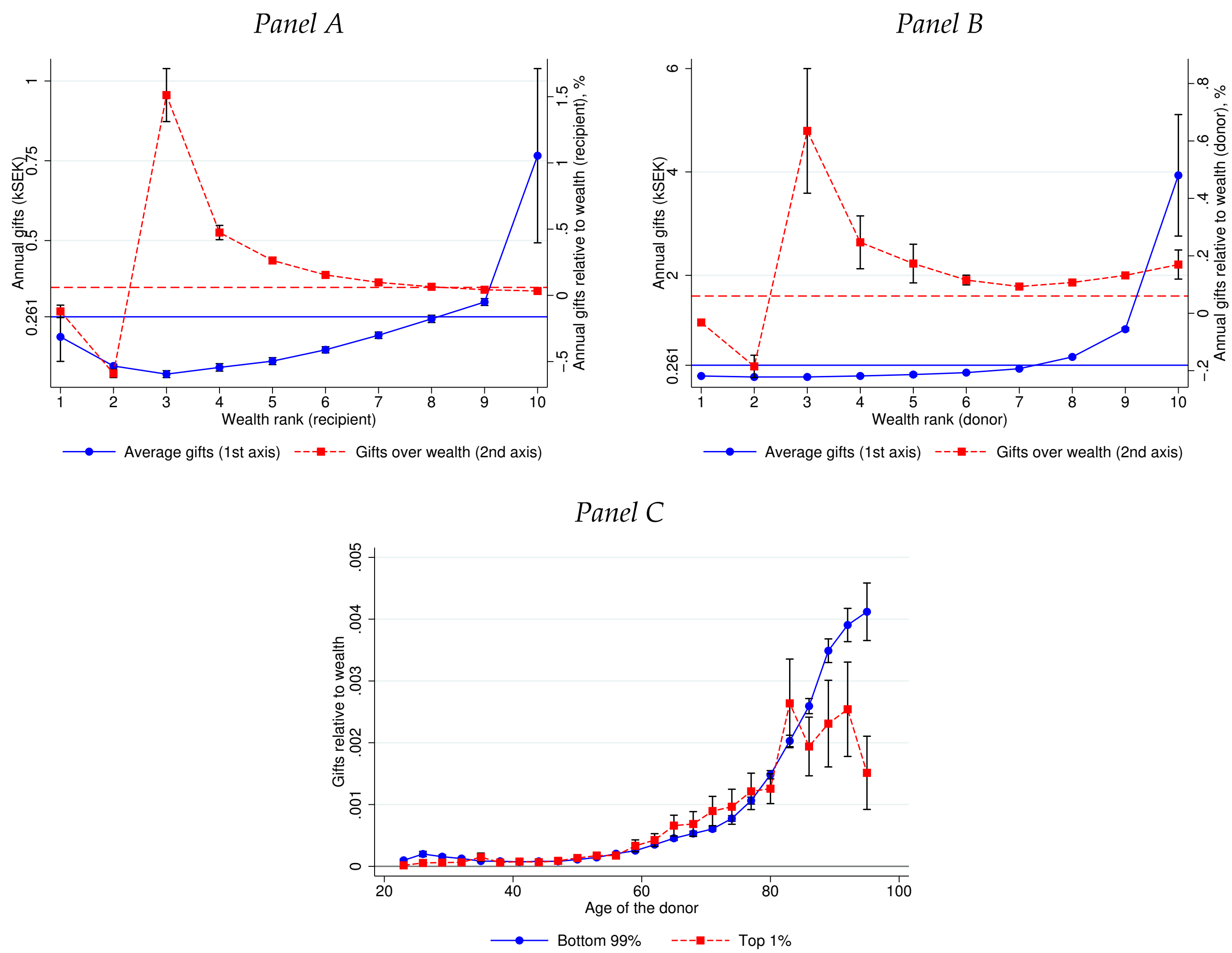


Figure C.33: Gifts emitted and received

Note: Panel A shows average annual gifts (averaged over 2002-2004) in kSEK emitted (solid circled series) against wealth population rank of the donor (measured as deciles of average wealth over 1999-2001). This figure uses the entire Swedish population aged 20 and older, and not the parent-child population as in the rest of the paper. The horizontal solid line shows the population-average. The same panel also shows average annual gifts as a share of average wealth on the second y-axis (measured as mean wealth during 2002-2004) (squared dashed series). This share can be negative because wealth can be negative. The horizontal dashed line shows the population-wide ratio of those averages. We omit individuals with an absolute value of wealth of 50 kSEK or less to avoid that these ratios become sensitive to individuals with very low wealth. Panel B shows an analogous picture but here we focus on gift recipients instead. Finally, Panel C shows average annual gifts emitted within 3-year age-intervals against age of the donor. We split the sample by donor's wealth belonging to the bottom 99% (circled solid series) and top 1% (squared dashed series), measured using average wealth over 1999-2000 and within each birth cohort.

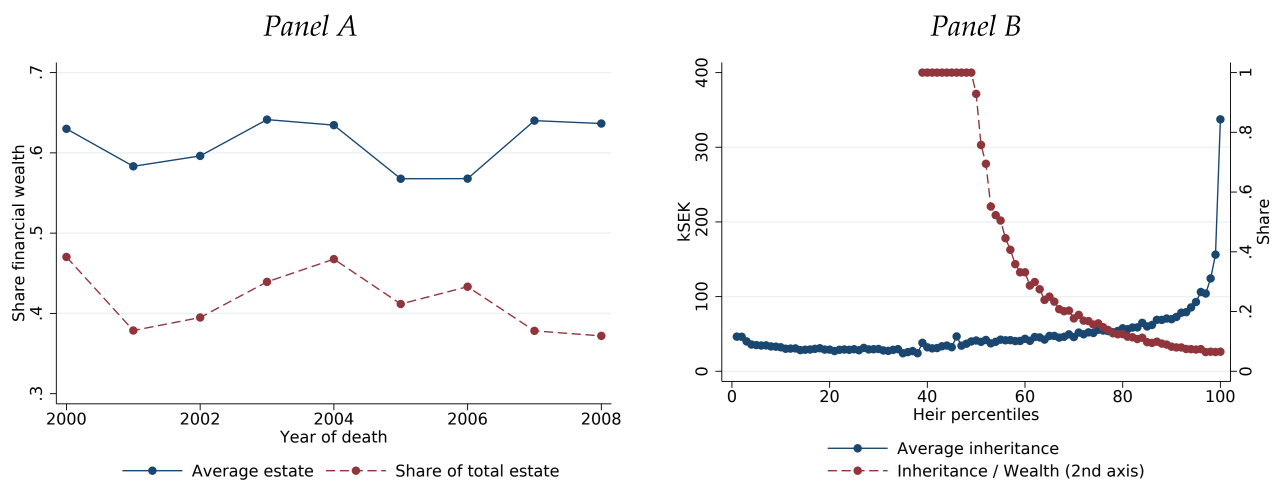


Figure C.34: Inheritance composition and distribution

Note: Panel A displays the composition of our population's parents estates in two complementary ways. To construct the solid blue series, we first compute total financial and real assets, net of liabilities of each parent one year before death. Liabilities are subtracted from each asset type in proportion to asset shares. Negative net wealth are set to zero as liabilities cannot be inherited. The series show the average share financial (net) assets against year of death for the period 2000-2008. The dashed red series show the share of total (net) assets that are represented by financial wealth against time. The solid blue series in Panel B show average inheritance against wealth percentiles, computed one year before parental death, at the child level for children who lose their parents in 2002-2004. The dashed red series represent the average share of inheritance out of total wealth within each percentile. Average shares are censored at 1 and are only constructed for positive wealth-bins.

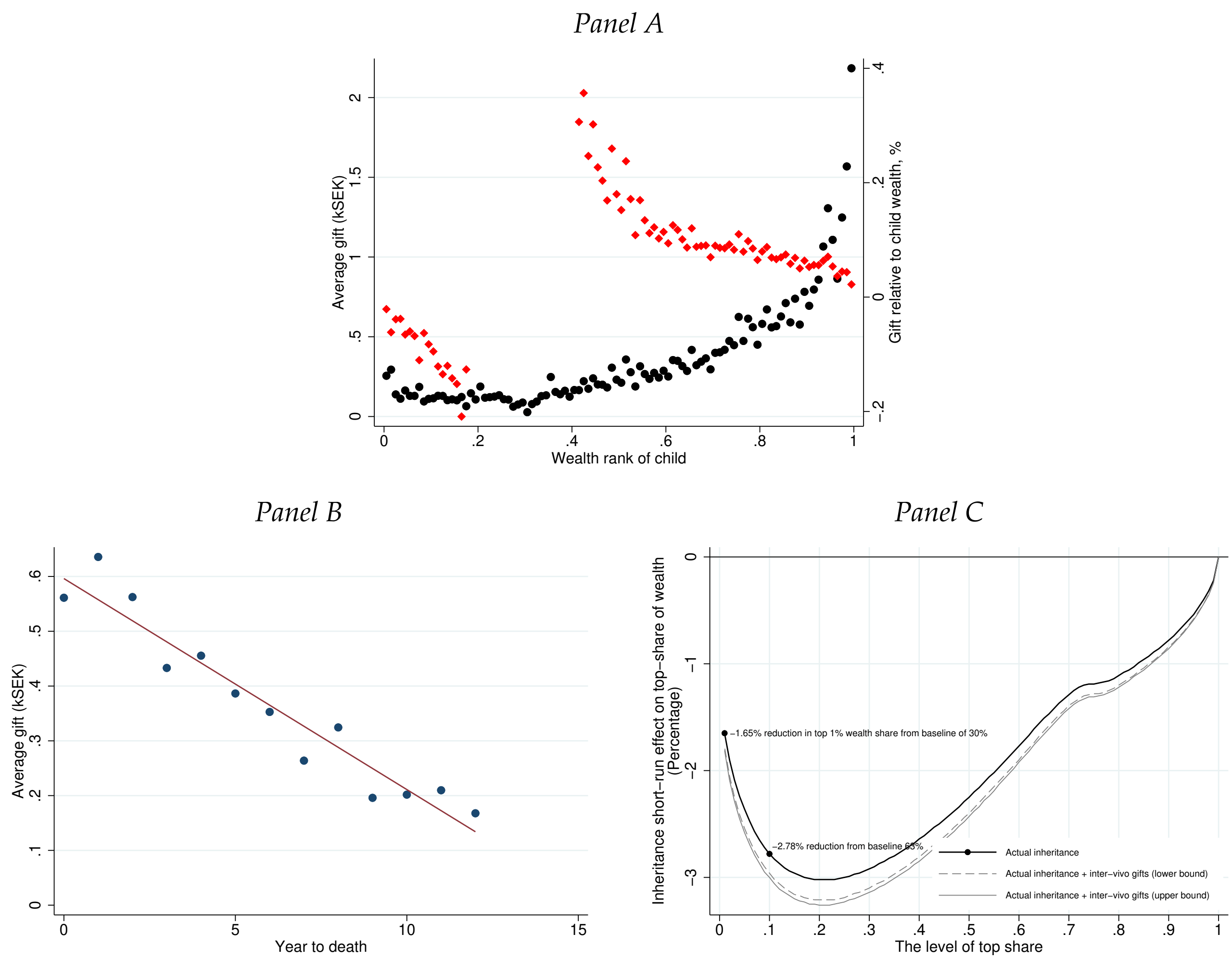


Figure C.35: Inter-vivo transfers

Note: In Panel A, the black circled series present the average gifts in thousands of Swedish kroner (kSEK) in 2003 to children of parents who die during 2003-2015 against the children's wealth rank in 2002. To be precise, the figure shows the average gift within each percentile. The red, diamond-shaped series instead depict the average ratio of gifts over wealth against the ranks. Panel B displays average gifts in 2003 against parents' year of death (measured relative to 2003, i.e. year of death minus 2003). Panel C shows how the Lorenz curve difference is affected by gifts. The lower bound augments inheritances using the average gift over the thirteen years before death within each percentile. The upper bound instead assumes that the average gift over this period is received during sixteen years before death.

C.6 Validity Tests for the Empirical Strategy

In this section, we scrutinize the validity of our results. To the extent that individuals anticipate inheritances, they may act in advance, for instance by adjusting their pre-inheritance consumption. Our research design would detect such responses as they would manifest through a violation of the parallel trend assumption. Nevertheless, splitting the sample into deaths that are unexpected and those that are not reveals an absence of a difference between the parallel trends across those sub-samples (Appendix Figure C.36).[63] This suggests that individuals do not change behavior in anticipation of inheritances.[64]

Our research design exploits randomness in the timing of the inheritance receipt. However, the timing of the inheritance receipt may induce behavioral responses already while the parents are alive. In our design, the control group receives inheritances at a later age than the treatment group, but since the likelihood of receiving inheritances increases in age, heirs may be inclined to act in advance at later ages. It may also be the case that parents who live longer pass on more of their wealth to the next generation through inter-vivo transfers, generating a depletion pattern that would in part be driven by the control group receiving wealth before their parents die. Such responses may be particularly strong if the inheritance tax incentivizes inter-vivo transfers.

We first note that the Swedish inheritance tax was accompanied by a gift tax to prevent such responses. The same progressive scheme as for inheritances was applied to annual transfers that exceeded 10 thousand Swedish kronor for each donor, an exemption threshold lower than that for inheritance tax. In order to reduce tax avoidance by spreading transfers across time, taxed gifts within the last ten years were added to the inheritance tax base at the time of death. Therefore, the main strategy to minimize the total tax would be to distribute the gift payments across years far from death. The consensus in the literature is expressed well by Kopczuk (2013): "gifts appear to be significantly underutilized as a tax planning tool".

To further alleviate this concern, first note that the depletion pattern of inherited wealth begins right after the inheritance receipt (Figure 3). It seems unlikely that the control group acts on expected inheritances exactly when the treatment group receives inheritances. Second, Figure 2C shows a similar depletion pattern for wealth ranks in the pure time series, i.e. without the use of a control group. Third, unexpected deaths should not be preceded by anticipatory responses. Focusing on such deaths shows that the depletion patterns are similar for expected and unexpected deaths (Appendix Figure C.36).[65] Taken together, our results are not caused by behavioral responses within the control group.

Relatedly, individuals who live longer tend to be wealthier, implying that the control group receives larger inheritances. Differences in the level of parental wealth are not a threat to our identification strategy as long as they do not induce behavioral responses among the control group while

[63] We follow Andersen and Nielsen (2011) in defining unexpected inheritances as natural acute deaths, such as strokes or cardiac arrests, as well as unnatural deaths, such as accidents and violence.

[64] It could still be that the heirs anticipate bequests and would like to act on them in advance, but are cash-constrained and are not able to take any action. Another sample-split strategy, dividing heirs into liquidity-constrained and not displays no difference in the parallel trends across those two groups (Appendix Figure C.37). We therefore reject that most heirs are constrained but would like to act in advance.

[65] There is a difference in the depletion rate which we discuss in Section 5.2.

the parent is alive, of which we do not find any evidence. Moreover, Appendix Figure C.38 shows wealth trajectories for parents of same-aged children dying in 2003 and in 2009. Despite small level-differences, the parental wealth of those cohorts evolves in a similar way.

Finally, we investigate health patterns at the end of life for our parent generation, by studying hospitalizations during the years before death. This is useful for two reasons. First, it provides insights into how much parents spend on health care at the end of their lives. Second, the pattern of hospitalizations indicates how expected the inheritances are. Appendix Figure C.39 shows that the number of days in hospital and the likelihood of being hospitalized increase slowly until two years before death and then rise rapidly with a peak in the year of death. Hospitalizations are roughly four times more pronounced in the death year compared to two years before. With publicly provided health care, the cost of hospitalization in Sweden is capped at 100 SEK per day. This means that the average parent spends 1 thousand SEK on hospitalization in the year of death, or 1.7% of the direct inheritance effect on heirs.

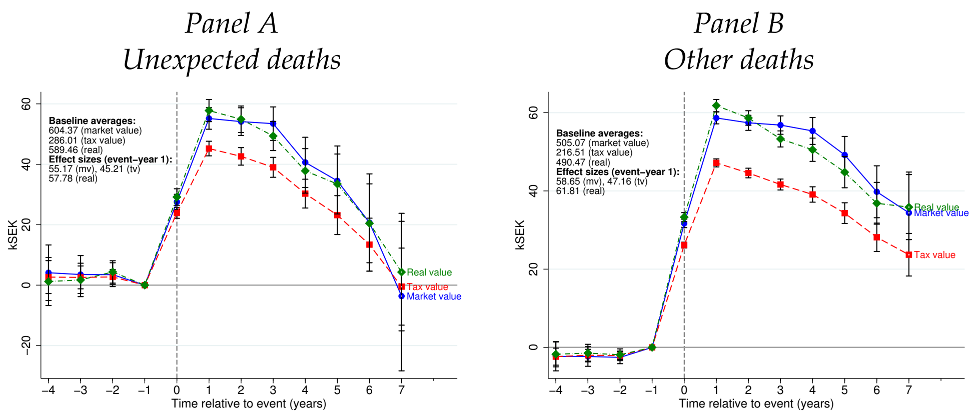


Figure C.36: The effect of inheritance on wealth, unexpected deaths

Note: This graph shows the effects of inheritance on wealth in thousand Swedish kroner (kSEK) for the subsample of children who lose a parent unexpectedly. We follow Andersen and Nielsen (2011) in defining unexpected deaths based on WHO's ICD-10 codes that we observe for each deceased parent. These conditions include natural deaths (such as acute myocardial infarction, stroke and cardiac arrest) as well as unnatural deaths (such as accidents and violence). 15% of all heirs lose a parent unexpectedly according to this definition. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of birth-years of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

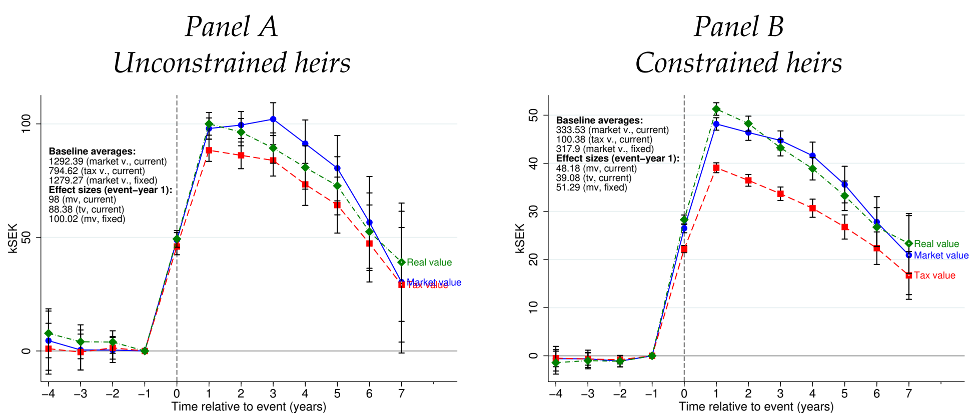


Figure C.37: The effect of inheritance on wealth, by liquidity constraints

Note: This figure shows coefficient estimates when estimating Equation 6 on wealth in thousand Swedish kroner (kSEK) separately for liquidity constrained heirs and unconstrained heirs. An individual is defined as unconstrained if the value in her bank accounts in 1999 exceeds 58 kSEK, the direct inheritance effect (see Panel A of Figure 3 and Table 2), in year 1999. All regressions reweigh the birth-year distribution as well as education level (4-categories) of each year-of-death-cohort non-parametrically to match the distribution of children who lose a parent in 2000. We omit event-time minus one as the reference period. Standard errors are clustered at the heir-level and the figures display 95% confidence intervals.

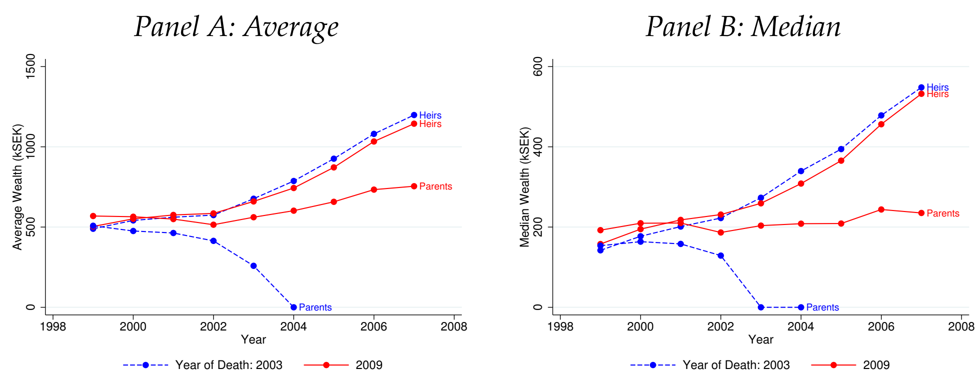


Figure C.38: Wealth patterns at the end of life

Note: This figure shows average (Panel A) and median (Panel B) wealth of parents and children by death year of the parents (either year 2003 depicted by the blue, dashed series, or year 2009 depicted by the red, solid series). The unit is thousand Swedish kroner (kSEK). We reweigh the birth-year distribution as well as education level (4-categories) of both year-of-death cohorts non-parametrically to match the distribution of children who lose a parent in 2000.

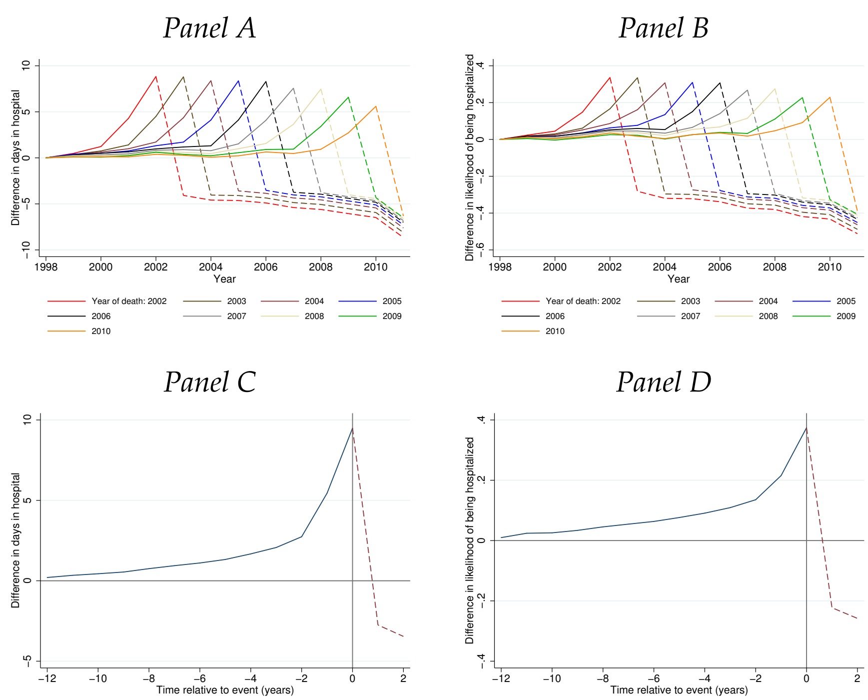


Figure C.39: Hospitalizations at the end of life

Note: Panel A shows the difference in average days in hospital per year between various cohorts of parents defined by year of death and parents who die in 2012. A hospital day is defined as a hospital visit that includes an overnight stay. The data include stays for all treatments. We reweigh the year-of-birth distribution of parents to match that of those parents who die in 2000. The dashed series indicate the difference for the period after death, which is the same as the negative of the number of days in hospital for the death cohort 2012. Panel B shows instead the difference in the likelihood of being hospitalized across years depending on the death year. Panels C and D show the same differences (again relative to parents who die in 2012), but here we instead pool all parents together and use time (in years) relative to year of death as the x-axis variable.

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