Inherited wealth over the path of development: Sweden, 1810–2016*

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Abstract: We estimate the importance of inherited wealth in Sweden over the past 200 years. Inheritance is measured both as the annual inheritance flow divided by national income and as the share of inherited wealth in all private wealth. In the nineteenth century, Sweden differs from France and the U.K. in having much lower inheritance-income flows, but at the same time exhibiting equally large shares of inherited wealth in total wealth. This pattern is in line with Sweden at the time being a poor country with low domestic capital accumulation, but at the same time exhibiting high economic growth rates. In the twentieth century the importance of inheritance in relation to national income fell, but since the 1990s it has increased rapidly, today reaching almost the same levels as a century ago. The share of inherited wealth in total wealth has also fallen over time, but remains relatively low due to a rapid accumulation of new wealth. We study potential determinants and explanations, pointing especially to Swedish welfare-state institutions, and in particular to the development of an extensive public occupational pension system contributing to keeping private inheritance low.

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1. Introduction

A fundamental question in economics is that of the relationship between inheritance and own effort in the determination of individual lifetime consumption possibilities. In very simplified terms: In the case of basic life-cycle models, individuals work and save so as to smooth consumption over time, but the origin of their wealth is assumed to always be their own effort. In the polar opposite case, individuals could, in principle, inherit all their wealth from the past and live of the returns to this without creating any new income.[1] Understanding where we stand between these extremes, and how this has changed over time, is the underlying question in this paper.

There are different ways in which one can try to quantify the importance of inheritance in the economy. One is to study the value of all bequests (including any prior *inter vivos* gifts) in a given year in relation to all income. Over time, such a ratio gives a measure of the relative importance of inheritance flows in the economy. Another is to look at all current wealth and measure how much of it that was inherited from the past and how much is a result of efforts by the current population.

The seminal work by Piketty (2011) focuses on the first approach and studies the inheritance flow in relation to income for France starting in the early nineteenth century. By developing new methods and collecting new data, he shows that the relative importance of inheritance flows has changed significantly over time. Inheritance was important throughout the 1800s, then it fell sharply in the first half of the twentieth century only to recover in the period after 1950. Atkinson (2018) produces corresponding inheritance flows for the U.K., starting at the beginning of the twentieth century and finds a similar pattern.

The second approach to inheritance, that focuses on the relative importance of inherited wealth and self-made wealth in the total stock of private wealth, was at the center of attention in the famous debate in the 1980s between Kotlikoff and Summers (1981) and Modigliani (1986, 1988), and it has recently been revisited, starting with Piketty (2011).[2] Piketty, Postel-Vinay and Rosenthal (2014) suggest a conceptually consistent way to resolve the controversy and use micro data from France to calculate the share of inherited wealth in total wealth. As their proposed way of calculating the share of inherited wealth in total wealth requires detailed micro data of a type that is not typically available, Piketty and Zucman (2015) suggest

[1] The very concepts of "inherited" and "own-effort" are, of course, debatable and require deciding on how to view the *returns* to inherited capital in relation to "own effort".

[2] A detailed discussion of the debate and its relation to recent work is given in the working paper version of Piketty (2011), see Piketty (2010).

a simplified, approximate, version based on the comparison between inheritance flows and savings flows. They show that their approximate method gives similar results for France as the series based on more detailed microdata. Recently this approach has been used in Alvaredo, Garbinti and Piketty (2017) to calculate the share of inheritance in aggregate wealth in some European countries comparing these to the U.S.

In this paper, we take both of these approaches to the case of Sweden. More precisely, we present annual estimates of inheritance flows in relation to national income as well as estimates of the share of inherited wealth in total private wealth in Sweden over the period 1810–2016. Our paper is closely related to parallel work by Waldenström (2016, 2017) that estimate the capital stock and the capital/income ratio in Sweden over this period, which are essential for estimating the inheritance flows that are the focus of this paper.[3]

Our results shed new light on several broad questions relating to the dynamics of wealth and inheritance. A first important set of findings concern the developments in the nineteenth century and the proposed dichotomy between "Old Europe" and America, a distinction which we show may not be so straightforward with respect to the role of wealth and inheritance. Work by Piketty and Zucman (2014) on long-run aggregate private wealth-income ratios – a key determinant of the importance of inheritance flows – suggests that accumulated "old wealth" was much more important in Europe than in the U.S. in the nineteenth century. A shorter history of accumulation, together with initial land abundance, explains why past wealth did not dominate new incomes in the U.S. and made it the "land of equal opportunity". In contrast, inheritance played a much more important role in aristocratic France and England, much due to the high capital/income ratio. Sweden, however, doesn't fit this particular aspect of being an "old European country". The estimates of private wealth-income ratios in nineteenth century Sweden in Waldenström (2017) find levels similar to those in the U.S. and, as we will see, this also translates into Swedish inheritance flows being less important than those in France and the U.K. before the twentieth century.

Quantitatively the differences are important. While inheritance flows in national income were around 20 percent in France and the U.K. throughout the nineteenth century up to the First World War, they were only about half of that in Sweden according to our main specification. The biggest contributor to this difference is a wealth-income ratio of 300–500 percent

[3] As will be made clear in Section 2 the capital/income ratio is an important ingredient in estimating the inheritance flows, but it does not in itself determine it. Inheritance also depends on mortality and on the distribution of wealth over the life-cycle, both of which change over time and, as will also be discussed, interact in important ways with policy.

in Sweden, similar to the U.S., but much smaller than the 600–700 percent found in France and the U.K. This difference, however, is not due to Sweden being a "frontier country" with cheap land and a short history of accumulation, at the time. Instead, the most likely explanation is the very low Swedish savings rate before 1900, being only a third of the ones in the larger U.S and French economies. As a consequence, Sweden simply did not accumulate the same levels of wealth before industrialization, resulting in low wealth-income and inheritance-income ratios. This relative lack of domestic wealth accumulation meant that when Swedish industrialization took off in the second half of the nineteenth century, it was largely financed by borrowing abroad (as can also be seen in the current account deficit at the time).

However, when we instead look at the ratio of inherited wealth to total wealth in the nineteenth century, this level is, in fact, even higher in Sweden than in France at the time and in this sense, Sweden looks very much like "Old Europe". Whatever wealth that existed before industrialization, it was for the most part inherited, although the amounts were still small in relation to income. This illustrates the potentially different interpretations that can be given to how important inheritance is in the economy; in nineteenth century Sweden inheritance flows were small in relation to income flows, but still important in the sense that most wealth in society was inherited.

Looking at the twentieth century, Swedish inheritance flows resemble those in France and the U.K., falling in importance until reaching historical lows in the decades after the Second World War. An interesting aspect is the similarity in the timing of this fall since Sweden did not take active part in any of the World Wars. One plausible interpretation is that this finding stresses the relative importance of institutional factors, such as capital regulation and taxation, over outright war destruction, in explaining the declining importance of inheritance in this period.

During the postwar decades, Swedish inheritance flows remained relatively stable and historically low. Since the 1980s, we see an upward trend that accelerates in the late 1990s and 2000s, but still remain lower than the levels observed in France. We also observe a wedge between different ways of estimating inheritance flows in Sweden. We believe there are several reasons for these observations, all in various ways relating to aspects of the Swedish welfare state. We discuss them in more detail in Section 4, but to exemplify, it seems that Swedes above the age of 65 have lower individual private wealth, and also that they seem to be running down their wealth faster than their likes in France and the U.K. do. This is consistent with Swedes placing more faith in the government in terms of providing insurance for old age. Furthermore, a large part of the lower inheritance flow in Sweden comes from the

lower level of *inter vivos* gifts in Sweden. This is consistent with welfare state arrangements that could explain why parents do not necessarily transfer wealth to children during life to the same extent in Sweden as in many other countries. For example, university education is heavily subsidized (and tuition-free), as is student housing, and there are generous, non-means tested transfers and student loans. While similar arrangements exist in other countries as well, their universal character is likely to make saving for children's education (or housing) less common in Sweden.

Our analysis also makes some important methodological observations that have only been touched upon in the previous literature. One is about how much of private-sector wealth in modern welfare states that is actually bequeathable. Since the 1990s, an increasing fraction of private financial assets takes the form of occupational pension funds and insurance schemes.[4] For many of these assets, individuals can choose between receiving a higher return when retiring, or saving some returns to be passed on to named beneficiaries after a person dies. The latter choice results in an intergenerational transfer that can be considered as inheritance, but it is rarely recorded in estate inventory reports and therefore not visible in inheritance measures using fiscal statistics. If one instead chooses not to name beneficiaries, wealth that has not been paid out at the time of death is "inherited" by everybody else in the collective scheme. Needless to say, such inheritances do not appear on estate inventories either. In short, some "collective" private wealth is not necessarily bequeathable in the same way as individually held private wealth, potentially creating a wedge between different ways of calculating the inheritance flow.[5] In terms of methodology, this means that multiplying private wealth with mortality and the ratio of the average wealth at death to that of the living (the so called "economic flow") should not necessarily be expected to yield the same result as inheritance observed in estate returns (the so called "fiscal flow"). We discuss this in more detail for the case of Sweden in Section 3.6.

Another observation about the role of institutions is the incentives to avoid taxes on inheritance, gift and wealth, leading to potentially sizeable parts of private wealth not being visible in official, tax-based statistics. The magnitude of tax avoidance or tax evasion has likely

[4] There is considerable wealth in the Swedish occupational pension funds. As reported in the Appendix, occupational pension wealth corresponds to more than 80 percent of GDP. Occupational pension wealth is even more important in the United Kingdom, the Netherlands, Switzerland, and Denmark. In Germany, France, Italy, and Spain, on the other hand, occupational pension wealth is negligible.

[5] In addition, there are of course substantial amounts of wealth that have been accumulated in the form of government pension wealth that substitutes for individual savings. Using the data of Waldenström (2016), Hasselberg and Ohlsson (2016) show that the importance of such wealth has increased considerably since 1950. Presently collective private financial assets constitute about 50 percent of total private financial assets. Collective private financial assets correspond to a third of private net wealth.

varied over time along with the level of inheritance taxation and the costs of moving capital across country borders, but estimates from Sweden indicate that it may have had a notable effect on estimated overall inheritance flows.[6]

Taken together, these points suggest an interpretation of alternative estimates for inheritance flows as being upper and lower bounds of the "true flow", keeping in mind that the interpretation of what constitutes inheritance may be different in the Swedish setting. These insights are potentially important for further cross-country comparisons of the role of inheritance flows in the economy.

The rest of the paper continues with the estimation of inheritance flows in Sweden in section 2, and of the share of inherited wealth in total wealth in section 3. In section 4, we compare these estimates across countries by making decompositions and proposing possible explanations. Section 5 concludes.

2. The flow of inheritance as a share of national income

2.1 Conceptual framework

Our objective is to estimate the annual flow of aggregate inheritances B in relation to national income Y, denoting this ratio as $b_Y = B/Y$.[7] By "inheritance", we mean the annual total market value of all real and financial tangible assets less financial debt that is passed on at death or transferred as *inter vivos* gifts.

As shown in Piketty (2011), there are basically two ways in which we can estimate the inheritance-income ratio b_Y. One is based on using estate probate inventory data to directly measure how much is passed on as inheritance. Unfortunately, Swedish inheritance tax and

[6] Roine and Waldenström (2009) accumulate the net errors and omissions in the Balance of Payment statistics to get a rough estimate of offshore capital, and these stocks are between one sixth and one third of national income in the 1990s and 2000s. This level of wealth is potentially very important for measures of wealth concentration, assuming the wealth belongs to the very top group but the impact on the aggregate flow is much smaller. A recent estimate by Alstadtsaeter, Johannesen and Zucman (2018) using data from tax havens and national accounts suggest similar levels for Sweden.

[7] Our preferred measure of national income is the net national product (NNP). NNP is GDP minus the depreciation of the capital stock plus net factor income from abroad. An alternative income concept to national income would be disposable income, i.e., national income net of taxes and transfers. Using national income or disposable income is of some quantitative importance given the rise of government involvement over the twentieth century, but, as pointed out by Piketty (2010, p. 2) which one is to be preferred ultimately depends on perspective. We are concerned with the ratio of "old" to "new" wealth amongst individuals and one could therefore argue that disposable income is best. However, this would be assuming that government expenditures are useless to individuals. If one views government spending as mostly a substitute for things that individuals would otherwise have had to save and pay at least the same for on the market, then national income seems the better choice.

estate data are too scarce to allow us to follow this approach in a systematic manner. Nevertheless, we present estimates based on a handful of years for which such direct observations of inheritance flows are available.

The second way is to compute b_Y from the structural macroeconomic relationship between the ratio of the aggregate stock of private wealth W to national income Y, a ratio labeled β, the ratio of the average wealth of those who pass away to the average wealth of the living, μ, and the rate at which people pass away, i.e., the mortality rate, m. This is our main estimation procedure. We wish to include all intergenerational wealth transfers, both bequests at death and *inter vivos* gifts transferred during the donor's lifetime, and therefore use a gift-corrected μ ratio denoted μ^*. Our baseline series, calculated annually for the period 1810–2016, is thus the gift-corrected annual inheritance flow given by

$$b_Y = \beta \cdot \mu^* \cdot m\,. \qquad (1)$$

In the following, we examine each of these three components explaining how they are estimated and how they have evolved in Sweden over the past two centuries. A full description of the construction of the dataset can be found in our online appendices.

2.2 Wealth-income ratio (β)

The ratio between private wealth and national income shows how many years of income that are needed for the economy to reproduce all of its household and corporate net assets. Piketty (2011) and Piketty and Zucman (2014) present a simple accounting framework for analyzing changes in the wealth-income ratio, decomposing real wealth growth into saving and capital gains components. They also use the classical Harrod-Domar-Solow model to show that it is possible to express the steady-state level β as the direct relationship between the net private saving rate s^n and the income growth rate g, i.e., as $\beta = s^n/g$.[8]

Data on the aggregate wealth-income ratio β for Sweden comes from a newly constructed annual national wealth database (Waldenström, 2016, 2017), covering the full balance sheet of Swedish households and the corporate stock for the period 1810–2016. These data series follow the main principles of international national accounting standards (ESA 2010 and

[8] Piketty (2011) and Piketty and Zucman (2014, 2015) show how this expression holds for a number of models using different savings motives.

SNA 2008) and the structure of the Piketty and Zucman (2014) database. Private wealth is defined as the sum of market-valued non-financial assets (mainly buildings and land) and financial assets (mainly deposits, shares and collective life insurance and pension assets) minus the sum of liabilities. All series are constructed from observed stocks in historical official sources, e.g., tax assessments and banking statistics, and different works by historians and economic historians. From 1980 onwards, data are based on Statistics Sweden's official national wealth statistics. Pension assets are included in private wealth to the extent that they are funded, i.e., part of accounts-based defined contribution systems. Unfunded pension assets, defined as the present value of expected future pension income, are not part of our baseline definition of private wealth W.

Figure 1 depicts the development of the private wealth-income ratio β in Sweden during the two hundred year-period 1810–2016 expressed in decennial averages. Table 1 shows the roots of this observed β along two dimensions. The first is to decompose the average annual percentage growth of the wealth-income ratio into the real growth of national wealth and of national income. The second is by decomposing the real wealth growth into two components, using a simple wealth accumulation model: private net saving (which includes both household and corporate saving net of capital depreciation) and capital gains. In the pre-industrialization era up to 1870, β increases from around 300 percent to 400 percent. Private savings were low in this period, only a little over two percent per year, and three quarters of the wealth growth came from capital gains in the housing and emerging stock markets. In the period after 1870, often described as the beginning of the industrial revolution in Sweden, the capital stock begins expanding faster than the economy grows; average compounded annual GDP growth was over two percent 1870–1910 whereas average compounded annual growth in private net wealth was 2.7 percent in the same period. As a result, β grew to about 450 percent in the beginning of the twentieth century, mostly due to asset price increases and less due to accumulated private saving. This development thus reflects a number of fundamental changes in the Swedish economy, such as the expansion of industrial production and the infrastructure associated with it, in particular the rise of urban housing structures, and the emergence of a financial system (financial assets as share of national income increased from one half in 1870 to almost three over just forty years).

[Figure 1 about here]

[Table 1 about here]

The wealth-income ratio during the twentieth century turned in the opposite direction, following a steadily decreasing trend, reaching a historical low at around 200 percent in the early 1980s. There are many potential explanations to this dramatic decline of private wealth. First, income growth accelerated in this period, averaging between 3.2 percent per year in the 1910–1950 period and 3.3 percent per year in the 1950–1980 period. One reason for this income growth is the marked expansion of educational attainment in Sweden, with especially secondary education becoming accessible to the majority of the population. Second, real wealth grew much slower than real income did. Table 1 shows that this was not primarily due to low private saving as in the nineteenth century; in fact, private saving was around 5–6 percent in the first half of the century. Neither was it due to World War-related capital destruction as seen in several continental countries (Piketty and Zucman, 2014), simply because Sweden stayed out of both of these wars. Instead, it appears that capital losses in asset markets account for the major part of this decline. While we cannot fully disentangle all relative price developments, they appear to be driven by a combination of increased supply of private housing pushing down property prices and, perhaps most importantly, rigorous postwar regulations of private market activities and increased taxation of profits and other forms of capital income (Waldenström, 2016).

A third explanation of the downward trend in twentieth century private wealth could be related to the expansion of the welfare state. Some point to the rising regulation and taxation as main reasons behind slower private wealth accumulation.[9] Others rather emphasize the rise of universal social security systems and publicly provided welfare services. The total effect from all these on aggregate private wealth has not been fully examined, but several researchers have found indications of crowding out of private savings.[10] In Section 2.6, we will discuss the potential impact of different ways of treating pension wealth and the impact on private wealth.[11]

Since 1990, the private wealth-income ratio has increased quickly and doubled its level in a mere twenty years. Most of this increase wealth accumulation arises from saving, and as shown by Waldenström (2016), primarily saving in the corporate sector, whereas households saved much less in this period. A notable change since 1990 is also the increase in private insurance wealth and occupational pension wealth. These are clearly part of private sector

[9] For an overview of twentieth century capital income taxation, see Du Rietz, Johansson and Stenkula (2015) and Du Rietz and Henrekson (2015) on the evolution of Swedish wealth taxation.
[10] See, e.g., Chetty et al. (2014) for a study of Denmark.
[11] See also the analysis in Waldenström (2016).

wealth but are not assets that individuals control and, at least part of this wealth, is not individually bequeathable as we will discuss more below.

2.3 Average wealth of the deceased over average wealth of living (μ)

The parameter μ^* is the gift-corrected ratio of average wealth of the deceased, $\bar{W}_d$, to the average wealth of the living, $\bar{W}_l$. It is the most difficult parameter to estimate in equation (1). Unlike in the case of France, where the wealth of the deceased is observed directly through large samples of estates alongside reported stream of taxable gifts, the Swedish μ is constructed using historical evidence on age-wealth profiles in the living population combined with age-specific mortality rates (adjusted for differences across social classes) as follows:

$$\mu = \frac{\bar{W}_d}{\bar{W}_l} = \sum_a \frac{M_a}{M} \left(\frac{\bar{W}_{l,a}}{\bar{W}_l} \right) . \qquad (2)$$

The challenging part in equation (2) is the average wealth of the deceased, $\bar{W}_d$. This is not directly observable (as we lack sufficient data on estates) so we calculate it by combining observed information about the average wealth of living individuals at each age a, $\bar{W}_{l,a}$, with information about adult death rates at the same specific age, M_a, and for the whole adult population, M. Taken together, this allows us to compute the age-specific average wealth of the deceased, $\bar{W}_{d,a} = (M_a \cdot \bar{W}_{l,a})/M$. When summing over a and then normalizing this expression by the average wealth of all living, we get the μ ratio for the whole population as shown in (2). We call this approach, originally proposed by Wolff (1996) and Poterba (2000) to study estate tax avoidance and evasion, the *inverse mortality multiplier method* (IMMM) with obvious reference to the more commonly used mortality multiplier method; instead of multiplying the wealth of the deceased by inverse mortality rates, we multiply the wealth of the living by the mortality rates.

We need to adjust for social mortality differentials in doing the IMMM estimation. Wealthy people typically live longer than the poor and this calls for an adjustment of the observed death rates across social classes when computing the average wealth of the deceased. Ignoring such an adjustment would attribute too high death rates to the wealthy individuals, which, in turn, would generate too large inheritance flows. Assigning the correct mortality risk is a challenging task and different assumptions have been shown to give a wide range of results

(see Kopczuk, 2013, and references therein). We use an approach in which we separate between two broad groups in the population: "the rich" (the ones owning most of private wealth and having markedly lower mortality rates than the rest of the population) and "the rest" (those owning a small share of all private wealth and having higher mortality rates than the rich). Each group is assigned a specific mortality rate based on historical sources. Data on wealth-mortality gradients are available as early as 1910 (Finansdepartementet, 1910) and recent work by Bengtsson and Dribe (2011) presents evidence on broader socio-economic gradients in Southern Sweden, covering almost the full time-span of our analysis, while Hederos et al. (2017) present mid-life income gradients at a yearly level since 1970 (for details about our methodology, sources and references see Online Appendix B). We end up using the wealth-mortality gradients reported in Finansdepartementet (1910) for the entire period. Having a constant gradient may seem surprising given how much the economy changes over this period but is based on the available evidence, presented by Bengtsson and Dribe (2011) and by Hederos et al. (2017). In both these sources, there are small trends in social differences in mortality (even if overall mortality has declined as shown below). Our choice to use only two population groups to capture the mortality gradient is also motivated by the historical data. To begin with, they are what we observe directly in our main source, Finansdepartementet (1910). Second, while both Bengtsson and Dribe (2011) and Hederos et al. (2017) provide estimates for up to five social classes (though differently defined in the two cases) there does not seem to be any substantial mortality differences across the classes that are contained within the broad population.[12] As it turns out, our correction is quite similar to what Piketty (2011) uses for France, with two similar population groups and constant mortality rates over the full period. However, unlike Piketty, we allow the actual wealth shares of the rich to vary along with the observed levels reported by Roine and Waldenström (2009) and Bengtsson et al. (2018).[13]

Historical evidence on actual age-wealth distributions in Sweden is scarce. We have assembled all information known to us from Censuses and previous scholarly work about the average wealth of Swedes for different age classes, $\overline{W}_{l,a}$, yielding a database with age-wealth distributions in nine different periods between the 1840s and the mid-1960s and annually

[12] Hederos et al. (2017) do find that the lowest 20 percent has experienced a slightly lower increase in life expectancy since the 1970s, which is an interesting finding, but not one that would have an impact on our results.

[13] In online Appendix B3 we also check the sensitivity of our results for making alternative assumptions about the mortality gradient. The bottom line of these sensitivity tests is that our results do not change much.

since 1968 based on administrative tax records.[14] These observations are described in detail in Online Appendix A.[15] Since our final aim is to compute annual observations of μ^* over the entire period 1810–2016, as opposed to the few points in time for which we observe the age-wealth profiles, we simulate historical age-wealth profiles by using fitted values from linear regressions where the ratio $\bar{W}_{l,a}/\bar{W}$ is regressed on a polynomial of degree j (up to 4) in age and calendar year:

$$\left(\frac{\bar{W}_{l,a}}{\bar{W}_l}\right)_t = b_0 + b_j \sum_{j=1}^{4} Age_{a,t}^{j} + c_j Year_t + d(Age_a * Year_t). \quad (3)$$

The fitted values from the regressions of equation (3) are inserted into equation (2), yielding the parameter of interest, $\hat{\mu} = \sum_a \left[(M_a/M)(\widehat{\bar{W}_{l,a}/\bar{W}_l})\right]$.[16]

Gift correction, finally, allows us to go from μ to the parameter of interest, μ^*. Accounting for transfers made in the form of *inter vivos* gifts before the time of death is crucial and we calculate the ratio of gifts to inheritances, υ, to finally get $\mu^* = (1 + \upsilon)\mu$. Our main approach for the correction is to calculate the ratio between gift tax revenue and inheritance tax revenue annually, using annual revenue data from Ohlsson (2011). This is the same approach that Piketty (2011) used for France. This procedure results in gift ratios between 5 and 20 percent. For a few years (2002-2004), we also observe the total taxable gift amounts and they are in this period close to 20 percent of the aggregate estate values, which is also what we get when tax revenues and also close to evidence in a contemporaneous survey of gifts and inheritances reported in Nordblom and Ohlsson (2011).

An additional gift correction-adjustment is made for parental saving to under-aged children in the form of regular deposits into designated accounts aimed for the children's use later in life. Such transfers have received little attention in the previous literature, yet it may account

[14] Note that this yields comparable wealth concepts in $\bar{W}_d$ and $\bar{W}_l$. Specifically, we cannot use the aggregate private wealth W divided by the adult population for estimating $\bar{W}_l$ since the aggregate private wealth is both market-valued and consists of items not always included in the tax-based wealth concepts used in the age-wealth distributions reported by the Censuses or estate tax return-based nineteenth century estimates.

[15] Specifically, the historical sources (before 1968) report the wealth of people divided into between four and 13 age classes. All sources are based on the entire Swedish adult population except for our data from the nineteenth century, which is based on a rich estate sample of deceased in a Southern parish (Perlinge, 2003). See Online Appendix A for a detailed description of all historical age-wealth distributions.

[16] In section 4 below we also present a robustness calculation of μ^* for the years when we directly observe the wealth distribution over age, i.e., where we do not use the fitted values for the age-specific ratio of the average wealth of the deceased to the average wealth of the living but instead the observed ratio calculated for the specific year.

for non-trivial amounts. A survey made annually or bi-annually since 2005 by one of the largest Swedish insurance company (Länsförsäkringar, 2016) shows that about 80 percent of parents makes such regular deposits and their average amount lies around 500-600 euros per child and year. While this is lower than the gift tax threshold (which was approximately 1000 euro), when aggregated for all children, these savings amounts in 2005 to roughly 15 percent of the total estate value, i.e., having about the same relative importance as all taxable gifts. Looking over the period 2005-2016, the surveyed amounts represent about 5 percent of the total net saving of households. We therefore add the estimated non-taxable gifts, equal to 5 percent of personal net saving, to the taxable gifts observed in the fiscal statistics in our final gift correction.[17]

Figure 2 depicts the evolution of μ and μ^* in Sweden, which are based on the IMMM-estimations from historical and modern age-wealth data and gift-corrections, using gift tax data and personal saving-based estimations of parental transfers after 1980. Table 2 decomposes the relative contributions of changes in average wealth of the deceased and of the living to these trends. In terms of level and development during the 1800s, we note that the Swedish series are in line with what Piketty (2011) finds for France.[18] We also note that, like in the French data, in terms of cross-sectional age-wealth profiles these are rising for all observations until the late 1960s. This could, at least in some cases, be an artifact of only observing broad top age groups. Overall, however, clear life-cycle decumulation does not seem to be present in Swedish data until the late 1960s when profiles become hump-shaped.

[Figure 2 about here]

[Table 2 about here]

The decline in the late 1800s up until the 1930s, is consistent with what Roine and Waldenström (2009) have found in previous research on Swedish wealth concentration. Over this period, the wealth share of high-income individuals increases and in terms of wealth over age profiles relatively younger cohorts are accumulating new wealth while the share of older "rentiers" is declining.

[17] We only make this addition for years in the post-1980 period since we are uncertain about the representativeness of the surveyed amounts for parental behavior in the earlier period.

[18] It should be noted that the similarity is referring to the final series used. The trend for France changes when taking gifts into account. For Sweden we simply do not have data to capture any differences in gifts over the nineteenth century so the correction is basically the same factor throughout this early period based on late nineteenth century data.

The clear upward trend that we observe from the 1930s until the 1970s indicates that the relative wealth held by those who pass away rises compared to the living population. Looking at the Swedish institutional context during this period, incentives to accumulate private wealth were weakened. In part, this was due to anti-capitalist policies (like in France) of high taxes on wealth and inheritance, but a consequence of the build-up of the Swedish welfare state where private wealth accumulation for precautionary reasons became less important.[19]

In the most recent decades, the μ ratio has been relatively stable. There is an up-turn in the 1980s that fits the general picture of asset values increasing more rapidly than income and these increases largely being captured by relatively younger generations (see Roine and Waldenström, 2012).[20] Still, the ratio falls somewhat in the 1990s and 2000s. This could reflect that many of the appreciated assets are still in the hands of the living. In terms of the impact this has on inheritance flows it could then be a situation where there is a lagged impact of the asset price inflation in the sense that values held by the living population are still to be passed on to the next generation.

We also examine how the different historical estimates of a Swedish wealth-mortality gradient would influence the μ ratio. Figure 3 shows the four scenarios discussed above: our baseline series, a series using the Attanasio-Hoynes U.S. gradient, a series using our estimates plus an assumed equalization due to the gradual emergence of Sweden's welfare state, and finally a series without any gradient. The message from this comparison is that the largest effects appear in the nineteenth century, when mortality differentials were relatively large. By contrast, when approaching the end of the twentieth century, the role of wealth-mortality gradients vanishes as they become relatively small regardless of underlying estimate.

[Figure 3 about here]

2.4 Mortality (m)

The conventional view of a demographic transition when a country goes from being agrarian to industrialized and later post-industrialized fits the Swedish data fairly well with some important exceptions. Bengtsson and Ohlsson (1994) emphasize that the drop in child mortality

[19] A simple mechanistic model of decisions about life time savings, where "re-optimization" is more difficult the older you are would suggest a pattern – much like a demographic transition – where the wealth of the living is lowered relative to the old (those who die) until a new steady state is reached. The process should take about a generation to complete, which in line with the gradual increase over roughly a 40 year period.

[20] We double-check the simulated μ^* during the period 2000–2007 for which we can compute it using annual micro-data on individual wealth in the administrative Wealth Register at Statistics Sweden. The result is comforting, showing a clear similarity between simulated and actual μ^* (results available upon request).

in Sweden happens *before* industrialization, with average rates being slightly below those in richer countries such as France and the U.K. already in the first half of the nineteenth century. With industrialization taking off around the 1870s, child mortality dropped even further, much as a result of better nutrition, medicine and hygiene. Fertility, on the other hand, remained relatively stable throughout the nineteenth century and only started to drop in the beginning of the twentieth century. Together these trends caused rapid population growth in the nineteenth century and much smaller increases in the twentieth century, with the demographic transition being completed in the 1930s.

Our focus here, however, is not on the overall demographic changes but, for obvious reasons, focused on changes in *adult mortality*. Data on population mortality are available for all years 1810–2016 in the Human Mortality Database (see Online Appendix B for details about data and calculations). Specifically, for each yearly age a we observe the number of adult deaths M_a and the number of living adults N_a. Age-specific mortality rates are then computed as $m_a = M_a/N_a$ and the adult population mortality rate equals $m = \sum_a M_a/N_a$.

As shown by Figure 4, we see a sharp fall for at least the first half of the nineteenth century with a flattening out in the latter half. It is not clear what drives this as some of the advances that lowered child mortality should also have benefitted the adult population. On the other hand, the latter half of the century was the period when episodes of economic hardship led to mass-migration to the U.S. also reflected in the Swedish mortality rates. Starting in the early 1900s, adult mortality continues to fall until the 1950s when the trend flattens out. In relation to other countries, the Swedish adult mortality trend is similar, with the slight exception that its mortality drops earlier than in many other countries that were richer at the time.

[Figure 4 about here]

2.5 Inheritance flow as share of national income ("economic flow")

Equipped with the annual series of the wealth-income ratio β, the gift-corrected ratio of average wealth of the deceased to the average wealth of the living, μ^*, and the mortality rate, m, as explained above, calculating the annual inheritance flow b_Y is simply a matter of applying the formula $b_Y = \beta \cdot \mu^* \cdot m$ given by equation (1).[21]

[21] Note, again, that we do not observe everything on an annual basis. The wealth/income ratio is yearly and so is the mortality rate, but the ratio of wealth at death over wealth of the living population, μ^*, is estimated as explained in section 2.3 above. Section 4 contains series based only on actual observed data.

The resulting long run moving average inheritance flow in Sweden is shown in Figure 5.[22]

[Figure 5 about here]

The overall long run trend seems relatively clear. The average inheritance flow is relatively flat at around ten percent of national income throughout the nineteenth century until around 1910. It then falls sharply to about five percent around 1950 at which it stays until around 1970. During the 1990s aggregate inheritance flows increase quite distinctly, reaching a level in the 2010s at about eight percent of national income, a level not seen since the interwar period.

Now the question is how we can understand what drives these movements. We will return to this question in more detail when comparing our final series to those in other countries, but as a first step it is useful to decompose the changes according to the relative contribution of the three components that make up the annual inheritance flow equation. Table 3 shows the average annual percentage change in the inheritance flow (Δb_Y) over different time periods with contribution from the change in the wealth-income ratio ($\Delta\beta$), the ratio of average wealth of the deceased and the living population ($\Delta\mu^*$), and the mortality rate (Δm).

[Table 3 about here]

The decomposition in Table 3 shows that in the nineteenth century an increasing wealth-income ratio is balanced by a decreasing mortality rate, resulting in a stable inheritance flow. It also shows that the main contributor to the sharp drop in the first half of the twentieth century comes from the sharp decline in the wealth-income ratio. This, together with a continuing fall in mortality until 1950, is what drives the decline in inheritance.[23]

After 1950, the wealth-income ratio continues to decline as growth accelerates even further but its impact on the inheritance flow is cushioned by an increase in the average wealth of those who die in relation to the average in the living population. After 1980, the increasing wealth-income ratio boosts the predicted inheritance flow but the impact is again mitigated by the average wealth of those who pass away in relation to the living population but now in the other direction. This could be indicating either a change in retirement spending or that

[22] The volatile short run annual estimates are shown in Appendix A (figure A11).
[23] The reasons for the movements in the wealth-income ratio are discussed above in section 2.2.

new wealth that has been accumulated since the 1980s is still to be passed on to the next generation.

We also examine the role of different wealth-mortality gradients, studied above, for the estimated aggregate inheritance flow. Figure 6 the result of this exercise is that the overall historical trend does not change much with respect to these three cases. All cases show relatively high levels in the 19th century and a U-shaped pattern during the 20th century. The 19th century inheritance flow is notably smaller, as expected, when we impose starker wealth-mortality gradients. This reflects that a smaller share of the deceased were rich, and thus that a smaller share of the transferred wealth came from the rich and, in turn, that smaller wealth flows in general were transmitted from the dead to the living. The 20th century differences are smaller because of smaller overall age-mortality differentials, lower mortality in general, and smaller wealth differences between rich and poor, all of which imply a lower importance of the mortality-wealth gradient.

[Figure 6 about here]

2.6 A direct inheritance tax-based measure of the inheritance flow ("fiscal flow")

We have also tried to determine the size of inheritance flows by measuring them directly from estate data, which Piketty (2011) did for France in what he called the "fiscal flow". As already mentioned, Swedish data on estates are more scattered and of lower quality (at least more difficult to compare over time) than those available for calculating the economic flow estimates. We therefore view the estate-based series mainly as a robustness-check of the previous findings. Online Appendix C contains more details about Swedish estate tax data and exactly how we deal with each source of information.

Despite a requirement to file estate inventory reports (or probate records) in Sweden since 1734, there are very few statistical compilations of these.[24] In our search for previous aggregations of the estate and inheritance, we have found a publication by the Finance Ministry (Finansdepartementet, 1879) showing the aggregate values of estates during 1873–1877, a detailed account by the Finance Ministry of estate reports for the years 1906–1908 (Finansdepartementet, 1910b) and one on inheritances for the same years (Finansdepartementet,

[24] The historical reports are kept by local courts and in regional archives. In 2001 the responsibility was moved to the Swedish Tax Agency, which now registers all estate reports in the Inheritance Tax Register but as the inheritance tax has been abolished this database is, unfortunately, incomplete with respect to economic variables after 2005.

1910a), a government commission on taxation (SOU 1946:79) with aggregate data on estate inventory reports for the years 1943–1944, a government commission on inheritance tax (SOU 1957:48*)* over similar data for the broken calendar year 1954/1955, and yet another government commission on capital taxes (SOU 1969:54) with an ambitious study of estate inventory reports registered in 1967, and finally the recent administrative estate database for Sweden called Belinda giving detailed information on bequests and taxable gifts for 2002–2005. Altogether, these sources allow us to estimate direct inheritance flows in a few years.

Gift correction should be done in the same way for the fiscal flow as for the economic flow, but before doing so we need to adjust what we observe in the Swedish estate data somewhat. In particular, especially in recent years, there are assets that are inherited but which we know are never included in estate records. Applying the same multiplicative gift-correction factor to a total, which we know is too low, will automatically make the gift correction too low (in absolute terms). Collective and individual life insurances and funded occupational pensions have grown in importance and they almost never show up on estate records. Unlisted family firms' value was heavily subsidized when reported in estates, but even so they hardly ever show up since they are generally sold (or transferred to children) long before the owner's death. In order to account for this, we back out the estimated size of the inheritance flow of these specific assets (using the economic flow formula with a W only containing the assets in question) and add them to the observed estate values (details are given in online Appendix C). Then we apply the gift correction similarly as for the economic flow estimates above.

Figure 7 shows both the gift corrected fiscal flow estimate based on the raw estate values as well as the fiscal flow estimate, which includes the items typically not included in estate values. These are then compared to our main economic flow estimate from the previous sections as well as to an economic flow estimate without items in total private sector wealth that may not be transferred between generations, aiming to get as comparable series as possible. Together these different estimates give bounds on the potential errors we may make depending on different assumptions.

[Figure 7 about here]

Figure 75 illustrates that the direct inheritance measure was close to the economic flow during the 1870s and the early 1900s. The fiscal flow then became considerably smaller than the economic flow during the 1940s, the 1950s, and the 1960s, especially when using the raw estate data. Our latest observations suggest that the fiscal flow has increased the last decades, but again the fiscal flow is much smaller than the economic flow. When adding items we

believe to be missing in raw estate data, we get closer to the economic flow estimates but the estimated flow is still lower.

In addition to the concerns that estates, especially in recent times, systematically exclude parts of true inheritance, tax non-compliance is another primary candidate for explaining the gap in the series. This interpretation is supported by the fact that the early observations (1873–1877, and 1906–1908) are similar for the economic flow and fiscal flow estimates, while the later observations starting in the 1940s, when taxes are much higher, show larger differences. That tax planning was an issue already in the 1940s is clearly visible in a massive spike in gifts in 1947 when increased taxes on inheritances, estates, and wealth were about to be implemented in the following year (see Ohlsson, 2011 and Online Appendix C for details). More generally, one way of avoiding inheritance and gifts taxes for a parent was to annually transfer a gift amount to each child at the exemption level for the gift tax. Anecdotal evidence suggests that this type of tax planning was common.

Our overall conclusion from trying to estimate the inheritance flow using fiscal flow estimates is, in the end, that the overall long run trend is confirmed. However, we do note that there is considerable uncertainty about the precise levels of these flows in recent decades.

3. Share of inherited wealth in aggregate wealth

A long-standing issue in the analysis of intergenerational transmission concerns the importance of accumulated past inheritances W_B in relation to the existing stock of private wealth W. In a famous debate, Modigliani (1986, 1988) and Kotlikoff and Summers (1981) and Kotlikoff (1988) presented different, and widely diverging, estimations of the share of inherited wealth in total wealth, $\varphi = W_B/W$, using U.S. data from the early 1960s. Modigliani measured W_B as the sum of all past inheritances, accounting for inflation but otherwise assuming that any capital returns are consumed away, which produced a φ of 20–30 percent. Kotlikoff and Summers, on the other hand, argued that one should add a rate of return to capital (proxied as the average GDP per capita growth) to the accumulation process, and found that φ was 80–90 percent.[25]

[25] Kotlikoff and Summers also made some other assumptions that were different from Modigliani's, such as viewing parental expenditures on education as part of inheritance and regarding consumer durables as consumption rather than saving. The most important factor in the competing views, however, comes from how to think about returns to inherited capital; see Blinder (1988) for a review of the debate.

Both these approaches have the drawback of applying some fixed return (in Modigliani's case a zero return) to the sum of all inheritance flows. In reality, of course, the wealth accumulation process is made up of a mix of saved (or invested) inheritance and new accumulation from labor savings. To account for this Piketty, Postel-Vinay and Rosenthal (2013) proposed an alternative, allowing past inheritances to grow over time with some rate of return but also acknowledging that some fraction of inheritances may be diverted through consumption, bad investments, or some other reason, as well as allowing individuals to accumulate out of labor incomes. In their framework individuals are either "inheritors" or "savers" depending on if they die with more or less than the capitalized value of the inheritance they received from the previous generation (on average 30 years earlier).[26] Having access to individual data of both how much was inherited as well as how much was left behind at death they can calculate the share of inheritance in total wealth from actual individual observations.

Their method, however, requires detailed data of a sort that is typically not available. Piketty and Zucman (2014) therefore suggest a simplified version based on aggregate bequest and savings flows. Assuming that the propensity to save is the same regardless if the source of wealth is inheritance or labor income on can attribute a fraction $\varphi\alpha$ of the saving rate s to the return to inherited wealth, and a fraction $1-\alpha(1-\varphi)\alpha$ should be attributed to labor where α is the capital share and $(1-\alpha)$ is the labor share of national income. Assuming the economy is in steady state, rearranging gives the following simplified formula for the share of inherited wealth in total wealth as a function of aggregate flows:

$$\varphi = \frac{b_Y}{b_Y + (1-\alpha)s} \ . \tag{4}$$

Piketty and Zucman emphasize that this formula is a simplification in many ways. In particular, the economy is typically not in steady state so it is important to base calculations on long run (moving) averages of b_Y, s and α. Importantly though, given the individual level data estimates of φ in Piketty, Postel-Vinay and Rosenthal (2013) they can compare these results to the simplified equation (4). They find that the simplified formula tends to underestimates the micro-data based share of inherited wealth by between a tenth and a fifth.

[26] In their framework, the decisions between these two points is irrelevant; leaving more than you inherited makes you a "saver", even if the result would be due to, for example higher than average returns on the inheritance; leaving less than inherited makes one an "inheritor" (even one in fact gave away everything one inherited and then built a larger fortune over life.

In the absence of the kind of micro data used in Piketty, Postel-Vinay and Rosenthal (2013) we estimate equation (4) for Sweden annually back to the 1870s when the first evidence of total compensation to employees is available. Specifically, we compute the capital share of value added, α, as the sum of net surplus in the corporate sector (which includes incomes of self-employed) divided by national income at factor prices (i.e., net of indirect taxes on production and imports less indirect subsidies).[27] The Swedish private net saving rate s comes from the historical national accounts constructed by Statistics Sweden since 1950 and economic-historical research as reported in Waldenström (2016, 2017).[28] Figure 8 shows the evolution of α and s, and while the saving rate have increased steadily over time, the capital share fell after the First World War and has thereafter been at a level just below 20 percent.

[Figure 8 about here]

Figure 9 reports φ in decennial averages for Sweden using 30-year (one generation) moving averages of the variables in equation (4). According to this series, the Swedish φ was stable at a high level of around 80 percent in the nineteenth century and up to the 1910s. After that it declines steadily to the 1950s to just below 50 percent of aggregate private wealth, a level at which it stays for the rest of the period up until present day. Though we can obviously not make a comparison to micro based estimates as in the case of France, we note that for the one year where there is a micro based calculation of φ, 1981, the figure 0.51, reported in Laitner and Ohlsson (1997, p. 8) is very close to our series.

Looking at the trends in the underlying parameters, it becomes obvious that the main drivers behind the twentieth century fall in φ is the simultaneous fall in the inheritance-income ratio and secular increase in net private savings. This, again, suggests that inheritance flows may grow in importance in the future as we seem to be in a phase where accumulation is taking place.

[Figure 9 about here]

[27] For a detailed description, see the online appendix of Bengtsson and Waldenström (2018).

[28] Historical saving rates up to 1949 were constructed using historical national accounts data in Edvinsson (2005). Gross saving rates are defined as the sum of gross investments, the current account balance (export-import differential) and net foreign income and net saving rates are computed by subtracting the consumption of fixed capital from the gross saving rates. Saving rates since 1950 come from the official national accounts, which are based on similar macroeconomic computations but also on household survey evidence.

4. Interpreting Swedish inheritance flows in international comparison

4.1. Comparing inheritance flows, b_Y

Figure 10 shows the inheritance flows for Sweden, France and the U.K. while Table 4 decomposes the country differences in b_Y in relative contributions of β, μ^* and m. The inheritance flow in Sweden was clearly lower than in France and the U.K. during the nineteenth century. In the twentieth century, the flow has fallen everywhere, but in the last decades, it has increased considerably in France while increasing moderately in the U.K. and Sweden.

[Figure 10 about here]

The three components of the inheritance flow measure are presented in Figure 11 for the different countries. Starting with the wealth-income ratio β, Sweden exhibits a development highly similar to the U.S. the nineteenth century (we include the U.S. as reference despite its lack of an inheritance flow series). France and the U.K. had β's in the nineteenth century at almost twice the level found in Sweden, and also the U.S. Over the first half of the twentieth century the β's in all countries go down but after the second world war the ratio starts moving up again in France, the U.K., and the U.S. In Sweden, there is also an increase in the second half of the twentieth century, but it starts later. The decomposition in Table 4 shows that these changing differences in β accounts for most of the changes in the difference in b_Y, especially in the beginning and end of the studied period.

Turning to μ^*, it is clear that Sweden has had a similar development as France except for the last decades. A conjecture is that the age-wealth profiles in Sweden and France have diverged. This in turn might be be-cause age-savings profiles have become less similar. The μ^* in the U.K., however, has evolved differently when compared to the other two countries. Atkinson (2018) discusses this deviation without pointing to any particular explanation, but he indicates that the adjustment for *inter vivos* gifts may be insufficient in the U.K. series. Finally, there are no major differences in how mortality has decreased, even though the level of the mortality rate has been different across these countries at different points in time.

In other words, the differences between Sweden, France and the U.K. are mainly due to differences in β and, especially in recent decades, differences, in μ^*.

[Figure 11 about here]

Our understanding of these differences can also be deepened by examining the long-run equilibrium condition suggested by Piketty and Zucman (2015) according to which the wealth-income ratio equals the net savings rate divided by the growth rate.[29] The upper left panel of Figure 12 shows the net savings rates for the four countries. This figure illustrates a remarkable difference in the case of Sweden in the nineteenth century: the extremely low savings rate. In relation to France and the U.K., this suggests that the reason for why inheritance flows were less important in Sweden was that wealth accumulation did not occur on any major scale before industrialization in Sweden simply because savings were too low. In relation to the U.S., it suggests that, while the wealth-income ratios in the two countries were similar, the underlying reasons were somewhat different. The absence of historical capital accumulation in the U.S. was due to low land values and rapid growth combined. In Sweden, it was instead a combination of low savings and low growth that gave the same result. Over the course of the twentieth century, the Swedish savings rate gradually increases and during the past decades the savings rates in Sweden seem to converge toward the levels in France, the U.K. and the U.S. As for differences in the growth rate, there has been a continuous increase of the 30-year averages for Sweden except for last period. At the same time, there has been almost continuous decrease in growth for the U.S. (mainly due to a slowdown in the rate of population growth).

[Figure 12 here]

How could Sweden finance its industrialization with such low levels of capital accumulation? The answer becomes clear when looking at Sweden's net foreign positions, shown in Figure 13. While both France and the U.K. had substantial foreign assets, Sweden started borrowing from abroad around 1850 and continued to do so until the beginning of the twentieth century. The importance of this capital import to the Swedish industrialization has been debated by economic historians, some pointing at the fact that bank credit stood for the bulk of corporate debt at this time while others arguing that it was actually foreign money that had capitalized the Swedish commercial banks in the first place.[30]

[29] Piketty and Zucman (2015) suggest using the classical Harrod-Domar-Solow model to express the steady-state level β as the direct relationship between the net private saving rate s^n and the income growth rate g, i.e., as $\beta = s^n/g$.
[30] See further Waldenström (2016) for more details and discussion on the importance of foreign capital in the evolution of the Swedish private and national stock of wealth.

[Figure 13 about here]

Overall, it seems like the paths of the wealth-income ratios in Sweden and the U.S. are similar but the explanations are not the same. Over the long run, Sweden started out from low savings and low growth and arrived at high savings and high growth. The U.S., on the other hand, started from high savings and high growth and has arrived at lower savings and lower growth. Comparing Sweden to France and the U.K. it is clear that it was lower savings, not higher growth, which made the Swedish wealth-income ratio lower than those in the other two countries in the nineteenth century.

Accounting for the divergence in inheritance flows points to the role of μ^*, and its two main components: the life-cycle wealth profile and the importance of gifts. As for wealth accumulation over the life cycle, average private savings of people over 65 years in the 1990s and 2000s were substantially lower in Sweden than in France and the U.K. (Nakajima and Telyukova, 2013).[31] This could, at least in part, be due to higher wealth taxation in Sweden but it is also consistent with Swedes having larger faith in government "safety nets" for old age (possibly together with a smaller direct bequest motive for reasons given below).[32]

As for gifts, even though the Swedish evidence is problematic, we see nothing like the explosion of giving seen in France. Possibly this adheres to the different importance of "the family" in social policy across countries. At least since the 1970s, many Swedish policies have explicitly emphasized the disconnect between opportunities and family background, in particular, putting systems in place that make young individuals less dependent on financial contributions from parents.[33] Examples of such policies, which could have an important impact on *inter vivos,* include heavily subsidized, tuition-free university education, tax free transfers to students as well as the right to take generous student loans from the government and also access to subsidized housing for students. While similar arrangements exist in other countries as well, their universal character is likely to make saving for children's education (or housing) less common in Sweden as compared to many other countries.

[31] Much of the growth in savings since the 1990s has also taken the form of private occupational pensions, often through automatic employer pension contributions. As discussed above the contributions of such savings in relation to inheritance flows are not obvious, but as shown in Chetty et al (2014) these kinds of arrangements seem effective in increasing savings among the majority of "passive savers". Given how recent the growth of such savings are, it remains an open question still how they will affects inheritance flows in the future. What is certain though is that there are very limited possibilities for individuals to use such funds for inter-vivos.

[32] Various reforms over the past decades have lowered taxation of capital and wealth in Sweden. In particular, inheritance and gift tax as well as wealth tax has been abolished completely in 2005 and 2007 respectively.

[33] Lindbeck (1997), p. 15, when discussing the main differences of the Swedish welfare state, puts it like this:"…Sweden has probably differed the most from other countries in the ambition to intervene in the lives of families and not just firms, largely to provide economic security and encourage egalitarianism".

A final point, which may contribute to the lower level of observed private wealth in Sweden, is that cross-border capital flight may have been more important than in many other countries. An attempt at estimating this is made in Roine and Waldenström (2009). Even though the estimate is very uncertain the order of magnitude, between one sixth and one third of national income, says something about the potential importance.

4.2. Comparing the inherited wealth share, φ

Figure 14 compares the share of inherited wealth in aggregate wealth in Sweden and France. The developments are very similar until the 1950s: the share falls from a high early level, and the fall in the first half of the twentieth century clearly reflects the declining inheritance flow documented above. As for the postwar trend, a question arises: Why does φ reach a minimum in France in the 1960s and start to increase thereafter while the φ in Sweden decreases to slightly below 50 percent in the 1950s and then has remained at this level, increasing only mildly? Studying equation (4) offers some answers. A higher wealth share α tends to raise φ, and α has been largely stable in both countries, at least since the interwar era when the level in Sweden has hovered at a level just below 20 percent. A higher b_Y tends to raise φ, and it has increased in both countries, but primarily in after 1990 after having been relatively constant over the postwar period. Its contribution to the rise in φ thus materializes in the last decades. Finally, the savings rate s tends to decrease φ, and there seems to be divergence across the two countries. In France, private saving has decreased in recent decades whereas it has increased somewhat in Sweden. The accumulation of new wealth from saved incomes has thus been more pronounced in Sweden than in France, and this seems to account for both the lower level of φ and the only mild rise since the 1990s despite a much larger increase in b_Y as documented above.

To sum up, we are able to account for the variations in the share of inherited wealth in total wealth using the structural framework offered above. The fall over the first half of the past century appears in both countries, reflecting the dramatic fall in the inheritance flows. The postwar increase is accounted for in France by a fall in saving and late rise in the inheritance flow while the lower level and only mild rise in Sweden is due to constant levels of the capital share, saving and inheritance flows until the 1990s when increased saving and rising inheritance flow seem to cancel out each other.

[Figure 14 about here]

5. Concluding discussion

In this paper, we have studied the role of inherited wealth in Sweden from the aggregate view, documenting flows and levels and their evolution of the past two hundred years. We have also presented a framework for understanding the main driving forces behind and compared this to the experiences in France, the U.K. and the U.S.

Going back to the fundamental question of the relationship between what each generation inherits from the past and what it creates, the Swedish case is interesting in its own right but, perhaps more importantly, it also sheds new light on some more general questions in a broader context. First, it complicates our understanding of the often-made distinction between an American, as opposed to a European experience.[34] The role of inherited wealth and all of its consequences for society, most famously noted by Alexis de Tocqueville (1835), has always been a key aspect of this dichotomy. Piketty (2014) also emphasizes the difference in accumulated wealth between "Old Europe" and America.[35]

Our results, however, suggest that, historically, Sweden was different from both France and the U.K., and from the U.S. Old wealth in relation to income was not as important in Sweden as it was in France and the U.K. in the 1800s. We cannot say exactly in what way this played a role in how society evolved, but it remains an interesting fact that, at the eve of industrialization, the tension between aggregate old wealth and new developments was not as strong in Sweden as in France and the U.K.[36] Sweden was in this sense more similar to the U.S., but the reasons for why this was the case differed. Before industrialization, Sweden had a combination of low savings and low growth and eventually financed its early industrial development through international borrowing. In the U.S., high savings and accumulation from a historically low level, and a high economic growth rate, in particular through population growth, combined to produce a low wealth-income ratio. Second, however, looking at the share of inherited wealth in total wealth, this was just as large in Sweden as in France and

[34] There are numerous studies that revolve around the issue of "American Exceptionalism" (Lipset, 1996) such as *Fighting Poverty in the US and Europe* by Alesina and Glaeser (2004) and *Inequality and Prosperity: Social Europe Vs. Liberal America* by Pontusson (2005) and many others. In many of these Sweden is depicted as the "most European" of countries due to the extensive level redistribution and the size of government, as we discuss more below.

[35] See also the overview by Piketty and Saez (2014) where, again, the Europe vs. U.S. case is emphasized.

[36] Acemoglu and Robinson (2000) explain the extension of the franchise in the nineteenth century based on a model where the elite responds to a threat of social unrest. Sweden is taken to be similar to England, France and Germany in this respect. Quoting Tilton (1974) they note that: "Swedish democracy had triumphed without a revolution — but not without the *threat* of a revolution". Without suggesting that industrialization or democracy arrived in Sweden without resistance, another possibility is that perhaps tensions were actually smaller in Sweden simply because the visible difference between the wealth stock and the income flow was less pronounced.

the U.K. in the nineteenth century. In this sense, Sweden appears to have been a typical example of an "old European" country, where most of the wealth was inherited. Reconciling these facts shows that Sweden in the 1800s was a poor country with low savings, little capital accumulation and rising income growth, resulting in low inheritance flows, but where the limited capital stock that existed had been for the most part inherited.

Another set of insights concern the twentieth-century growth of government, where the European-American divide can be framed as a distinction between Anglo-Saxon, Continental European, and Scandinavian models of society. With respect to this division, our results illustrate how inheritance flows are likely to be affected by aspects of the extensive Swedish welfare system. For example, it has often been noted that personal savings are low in Sweden for the simple reason that many things that individuals save for in other countries (higher education, health care) are partly or completely financed by the government, i.e., by taxes, and the public pension system and occupational pensions systems are also to a large extent organized collectively and financed by private contributions. This results in a situation where private retirement savings profiles of the elderly are substantially lower in Sweden (and the other Scandinavian countries) than in France, the U.K., and the U.S. Moreover, non-trivial amounts of wealth in collective pension and social security assets have been built up in Sweden, and these do not pass between generations in the form of private (typically family-based) transfers but largely stay within the collective systems.

Yet another important difference in the case of Sweden stems from the explicit government ambitions, especially since the 1970s, in making individuals less dependent on family for various investments in early life (such as higher education), but also in retirement. In historical perspective, this is of course a common feature of welfare state arrangements in most countries but Sweden does stand out in terms of its "cradle-to-grave" ambitions of making individuals independent of relatives (and markets) for education, health care and economic security. In relation to the role of inheritance, and perhaps most clearly in the role of *inter-vivos*, features such as tuition-free university education, student housing and student loans has removed some otherwise common savings motives in the case of Sweden.

Finally, there is the real possibility of relatively large amounts not being accounted for due, in part to low valuations, and in part to assets being "hidden", so as to avoid what have historically been high taxes on both wealth and inheritance. After the repeals of these taxes,

capital flows and developments of private wealth indicate that tax avoidance and evasion may have been substantial in the past.[37]

Overall, our analysis of inheritance flows in Sweden teaches us two major general lessons about the development of wealth and its impact on inheritance. The first is that Sweden does not, despite a long history of aristocracy, fit with the picture of a country where accumulated wealth was large in relation to income (even though inequality and wealth concentration most probably was high, and most of the wealth stock was inherited from the past). The second is that Sweden in more recent times stands out as a country where the returns to wealth has not automatically translated into a return of inherited wealth. In both these respects, the case of Sweden suggests that there is likely to be variation across countries, both historically and today, when it comes to the role of inheritance and the form it takes.

[37] The estimates of evaded offshore capital by Roine and Waldenström (2009) suggest that several hundreds of millions SEK are currently place abroad, which is about one third of national income.

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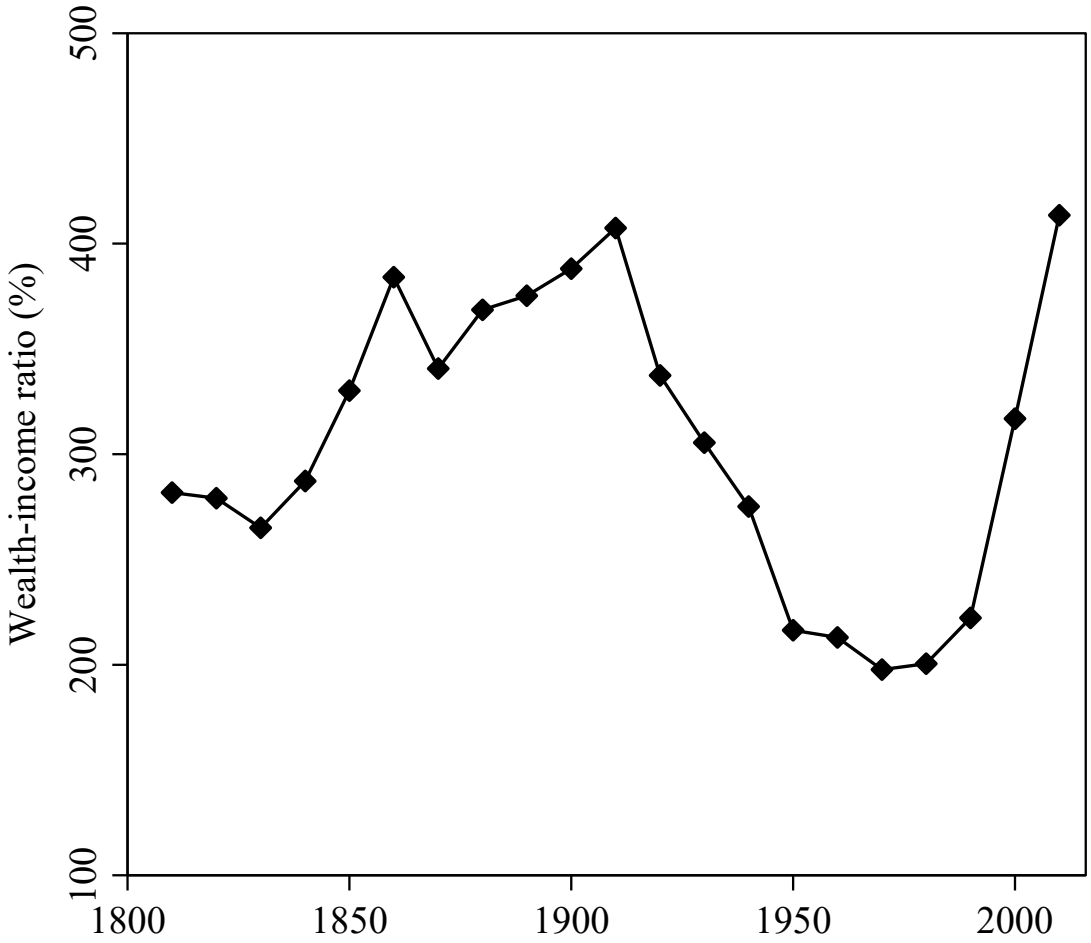

FIGURE 1: PRIVATE WEALTH-NATIONAL INCOME RATIO IN SWEDEN, β, 1810S–2010S.

Source: Waldenström (2016).

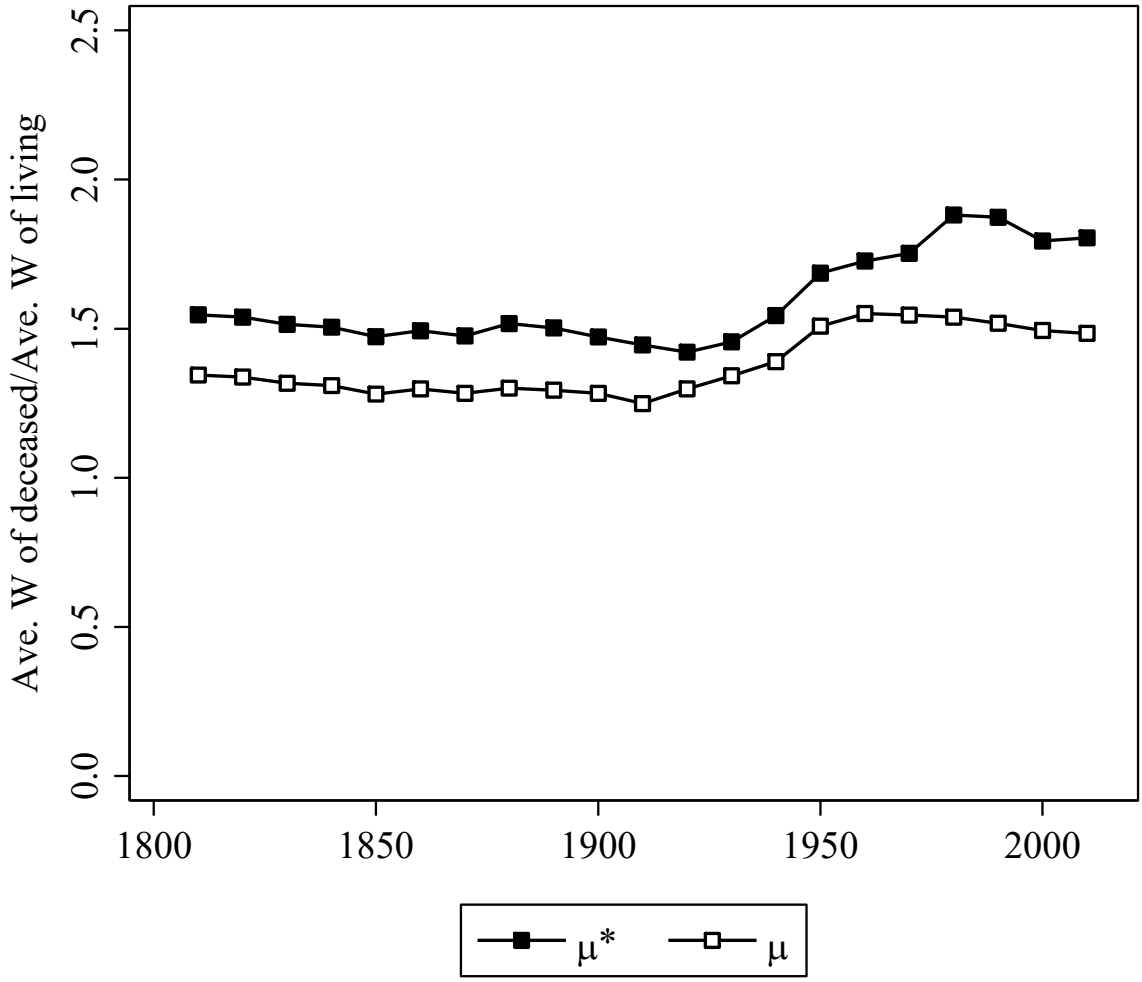

FIGURE 2: RATIO OF AVERAGE WEALTH OF THE DECEASED TO AVERAGE WEALTH OF THE LIVING, WITH CORRECTION FOR GIFTS *INTER VIVOS* (μ^*) AND WITHOUT (μ).

Note: The μ-ratio is calculated from various sources on age-wealth patterns and adjustments for gifts from tax statistics and the national accounts (see text for details).

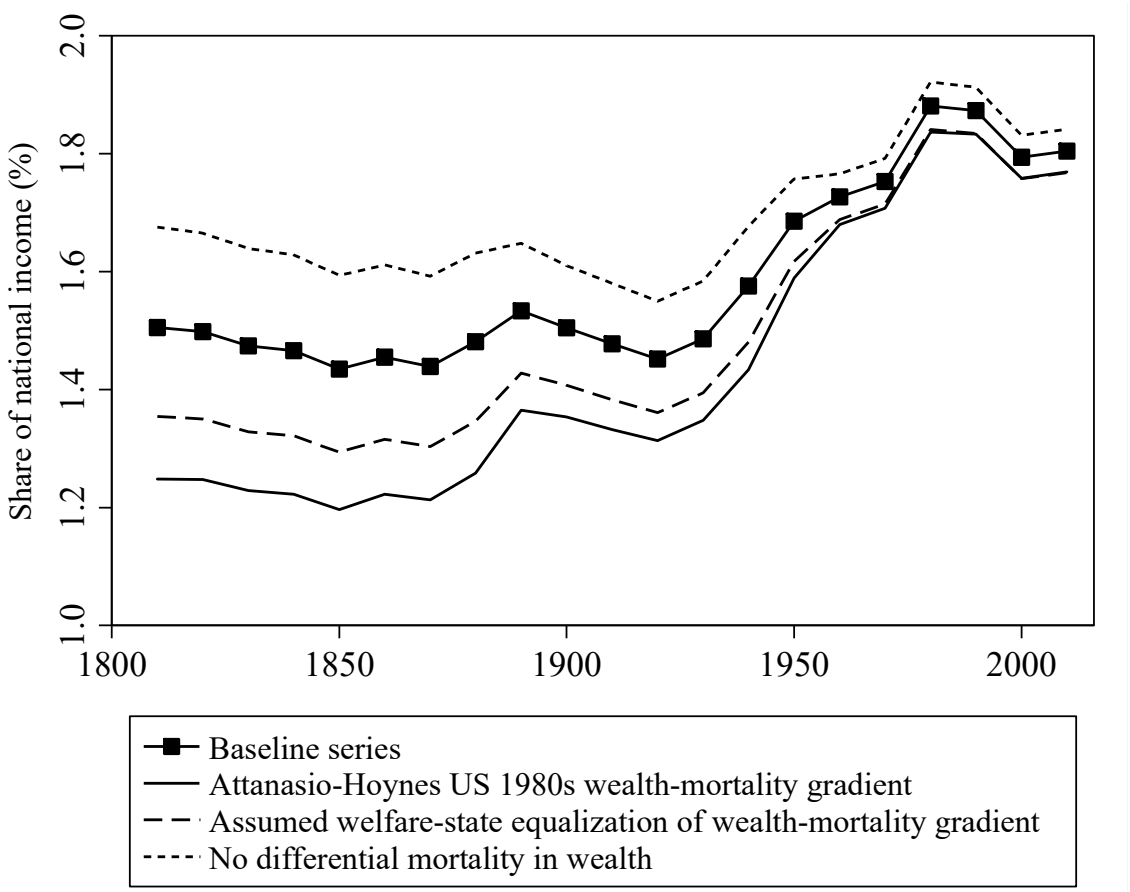

FIGURE 3: IMPACT OF MORTALITY DIFFERENTIALS ON μ^*.

Notes: "Baseline series" uses wealth-mortality gradients as described in the text.

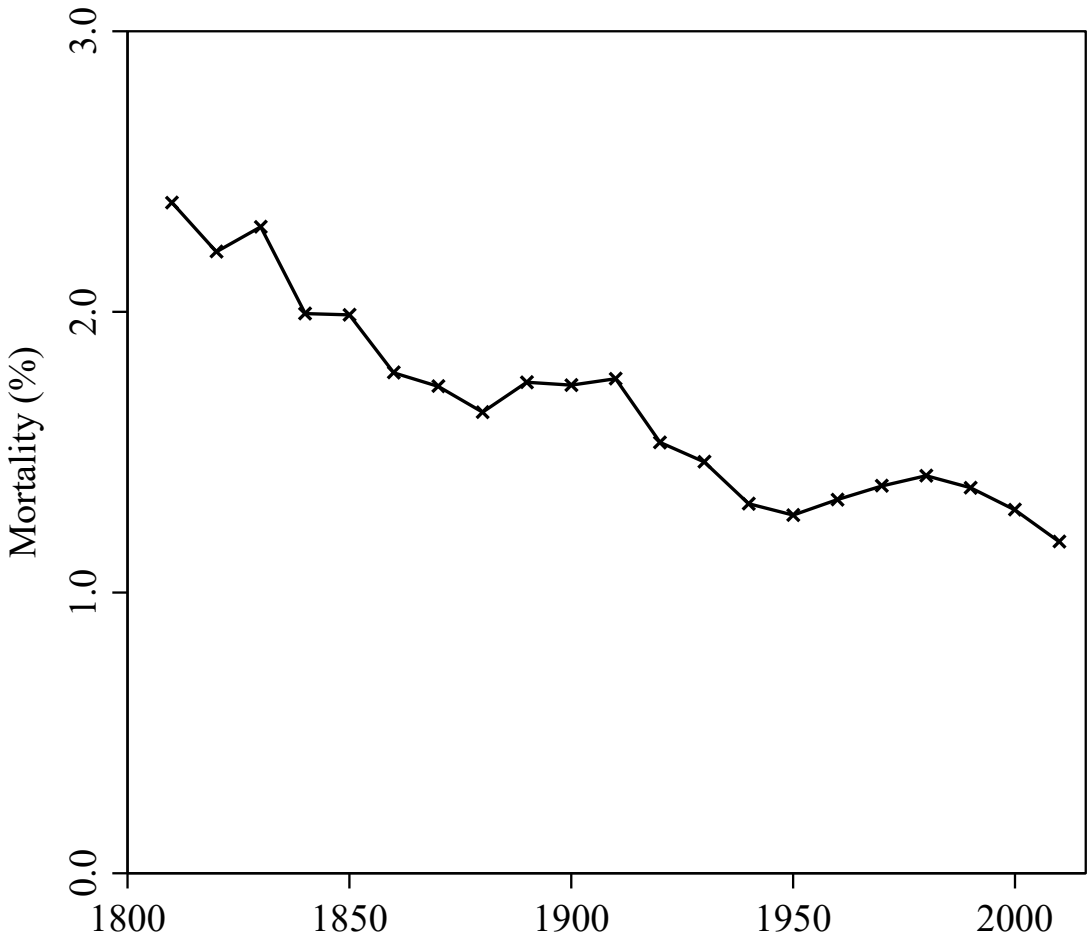

FIGURE 4: MORTALITY AMONG ADULTS IN SWEDEN, m, 1810S–2010S

Notes: Mortality (m) is measured among people aged 18 years or more as the number of deaths as a share of the living population. Source is Human Mortality Database.

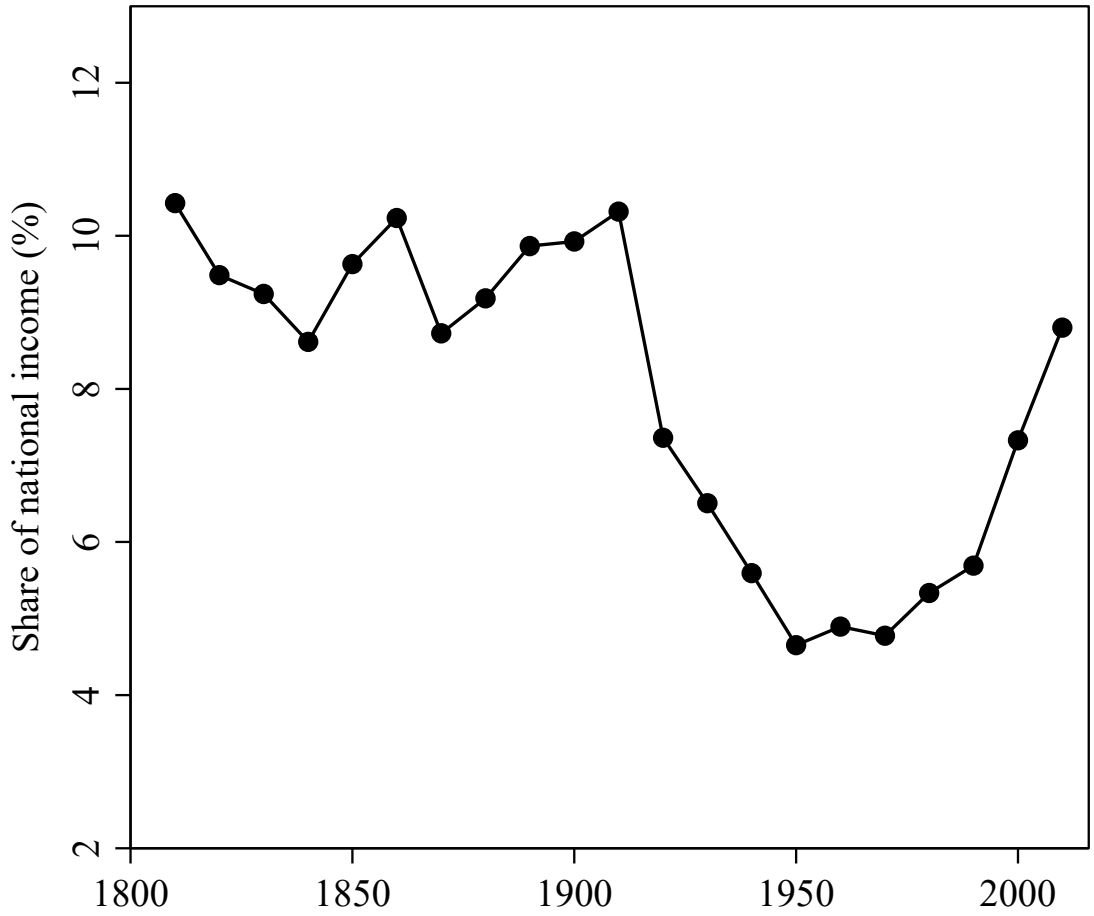

FIGURE 5: INHERITANCE FLOW OVER NATIONAL INCOME IN SWEDEN, b_Y, 1810S–2010S.

Note: The figure shows the economic flow, $b_Y = \beta \cdot \mu^* \cdot m$, where β is the private wealth-income ratio, $\mu^*$the gift-corrected ratio of mean wealth of the deceased over mean wealth of the living, and m adult mortality rate.

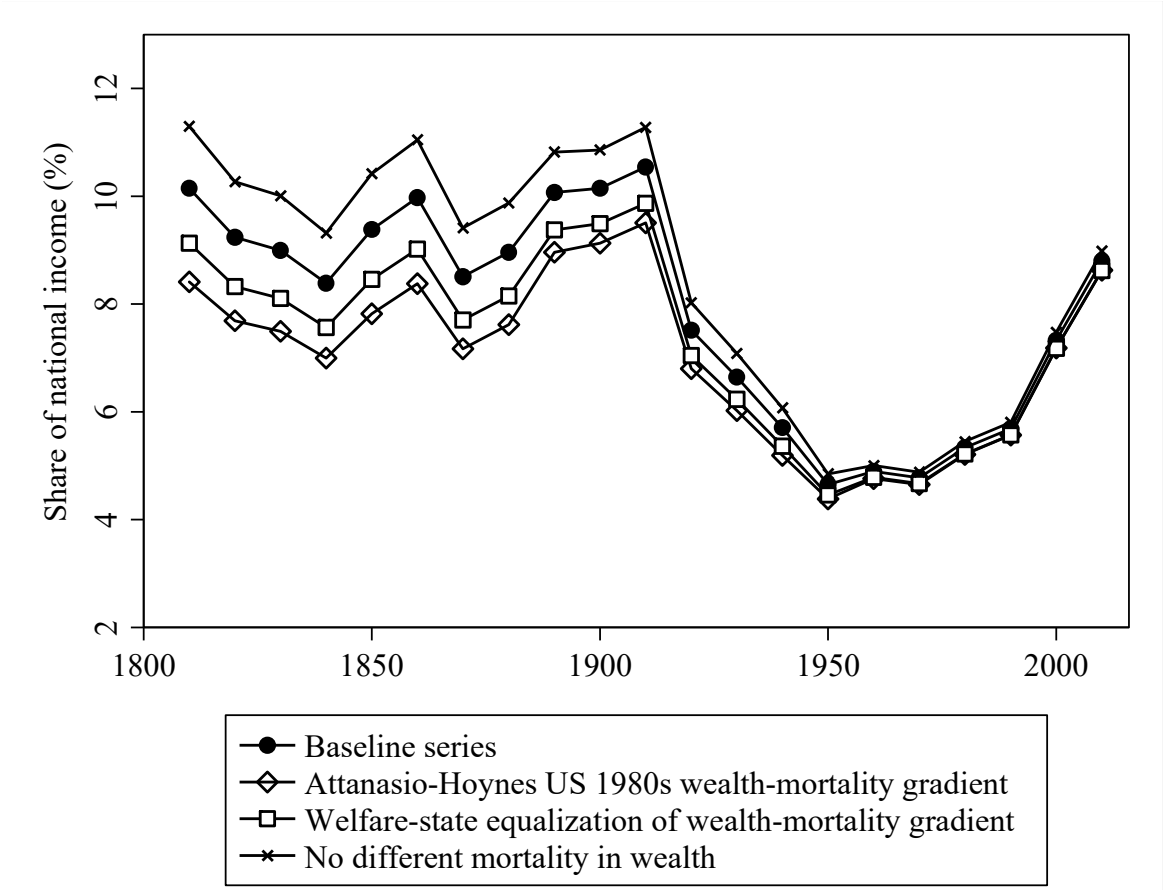

FIGURE 6: INHERITANCE FLOW USING DIFFERENT WEALTH-MORTALITY GRADIENTS.

Note: See section 2.3 for presentation of the different wealth-mortality gradients.

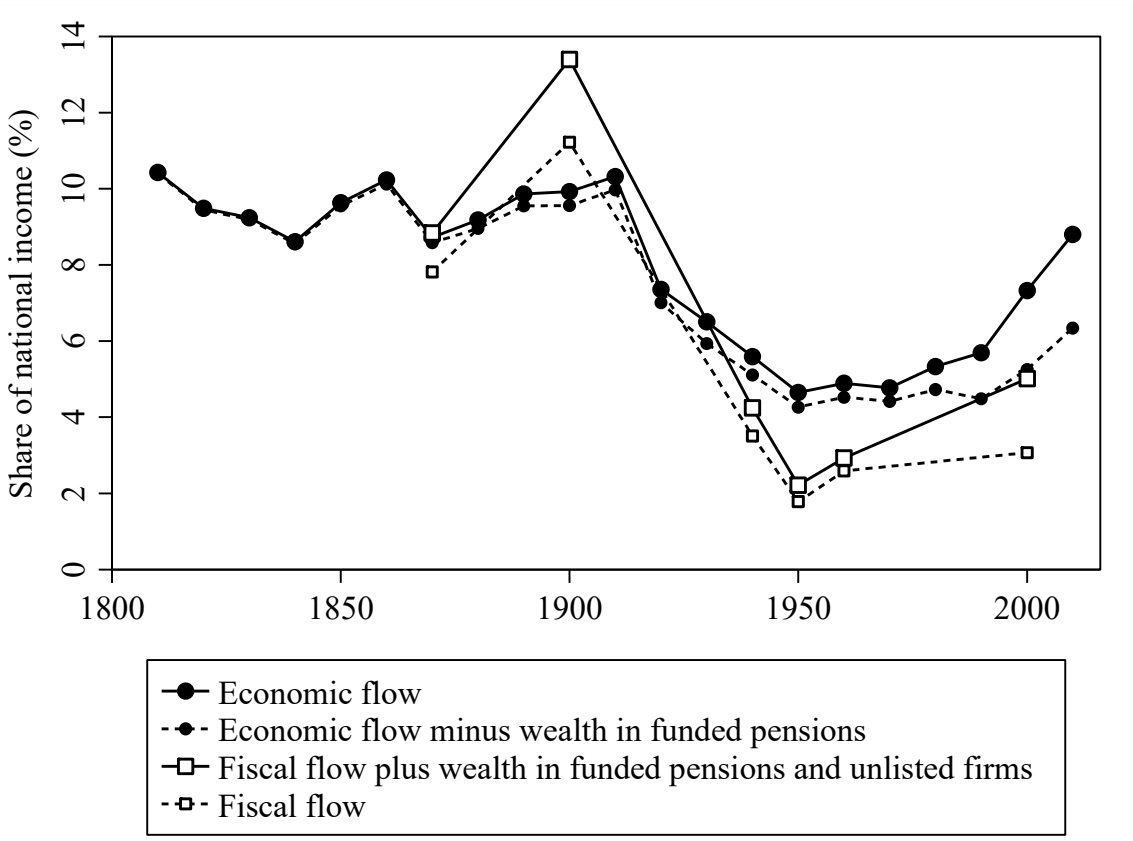

FIGURE 7: COMPARING "FISCAL FLOW" AND "ECONOMIC FLOW" ESTIMATES.

Note: The economic flow is b_Y. The fiscal flow is the value of estates in probate inventory reports and inheritance tax records. All flows are gift-corrected. Unfunded pension wealth is not included. See text for further details.

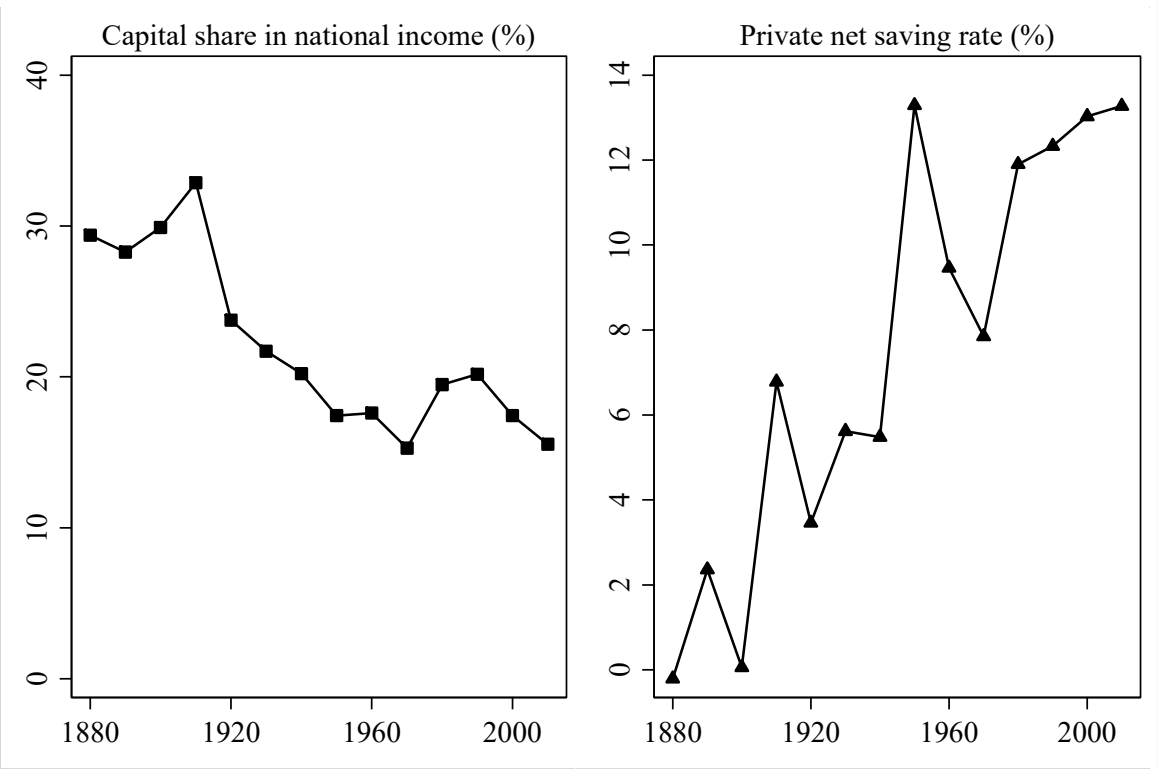

FIGURE 8: CAPITAL SHARE OF VALUE ADDED AND PRIVATE NET SAVING RATE FOR SWEDEN

Note: Capital share is net of capital depreciation. Private net saving rate includes household and corporate saving net of capital depreciation. See text for further details.

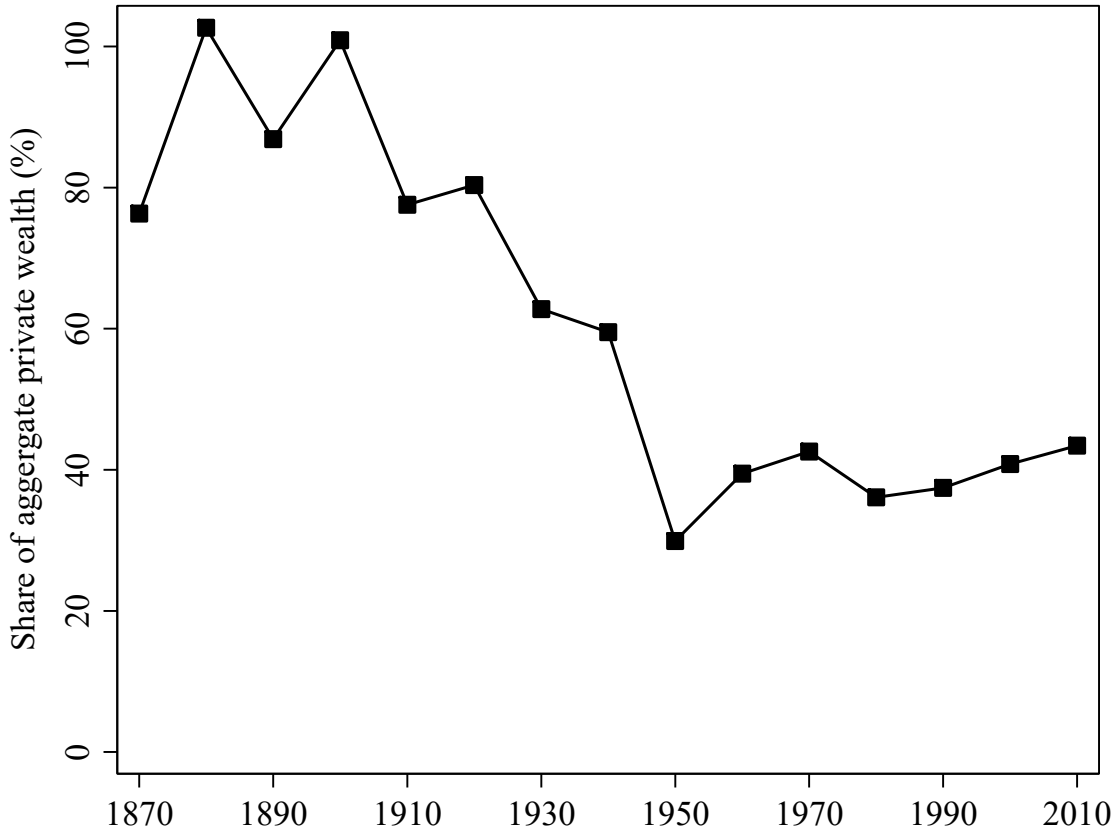

FIGURE 9: INHERITED WEALTH AS SHARE OF AGGREGATE WEALTH, φ.

Note and source: The smoothed series is based on 30-year moving averages of the variables in equation (4), the inheritance flow b_Y, the private net saving rate, s, and the net capital share of value added, α. For sources of the calculations, see text.

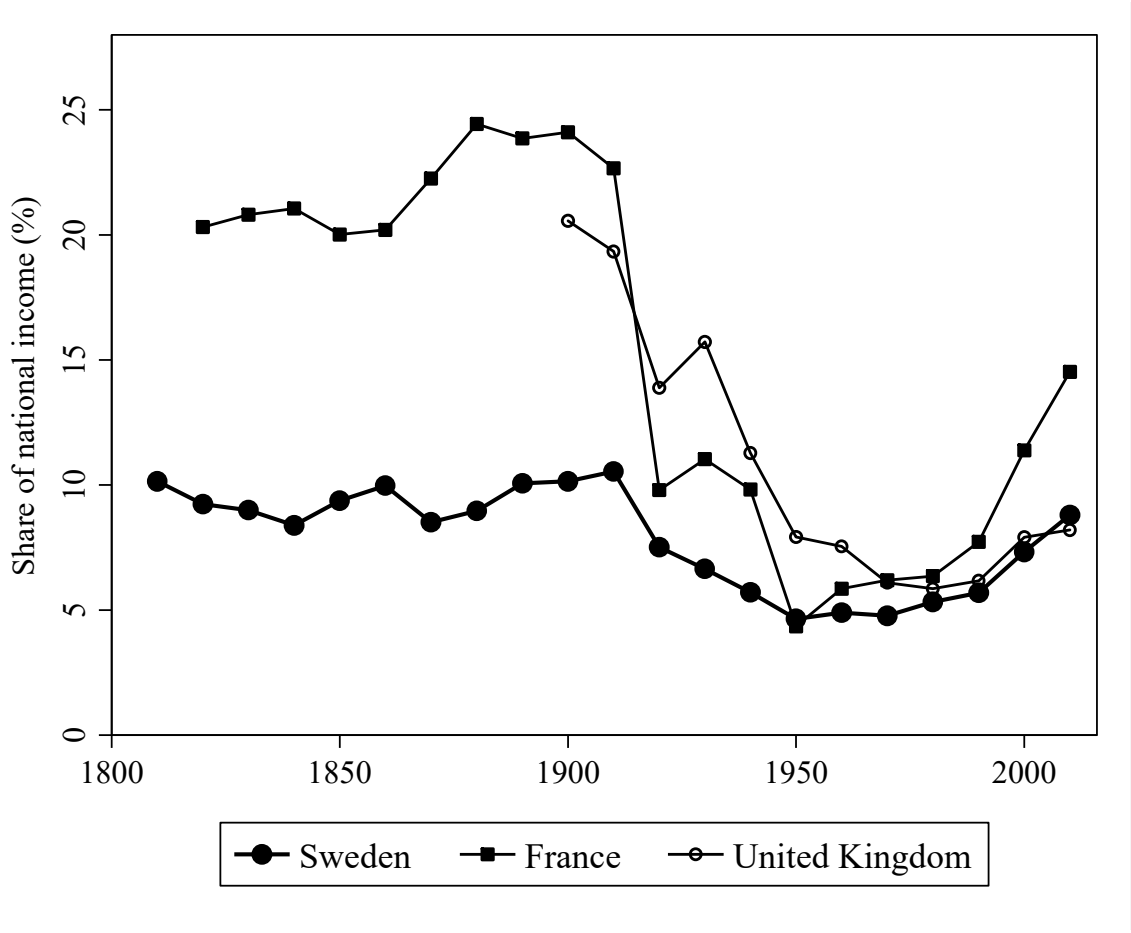

FIGURE 10: INTERNATIONAL COMPARISON OF INHERITANCE FLOW.

Notes and sources: Data on β from Waldenström (2016) for Sweden and Piketty and Zucman (2014a) for the other countries. Mortality for France comes from Piketty (2011), for Sweden and the U.K. from the Human Mortality Database. Data on μ^* come from this study for Sweden and from Piketty (2011) for France, and for the U.K. we have estimated it by dividing the inheritance flow (b_Y) by the product of β and the mortality rate based on the economic flow logic of equation (1).

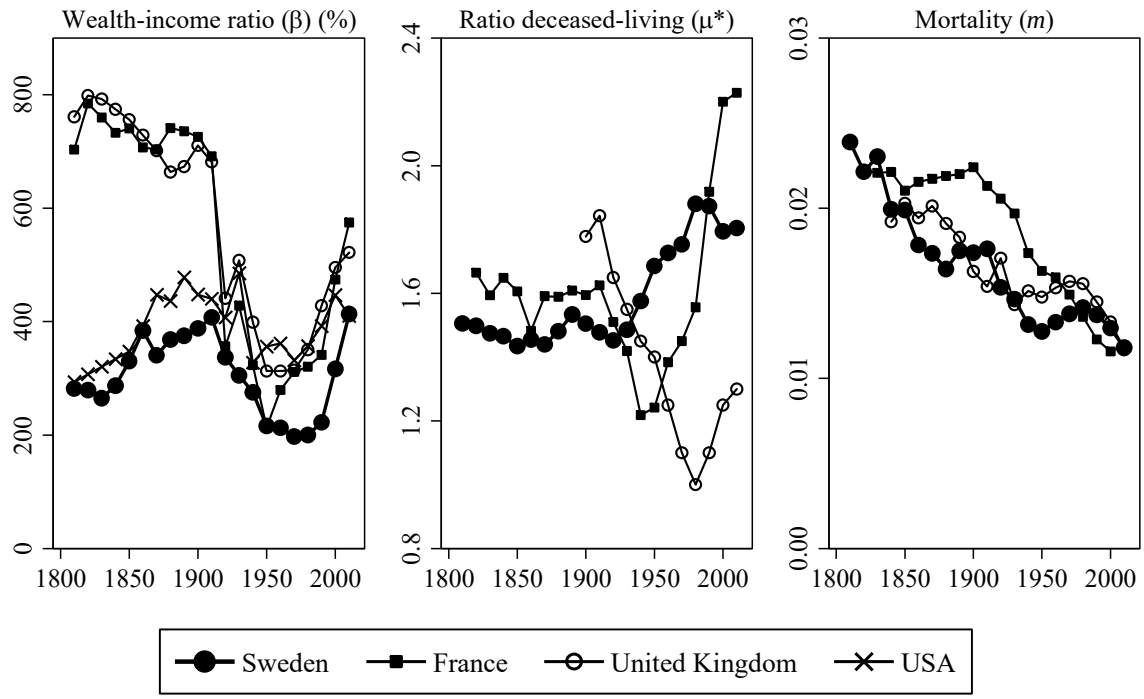

FIGURE 11: INTERNATIONAL COMPARISON OF THE DETERMINANTS OF b_Y.

Notes and sources: Data on β from Waldenström (2016) for Sweden and Piketty and Zucman (2014a) for the other countries. Mortality for France comes from Piketty (2011), for Sweden and the U.K. from the Human Mortality Database. Data on μ^* come from this study for Sweden and from Piketty (2011) for France, and for the U.K. we have estimated it by dividing the inheritance flow (b_Y) by the product of β and the mortality rate based on the economic flow logic of equation (1).

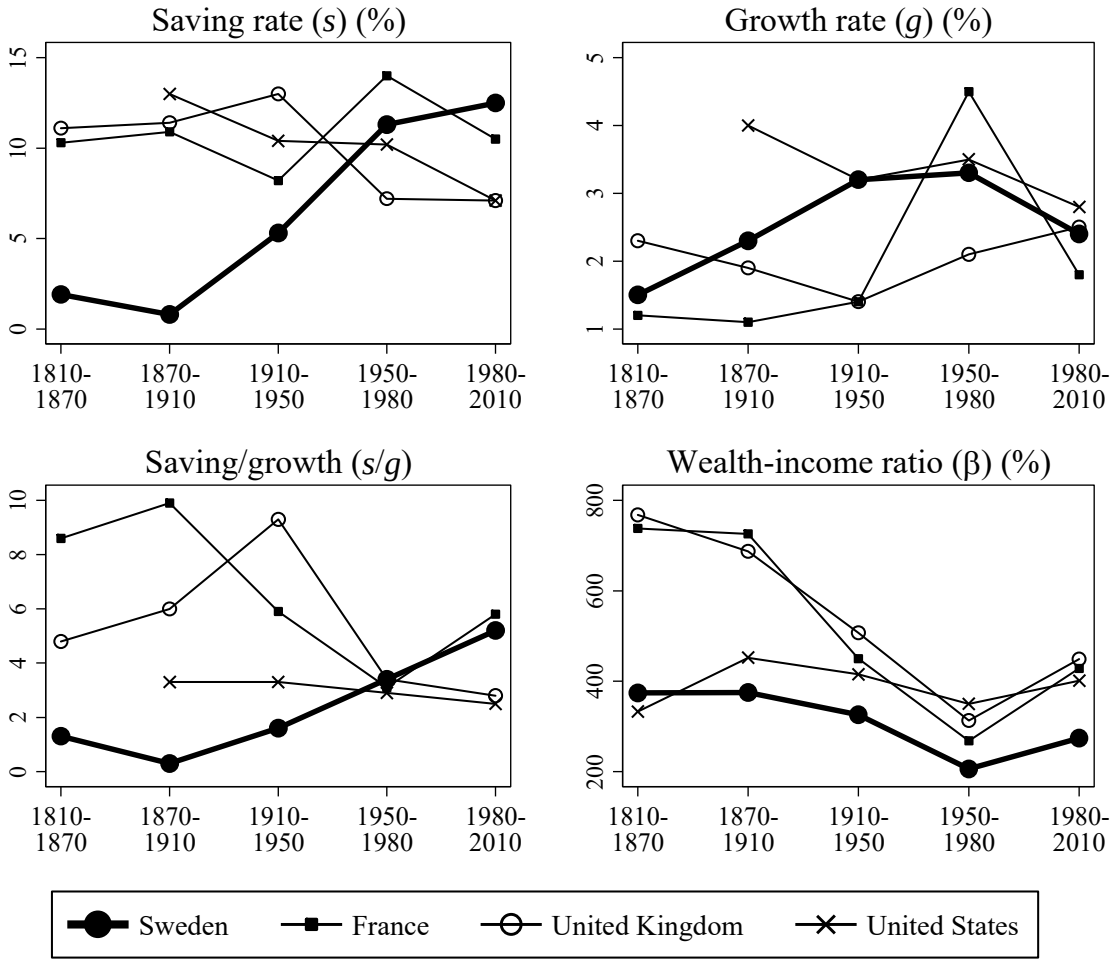

FIGURE 12: SAVINGS, GROWTH AND WEALTH-INCOME RATIOS IN FOUR COUNTRIES.

Source: Growth rates are compounded annual average growth rates of real national income, using data for France, the U.K. and the U.S. from Piketty and Zucman (2014) and for Sweden from Waldenström (2016) and this study.

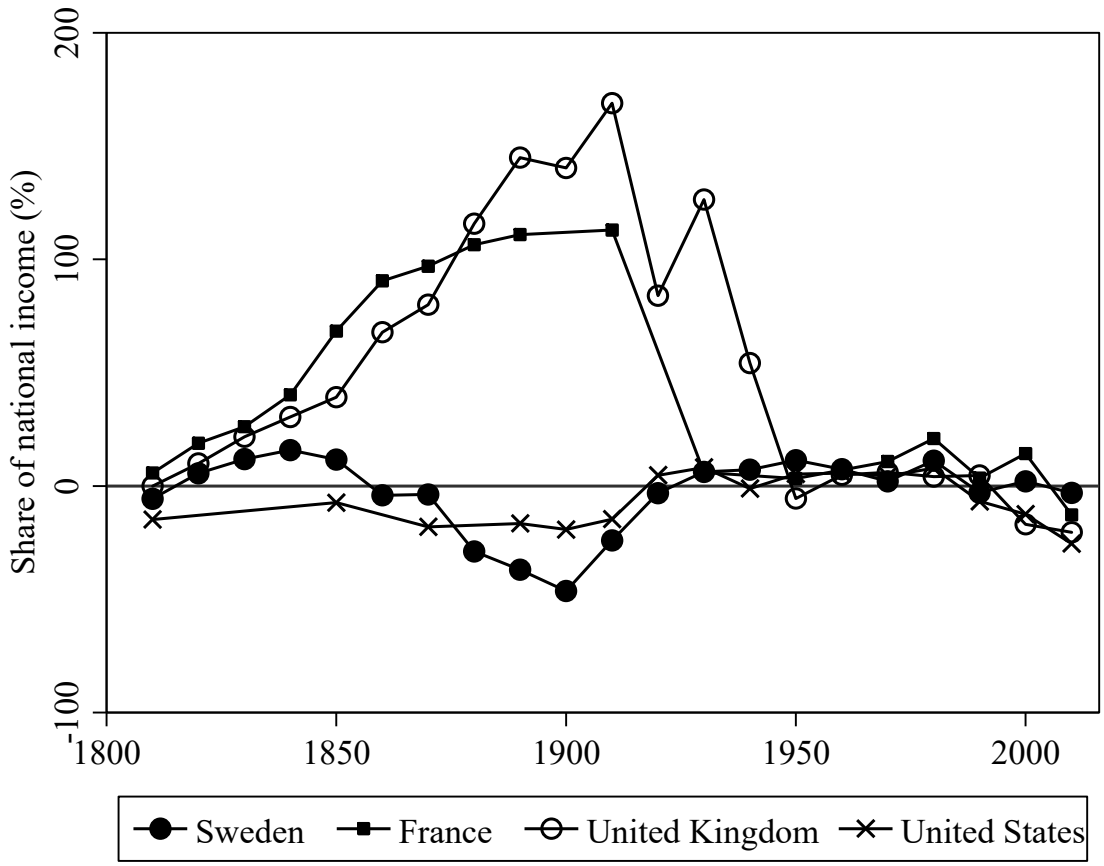

FIGURE 13: NET FOREIGN POSITION.

Source: Own calculations (see text).

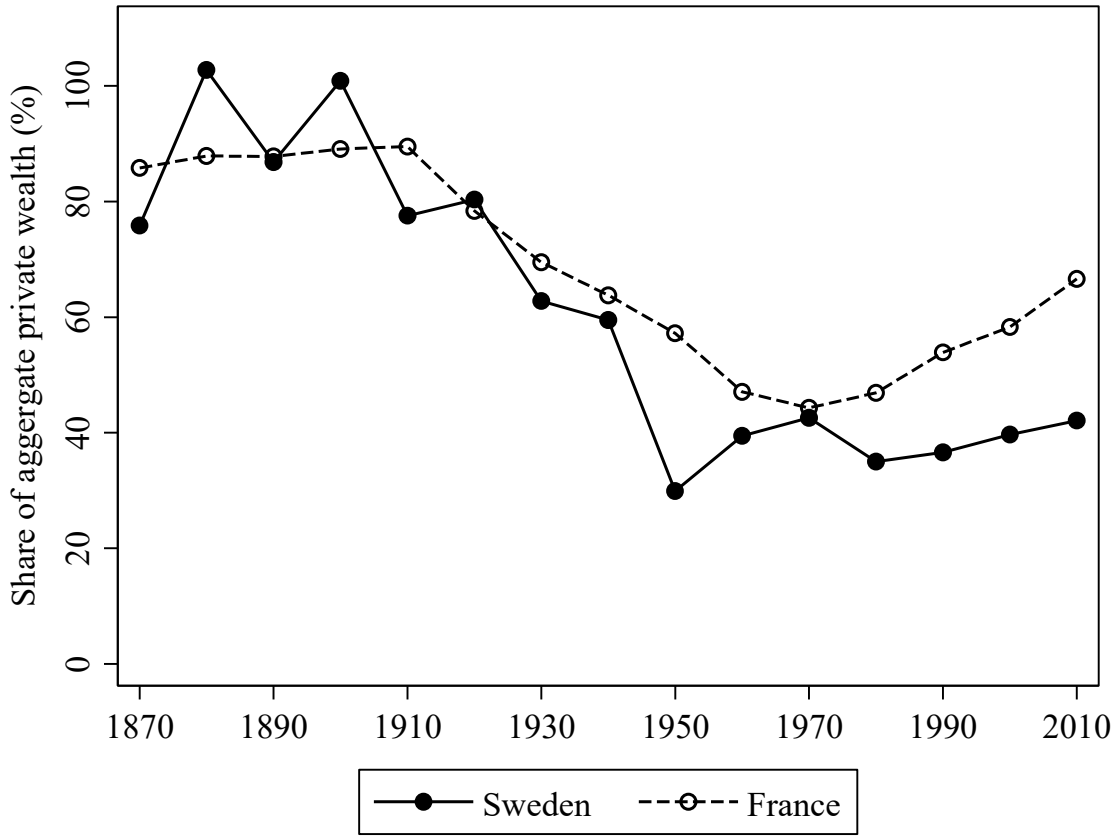

FIGURE 14: SHARE OF INHERITED WEALTH IN FRANCE AND SWEDEN, φ, 1850–2010

Source: For France, see Piketty and Zucman (2015) and for Sweden, our own calculations.

TABLE 1: ACCUMULATION OF PRIVATE WEALTH IN SWEDEN, 1810–2010

	β_{Start}	β_{End}	$\%\Delta W$	$\%\Delta Y$	$\%\Delta\beta$	Decomposition of $\%\Delta W$: Saving-induced	Decomposition of $\%\Delta W$: Capital gain-induced
1810–2010	279	369	2.6	2.4	0.2	2.1 (86%)	0.4 (14%)
1810–1870	279	374	2.0	1.5	0.5	0.5 (25%)	1.5 (75%)
1870–1910	374	428	2.7	2.3	0.4	0.3 (12%)	2.4 (88%)
1910–1950	428	250	1.9	3.2	–1.3	1.3 (72%)	0.5 (28%)
1950–1980	250	183	2.3	3.3	1.0	5.7 (230%)	–3.2 (–130%)
1980–2010	183	369	4.8	2.4	2.4	5.5 (113%)	–0.7 (–13%)

Note: The decomposition of the observed wealth-income ratio ($\beta = W/Y$) is the following: $\%\Delta\beta = \%\Delta W - \%\Delta Y$. The decomposition of wealth accumulation is based on a wealth accumulation model (discussed in the text) and states that $\Delta W = Saving\ induced\ wealth\ growth + Capital\ gain\ induced\ wealth\ growth$.

TABLE 2: DECOMPOSING CHANGES IN INHERITANCE FLOWS IN SWEDEN (%).

	μ	$\bar{W}_d$	$\bar{W}_l$
1870–1930			
1870	1.56	6,492	4,149
1930	1.36	24,488	17,964
Yearly percentage change	–0.2	2.2	2.5
Contribution to change in μ		48%	52%
1930–1970			
1930	1.36	24,488	17,964
1970	1.74	16,573	9,498
Yearly percentage change	0.6	–1.0	–1.6
Contribution to change in μ		38%	62%
1970–2000			
1970	1.74	16,573	9,498
2000	1.71	274,227	160,794
Yearly percentage change	–0.1	9.8	9.9
Contribution to change in μ		50%	50%

Note: Data on average wealth of the deceased, $\bar{W}_d$, average wealth of the living, $\bar{W}_l$, and the ration between them, $\mu = \bar{W}_d / \bar{W}_l$, are based on historical observations of age-taxable wealth profiles described in the text. Wealth in current SEK. The row "Contribution to change in μ" shows the relative contribution to the total change in the denominator and numerator of the μ-ratio.

TABLE 3: DECOMPOSING CHANGES IN INHERITANCE FLOWS IN SWEDEN (%).

	Average annual percent change in inheritance flow (Δb_Y)	with contribution from:		
		Wealth-income ratio ($\Delta\beta$)	Ratio of average wealth of deceased and living ($\Delta\mu^*$)	Mortality (Δm)
1810–1870	–0.3	0.3	–0.1	–0.5
1870–1910	0.5	0.4	0.0	0.0
1910–1950	–2.0	–1.6	0.4	–0.8
1950–1980	0.3	–0.4	0.3	0.3
1980–2010	1.6	2.4	–0.2	–0.6

Note: Percentage points reflect the compounded average annual change between periods. Decennial averages are being used.

TABLE 4: COMPARATIVE b_Y-DECOMPOSITION: SWEDEN VS. FRANCE AND THE U.K.

	Difference in b_Y between France/U.K. and Sweden (%)	with contribution from differences in (%):		
		Wealth-income ratio (β)	Ratio of average wealth of deceased and living (μ^*)	Mortality (m)
France				
1820–1870	124	106	10	8
1870–1910	148	101	12	35
1910–1950	65	32	–1	34
1950–1980	17	22	–14	9
1980–2010	51	49	8	–6
United Kingdom				
1910–1950	105	63	38	3
1950–1980	42	47	–16	11
1980–2010	10	19	–10	1

Note: Percentage points reflect the ratio of levels in France and the UK to the respective levels in Sweden. Decennial averages are being used.

ONLINE APPENDICES: NOT INTENDED FOR PUBLICATION IN MAIN PAPER!

Appendix A Age-wealth profiles in Sweden: Historical evidence and simulations

A1. Historical age-wealth profiles in Sweden

Data on the historical evolution of age-wealth profiles in Sweden are scarce. We have searched for evidence in Censuses, public investigations and academic research and managed to locate half a dozen of observations of early sources that allow us to estimate age-wealth profiles recorded in the 1840s–1890s, 1908, 1920, 1930, 1945, 1951 and 1966. From 1968 up to 2007 administrative public register databases at Statistics Sweden are available. After 2007, individual information about wealth is no longer available due to the removal of the wealth tax.

In this appendix, we describe how historical age-wealth profiles for Sweden are recorded and estimated for the full period 1810–2010. We begin by describing each of the historical observations in separate subsections. Thereafter we continue by explaining how we simulated annual age-wealth profiles, and provide results from a number of goodness of fit and sensitivity analyses associated with these simulations.

The structure of the historical data on Swedish wealth distributions across age is relatively homogenous over time, with most sources describing the population divided into age classes, with the number of wealth holders and the sum of their net wealth in each of these classes. However, some differences are worth noting.

i) The *unit of observation* is the individual, but in the 19th century probate wealth data we rely on probated, i.e., deceased, individuals.

ii) The *sample population* is the full adult Swedish population (18 years and older). One exception is one of the 19th century observations, which only covers a parish in Southern Sweden. Another is the tax-return based register data between 1968 and 2006, for which we only have annual information about tax-assessed wealth for those in the population with high enough net wealth to reach the tax threshold. The share of wealth taxpayers was between five and ten percent of all taxpayers during this period (Hochguertel and Ohlsson, 2012). For the period 2000–2007, we also observe the market-valued net wealth of all Swedish individuals in a parallel register database built Statistics Sweden called the Wealth Register (Statistics Sweden, 2006).

iii) The *concept of wealth* is tax-assessed wealth except in the 2000s. For the observations in the 20th century up until 2006, this means that wealth is the net assets taxable according to contemporary wealth tax assessments ("skattepliktig förmögenhet"). Wealth is here defined as the sum of real and financial assets less debts. Assets are reported in tax-assessed values, meaning that some assets, e.g., real estate and corporate stock, are not always reported at their full market value (see Roine and Waldenström, 2009, for a detailed discussion). The 19th century wealth is based on probate records, and thus refers to the rules of the 19th century estate and inheritance tax legislation (see Ohlsson, 2011; Henrekson and Waldenström, 2016).

For the years in the 2000s, we observe wealth both from the tax return-based registers and in the Wealth Register. The concept of wealth in the latter database deviates from the former in several ways. Most importantly, the Wealth Register reports assets in current market values as opposed to tax-assessed values in all the other sources. For housing equity, market values are retrieved from average sales price ratios computed at the municipal level by Statistics

Sweden. For financial assets, market prices at year end for corporate stocks, mutual funds, and bonds are used. Additionally, there are some items included that do not generally appear in tax-assessments and personal tax returns, e.g., condominiums. Despite the important differences between the Wealth Register data of the 2000s (using market-valued wealth for the entire population) and the tax register wealth of the period between 1968 and 1999 (using tax-valued wealth for a small share of the population), we show below that the age-wealth profiles derived from these sources do not differ greatly.

iv) Age classes are not homogenously reported across observations. Specifically, we do not observe wealth at each yearly age but rather in intervals of ages. These intervals also differ across data points as shown by the appendix tables below. For the period from 1968 onwards, however, we have microdata allowing us to use either yearly or year-interval age classes.

To homogenize the age classes across samples, we compute weighted average ages using actual population statistics on the number of living men and women in each age class times their respective age divided by the total number of men and women in each age class. Note that this weighting procedure becomes especially important for the calculation of a representative age for the open age interval in the top of the age distribution when otherwise an arbitrarily set top age could bias the results. Through this procedure, we get a certain age that corresponds to a certain average wealth for all years, which allows for the imputation strategy to attribute age-wealth profiles for all ages and all years in the studied period.

A1.1 The 19th century age-wealth profile

There exist a number of studies where Swedish economic historians have collected data from probate records and estate tax returns with the ambition to reconstruct household portfolios (see, e.g., Isacson, 1979; Magnusson, 1983; Ericsson, 1992; Lindgren, 2002; Hellgren, 2003; Lilja, 2004; Perlinge, 2005). Unfortunately, few of these report the net (or gross) wealth across age classes.

The only two sources of 19th age-wealth distributions to our knowledge are Håkan Lindgren's study of the extent of informal credits in the mid-sized city of Kalmar between 1840 and 1900 and Anders Perlinge's dissertation about the evolution of household indebtedness in the Vånga parish in Sothern Sweden between the 1840s and the 1890s (Perlinge, 2005). In both these studies, information is provided about the total number of deceased, the sum of their net wealth, and the total wealth of the living population (calculated by multiplying the wealth of the deceased by inverse mortality multipliers). These numbers are reported for each decade and men and women in six age cohorts.

An important drawback of both of these studies is their limited geographical coverage. Kalmar was by all means a significant city, being Southwestern Sweden's principal commercial and shipping center Sweden's seventh most populous city. In fact, Lindgren (2002) argues that the city of Kalmar may be a quite typical region for the whole of 19th century Sweden, placed in the country-side and yet taking part in the industrial boom of the end of the century. Perlinge's studied parish is much smaller and exclusively rural. Yet his database is rich both in terms of the number of studied estates, as well as the level of detail regarding the composition of estates in terms of different asset and debt components.

In order to reduce some of the small sample bias coming from having such a small number of deceased in each decade, we sum all the deaths and sums of wealth landing at three 19th century observations: 1840s (encompassing the 1841–1845 Kalmar and the 1840–1859

Vånga), 1870s (1871–1875 Kalmar and 1860–1879 Vånga) and the 1890s (1901–1905 Kalmar and 1880–1899 Vånga). Figure A1 shows the normalized average wealth of these summary series.

[Figure A1, and Tables A1a, A1b and A1c about here]

A1.2 The 1908 age-wealth profile

The earliest source of a nationally representative Swedish age-wealth distribution is to our knowledge a public investigation from 1910 which reports average net wealth across age classes in 1908 (Flodström, 1910). These data are based on a rich sample of estate reports for Swedish deceased in 1908, with estate wealth multiplied by inverse mortality multipliers for a number of groups of different age, gender and civil status.[38] Additional data were also collected by the investigators for the years 1906 and 1907. These years were not analyzed at the same depth as 1908, but they allow for robustness checks especially with regard to the possibility of observing extreme values in estate samples in individual years. These checks do not suggest any oddities in the 1908 data.[39] Figure A2 shows the observed age-wealth profile in 1908.

[Figure A2 and Table A2 about here]

A1.3 The 1920 age-wealth profile

The Census of 1920 was the first Census to report information about income and wealth for the Swedish population. We use information on taxable net wealth reported for different age-classes in Statistics Sweden (1927, p. 124).

[Figure A3 and Table A3 about here]

A1.4 The 1930 age-wealth profile

We use data from the 1930 Census to get information about age-wealth profiles in this year. Data were collected from Statistics Sweden, Statistical Yearbook of 1945 (table 254, p. 302-303), and further information is provided in the Census volume Statistics Sweden (1938, pp. 114ff).

[Figure A4 and Table A4 about here]

A1.5 The 1945 age-wealth profile

We collect information about the Swedish age-wealth population in 1945 from the Census of that year (Statistics Sweden, Statistical Yearbook of 1950, table 303, p. 320–321). Further information is available in Statistics Sweden (1951, table 1, p. 2). This Census observation differs somewhat from the 1920 and 1930 observations since the 1945 data are based on an eight percent sample of the population and not the full population as in the previous years.

[38] See Flodström (1910, Table K). The classes are, except age (which can be found in Table A2): unmarried men; unmarried women; married men; married women; widowers and divorced men; widows and divorced women.

[39] We use all the data from 1906–1908 when estimating the fiscal inheritance flow, shown in the paper's sections 2 and 3.

The listed numbers are scaled up so as to cover the whole population.

[Figure A5 and Table A5 about here]

A1.6 The 1951 age-wealth profile

Information about the Swedish age-wealth profile comes from the Census of 1950, collected from Statistics Sweden, Statistical Yearbook of 1957, table 388, p. 316. Further information can be found in Statistics Sweden (1956, table 1, p. 2).

[Figure A6 and Table A6 about here]

A1.7 The 1966 age-wealth profile

A public investigation called The Capital Taxation Committee ("Kapitalskatteberedningen") was summoned in 1967 to make a complete overhaul of the taxation of capital in Sweden. As part of the investigation, data on the Swedish age-wealth were collected and compiled (SOU 1969:54, tables 17 and 18, pp. 217–218). The numbers are based on a large stratified sample of the Swedish adult population, based on the tax register over individual taxable net wealth for the year 1966.[40]

[Figure A7 and Table A7 about here]

A1.8 Age-wealth profiles since 1968

From 1968 onwards, Sweden launched comprehensive population register databases with demographical and taxation-related information. These registers have been compiled into smaller, nationally representative databases, and we use one of these, the LINDA database, to retrieve information about the average taxable wealth across age classes. LINDA consists of a 3,35% sample of the population, representing between 200,000 and 300,000 individuals during the studied period. While this sample size is sufficiently large for our purposes, there is still a risk that single extreme observations may influence the results and we therefore use three-year averages to smooth out the influence of single-year/individual observations. As noted above, we have no information about wealth after 2007 due to the abolishment of the wealth tax in 2007.

In our estimation of μ, we wish to combine the historical evidence presented earlier and the modern data. To avoid unbalancing the age-wealth sample, especially avoiding giving too much weight to the modern era when we have annual observations, we restrict the modern sample in two ways. First, we only use five dates, 1970 (1969–1971), 1980 (1979–1981), 1990 (1989–1991), 2000 (1999–2001) and 2005 (2004–2006). These years are used since they cover the entire register period. Second, we harmonize these modern observations with the historical evidence by collapsing the yearly age levels into age intervals. We choose the 13 age classes reported in the 1908 sample. Figure A8 shows the resulting age-wealth profiles for the four modern reference years.

[Figure A8 and Tables A8a and A8b about here]

[40] Specifically, 2 percent of individuals with wealth between 0.1 and 0.3 million SEK were sampled, 5 percent between 0.3 and 1 million SEK, 20 percent between 1 and 5 million SEK and 100 percent with wealth above 5 million SEK. The average taxable net wealth in 1966 was 0.027 million SEK. See further SOU 1969:54, pp. 188–191.

As discussed above, the register data consists of tax-assessed wealth for all years up to and including 2006, but also third-party reported market-valued wealth for the period 2000–2007. In our main analysis, we only use the tax-assessed wealth to retain consistency with the historical evidence which exclusively consists of tax-assessed wealth. However, we argue, and also show in the paper's robustness analysis, that the tax-assessed wealth provides a sufficiently good view of the true age-wealth patterns in the Swedish economy.

One indication of the robustness of using tax-assessed wealth to conjecture age-wealth profiles is shown in Figure A9. Here we use yearly ages and instead age-classes as before. The main message is that the age-wealth profile looks roughly the same when one uses tax-assessed wealth of a small share of the population (those with taxable wealth) and market-valued wealth of the whole population. This result provides support for using tax-assessed wealth in our analysis.

[Figures A9 and A10, Tables A9 and A9 about here]

A2. Simulation of annual age-wealth profiles, 1810–2010

In this section, we show how we go from the historical observations of Swedish age-wealth profiles during a few years to having a full set of age-wealth observations for each year and age during the entire period of study, 1810–2010.

As is explained in the main paper, the estimation of Swedish inheritance flows across time requires historical values for the model parameter μ^*, the ratio of average wealth of the deceased population to the average wealth of the living population adjusted for the flow of *inter vivos* gifts across generations that takes may not be captured in the probates. This can actually be done using information about the distribution of wealth of Swedish adults at different ages using the formula

$$\mu^* = \frac{\bar{W}_d}{\bar{W}_l} = \sum_i \frac{M_a}{M}\left(\frac{\bar{W}_{l,a}}{\bar{W}_l}\right) \quad , \tag{1}$$

where M_a is mortality in age class a and W_a wealth in age class a. Note that our μ^* includes all *inter vivos* gifts since we incorporate the observed wealth of the whole living population at a certain point in time, and any gifts that have been given should thus be included in the wealth of the living individuals regardless of their age.

The challenge with estimating μ^* for the full time period is that we lack complete historical information about wealth of Swedish adults across all ages and years back to 1810. Our solution is to use the historical observations reported above to construct a complete dataset by way of simulation. From the Human Mortality Database, we get mortality in each age class M_a (and thus population mortality M) during the full period.

We compute the ratio between the average wealth of different age groups and the average wealth of the adult population as a whole, $\frac{\bar{W}_{l,a}}{\bar{W}_l}$, for all years and ages by regressing the observed historical ratios (reported above) on a set of age and year polynomials. Our main specification looks as follows:

$$\left(\frac{\bar{W}_{l,a}}{\bar{W}_l}\right)_t = b_0 + b_j \sum_{j=1}^{4} Age_{a,t}^{j} + c \cdot Year_t + d(Age_a * Year_t) \qquad (2)$$

The results from this regression are shown in the first column of Table A1. As can be seen from the table, not all age and year regressors are significantly different from zero, but the overall explanatory power (R^2) is still relatively high, around 80 percent. The table also reports the output from four alternative specifications in which variants of the age and year polynomials, and interactions between them, are included. The resulting model parameters associated with these regressions are presented in the subsections below.

Based on the regression output in Table A10, we impute fitted values, $\left(\widehat{\frac{\bar{W}_{l,a}}{\bar{W}_l}}\right)_t$, for each age between 18 and 110 and year between 1810 and 2010. Then we multiply these fitted age-average wealth ratios with the age- and year-specific mortality ratios, $\frac{M_{at}}{M_a}$. Summing these products over ages, we obtain a time series with annual values equal to the right hand side of equation (1) above, i.e., $\widehat{\mu^*}_t$.

Figure A11 contains three panels. The upper left shows the estimated normalized average wealth ($\widehat{\bar{W}_{l,a}/\bar{W}_l}$) over the life cycle for three years, 1810, 1910 and 2010. The ratio equals one when the age group has an average wealth equal to the population average wealth. As can be seen, the simulated ratios are below one for people up to about 45 years of age and then above one up to their 80's or low 90's when it starts decreasing rapidly.

Is this simulated life cycle pattern with accumulation (relative to the average) up to a certain age and then decumulation evidence in favor of the standard hump-shaped life cycle profile of the Ando-Modigliani model? Actually no. It is crucial to note that the decumulation begins very late in life. In 1810, when the expected life span was 40 years for newborns and 70 years for people living to see their 50th birthday (see Statistics Sweden, 1969, table 42, p. 118), the estimated relative average wealth increases up to age 70. That is, people accumulated wealth virtually to their expected point of death! Similarly, in 1910 people accumulated wealth up to the age of 72 while the average life span was 54 years and the expected life at 50 was 74 years. In 2010, the pattern is somewhat weakened. People accumulated up to the age of 74 while the expected life span had increased to around 80 (see Statistics Sweden, 2013), suggesting an earlier decumulation than in historical periods.

Figure A11 also presents the estimated μ^* and the implied inheritance flow (B/Y), which is the same series as in our main paper.

[Figure A11 about here]

How well does the simulated age-normalized wealth profile match the underlying historical observations? Figure A12 provides a simple goodness of fit test, in which we simply plot the simulated profiles onto the actual evidence for the respective years. This check is mainly ocular, and inspecting the results gives a good sense of how well the model fits the data. Especially during the 19th century the differences are at times quite large, which is expected given the small and highly specific sample of age-wealth observations used for these early years.

One common pattern seems to be that the decumulation presented in the simulated profiles is not as evidence in the historical evidence up to the 1950's. Since we are using grouped data for all years before 1968, it is possible that the grouping of individuals in age classes may explain why we cannot see any decumulation in earlier times.

[Figure A12 about here]

A3. Robustness checks: different models when simulating age-wealth profiles

One element of uncertainty in our estimations of historical age-wealth profiles is the assumed model specification in equation (2) and its impact on the resulting μ^* and inheritance flow. Because of this uncertainty, this section presents the results from using four alternative specifications.

A3.1 Using linear age and year trends and age-year interaction

In our first alternative specification, we remove the polynomials in age and run a linear model with an interaction term between age and year.

$$\left(\frac{\bar{W}_{l,a}}{\bar{W}_l}\right)_t = b_0 + b \cdot Age_a + c \cdot Year_t + d(Age_a * Year_t) \qquad \text{(A1)}$$

Figure A13 presents the results from using simulated age-wealth profiles based on this linear specification (see also Table A11, column 2, for the regression output). The age-wealth profile is quite different, naturally due to the fact that there are no polynomials in age and thus no room for a gradual transition from accumulation to decumulation. The estimated μ^* is at the same level as in the main model but only up to the postwar era, thereafter it continues to increase all the way up to 2010. This increase reflects that the relative wealth decumulation among the elderly observed in the main model is not present in the linear model (by construction through the absence of age polynomials). The increase in β therefore translates into a higher μ^*in the period after 1980.

Looking at the inheritance flow in the linear model, the overall level is slightly higher than in the main model, with the flow surpassing ten percent in 2010 (as opposed to eight percent in our main model). Still, the time profile looks similar as in the main model, with a relatively high level during the 19th century up to the 1910s, and thereafter a secular decline up to the late 1980s when the inheritance flow increases sharply.

[Figure A13 about here]

A3.2 Using age polynomials but no time trend

Another alternative specification used is one where we remove time entirely from the regression model:

$$\left(\frac{\bar{W}_{l,a}}{\bar{W}_l}\right)_t = b_0 + b_j \sum_{j=1}^{4} Age_{a,t}^{j} \qquad \text{(A2)}$$

Figure A14 shows the results from a simulated age-wealth profile without time trend. The result is quite striking: there is remarkably little difference between the main results in Figure A12 and these results. Of course, the simulated age-wealth profiles are constant over time, but the implied μ^* is only slightly lower than in the main model. For this reason, the resulting inheritance flow is almost the same.

[Figure A14 about here]

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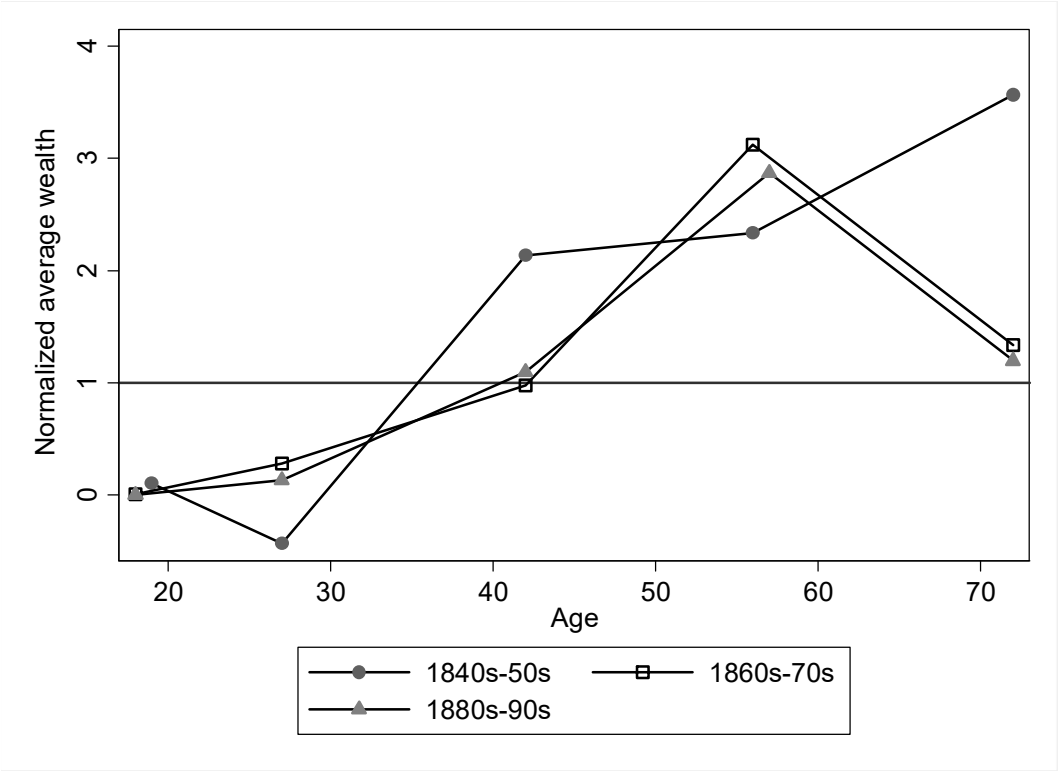
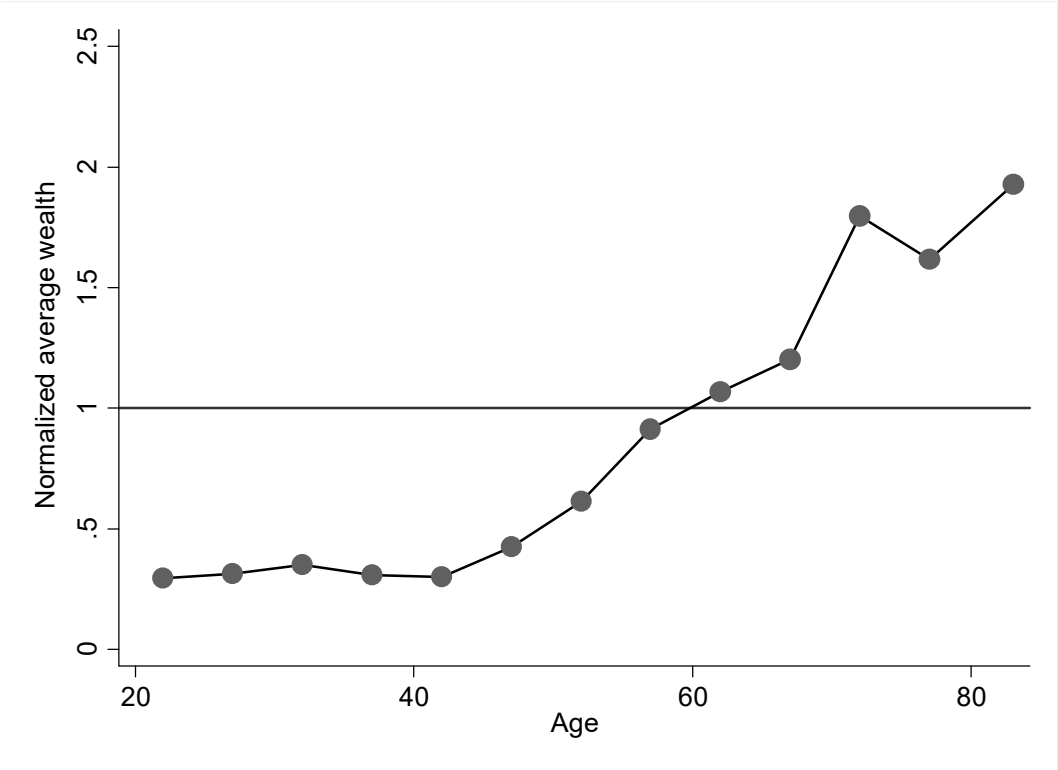
Figure A1: Age-wealth profiles between 1840s and 1890s.



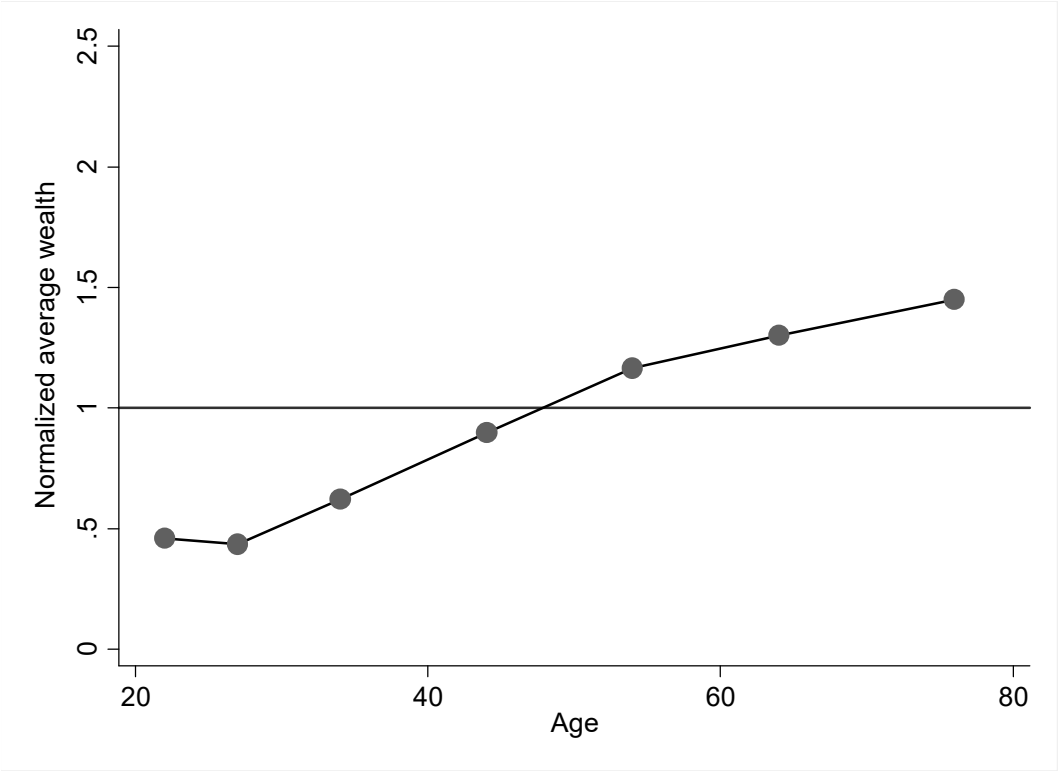
Note: Normalized average wealth is defined as $\bar{W}_{l,i}/\bar{W}_{l}$. Data come from Table A3.

Figure A2: Age-wealth profile in 1908.



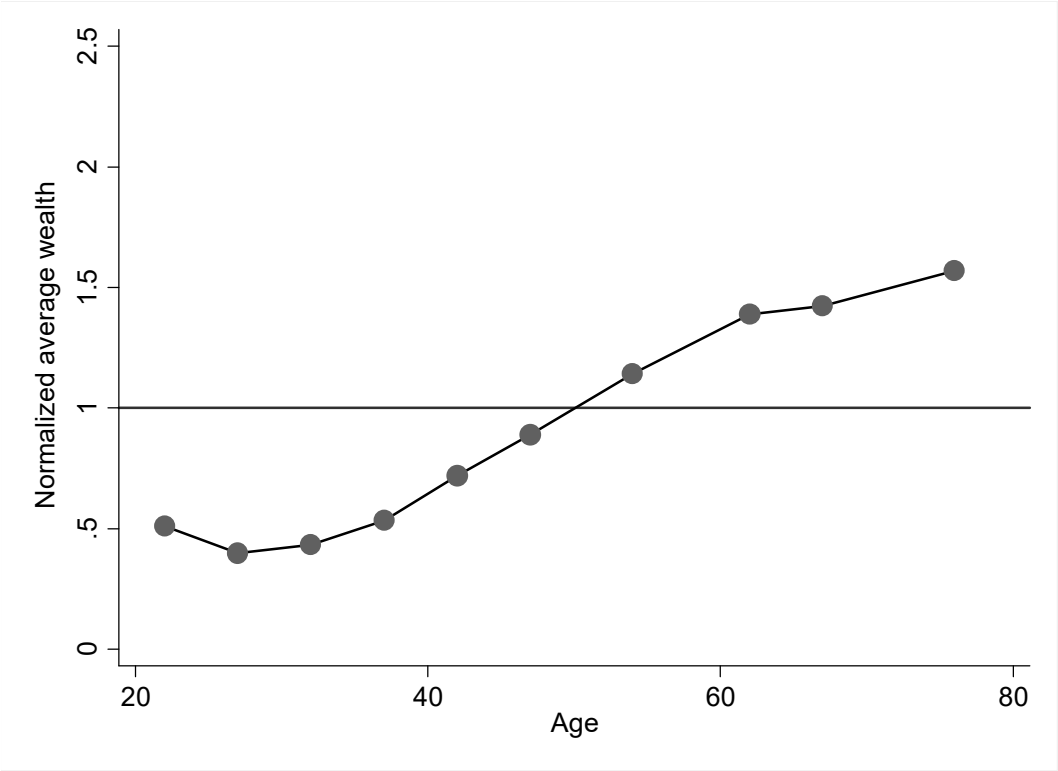
Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$, come from Table A2.

Figure A3: Age-wealth profile in 1920.



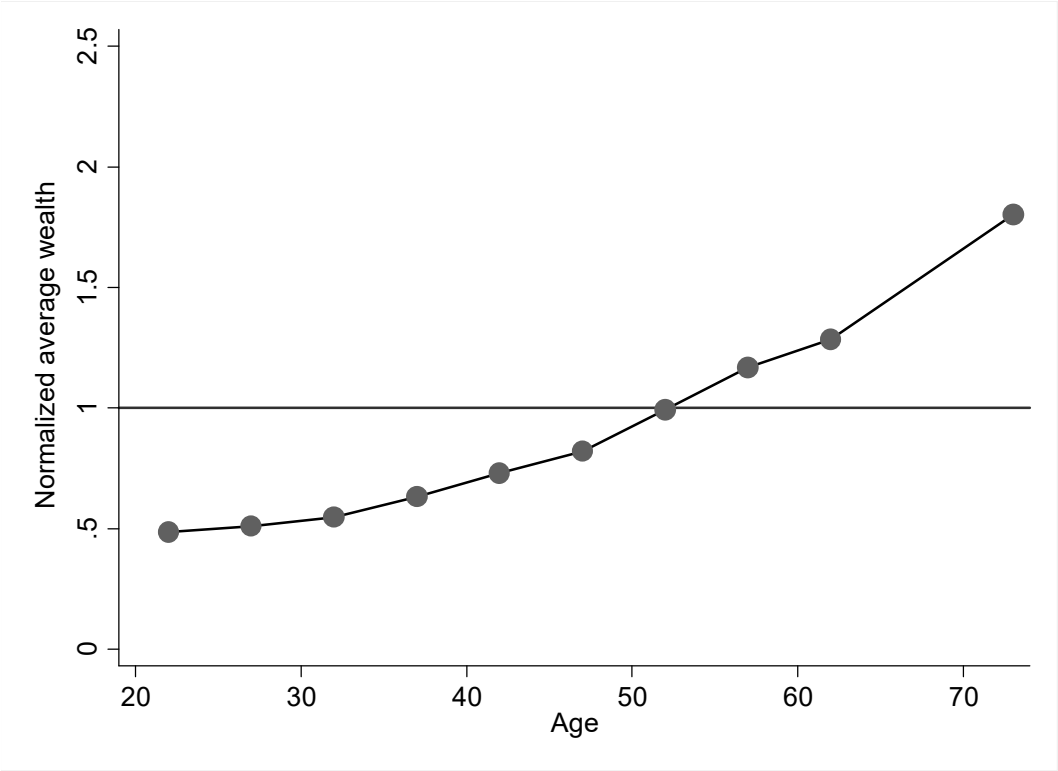
Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$, come from Table A3.

Figure A4: Age-wealth profile in 1930.



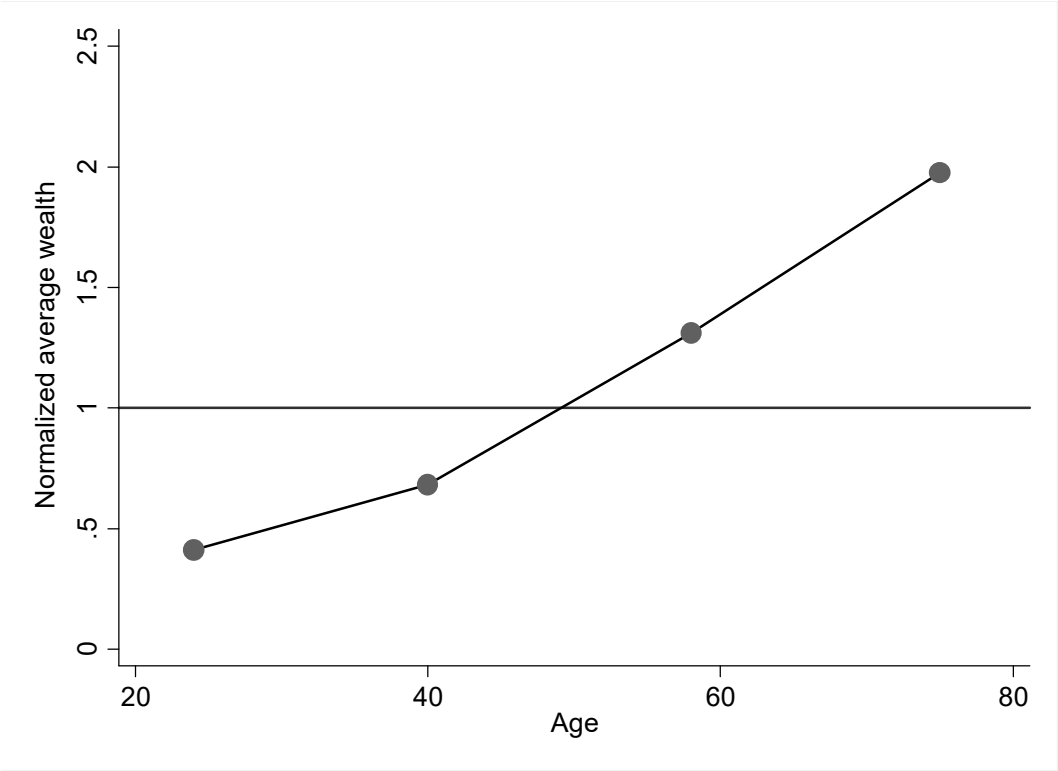
Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$, come from Table A4.

Figure A5: Age-wealth profile in 1945.



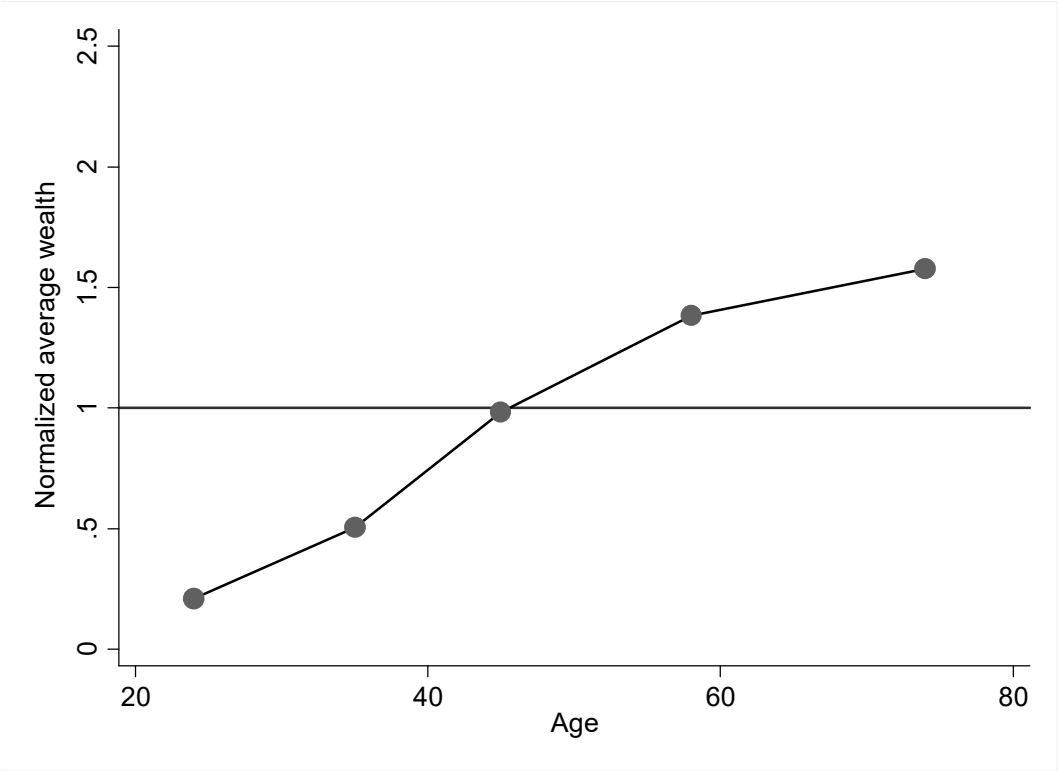
Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$, come from Table A5.

Figure A6: Age-wealth profile in 1951.



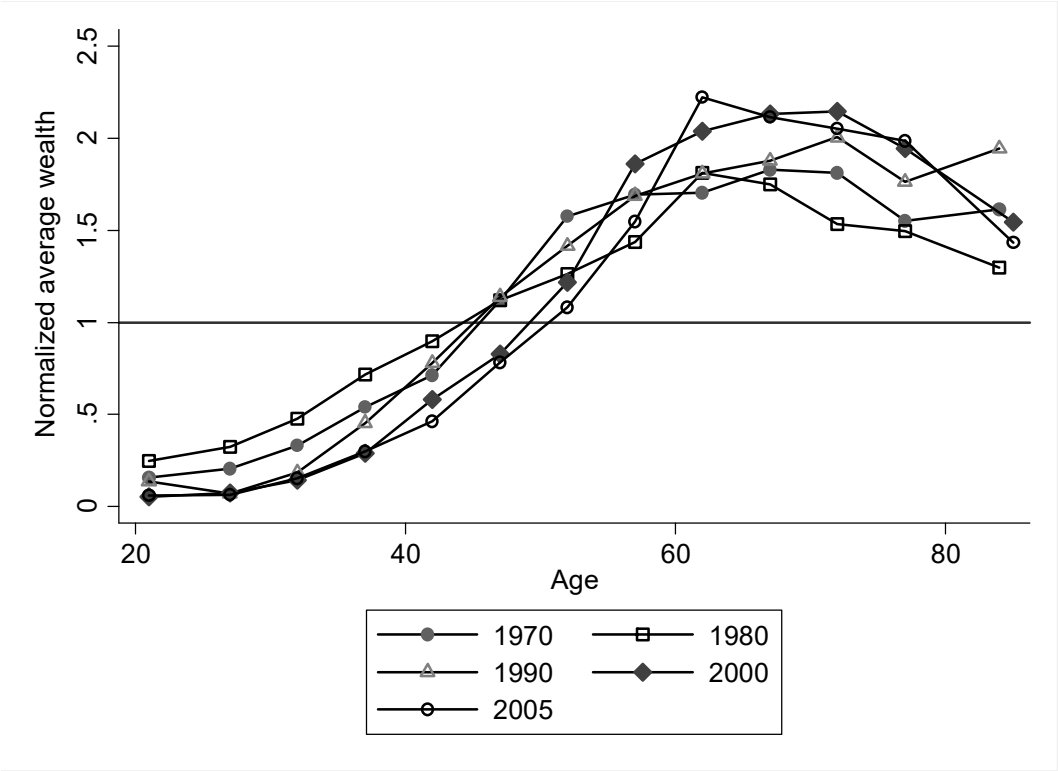
Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$, come from Table A6.

Figure A7: Age-wealth profile in 1966.



Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$, come from Table A7.

Figure A8: Age-wealth profiles in 1970, 1980, 1990, 2000 and 2005.

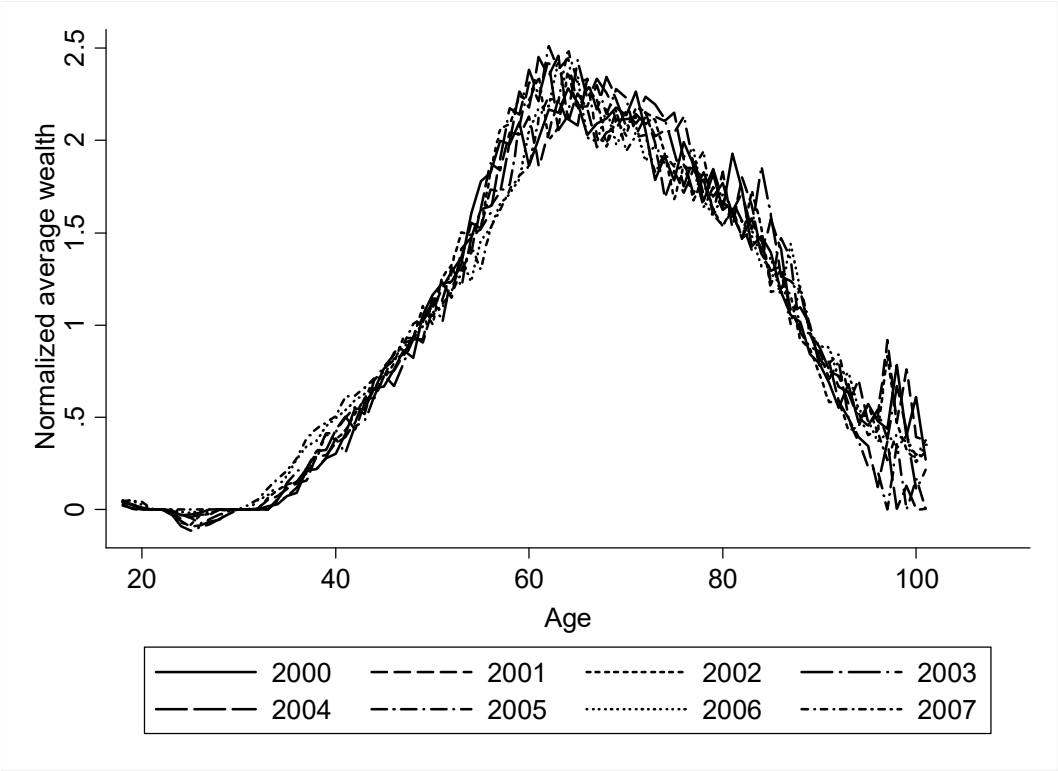


Note: Normalized average wealth is defined as $\bar{W}_{l,i}/\bar{W}_l$, (see, e.g., Table A1). Observations are three-year averages, with the denoted years as midpoint.

Figure A9: Age-wealth profile in 2005, tax-valued vs. market-valued wealth.

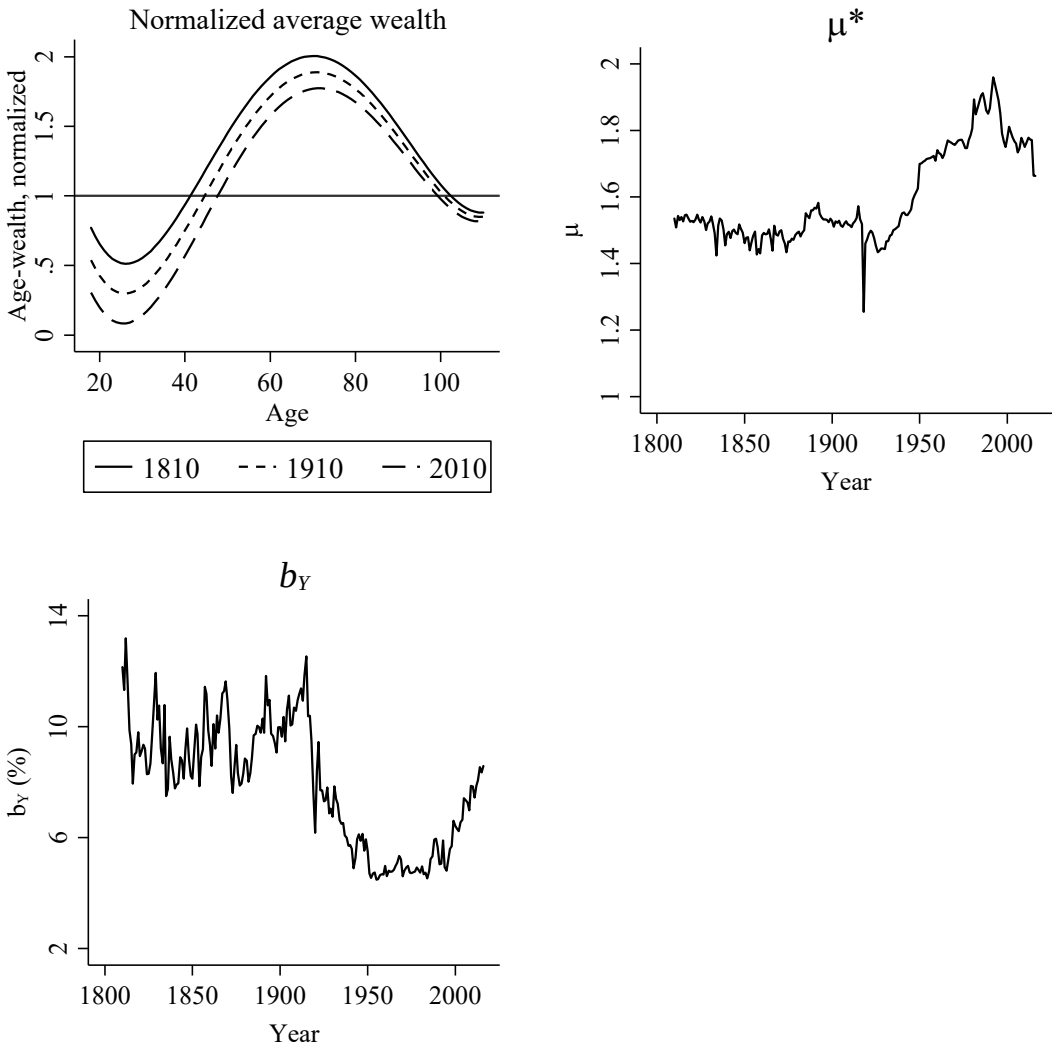
Note: Normalized average wealth, $\bar{W}_{l,a}/\bar{W}_l$, annual values corresponding to values in Tables A8b and A9. Observations are three-year averages, with the denoted year as midpoint.

Figure A10: Age-wealth profile in 2000–2007, market-valued wealth.



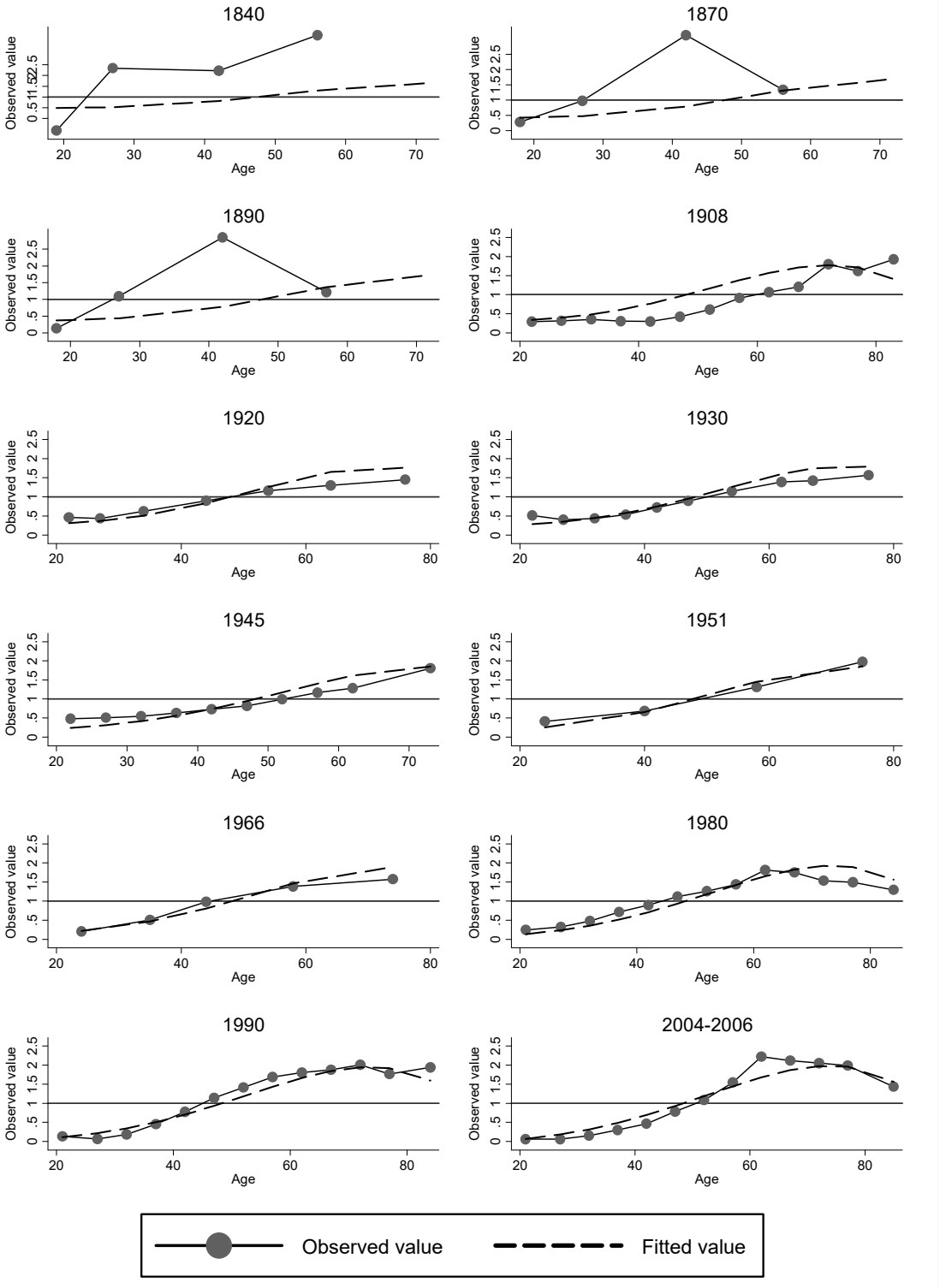
Note: Normalized average wealth, $\bar{W}_{l,i}/\bar{W}_l$. Data come from Statistics Sweden's Wealth Register and LINDA. The variable names in Register database for net wealth are "fnettw" and "cfnetto".

Figure A11: Age-wealth profiles, implied μ^* and inheritance flow (b_Y): Main model.



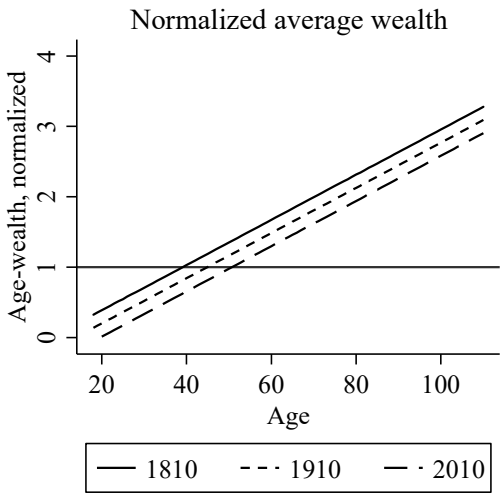
Note: The normalized average wealth, $\overline{W}_{l,a}/\overline{W}_l$, the ratio of average wealth of the living in each age class to the average wealth of the living in the whole population.

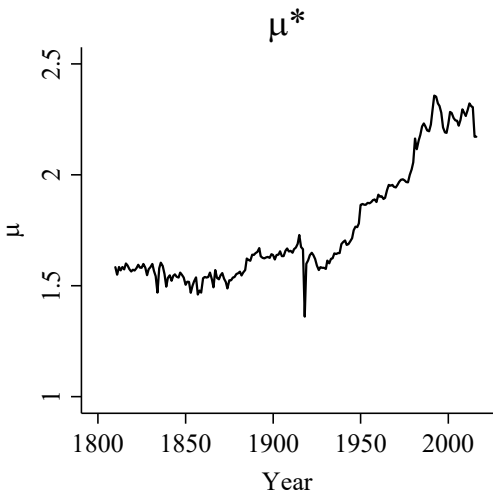
Figure A12: Goodness of fit: simulated and actual age-wealth profiles (main model).



Note: The figures show observed and simulated values of the normalized average wealth, $\overline{W}_{l,a}/\overline{W}_l$, the ratio of average wealth of the living in each age class to the average wealth of the living in the whole population.

Figure A13: Age-wealth profiles, implied μ^* and inheritance flow (b_Y): Linear model.





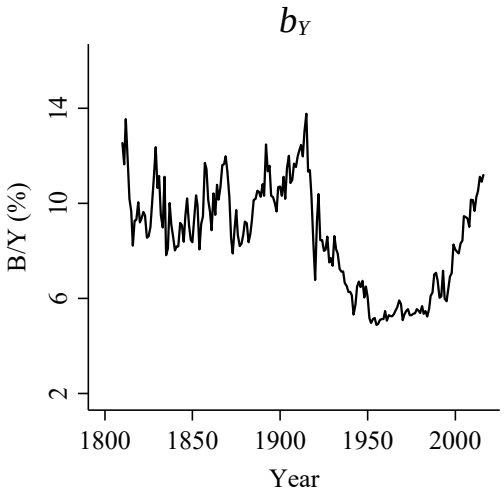


Figure A14: Age-wealth profiles, implied μ^* and inheritance flow (b_Y): No time trend.

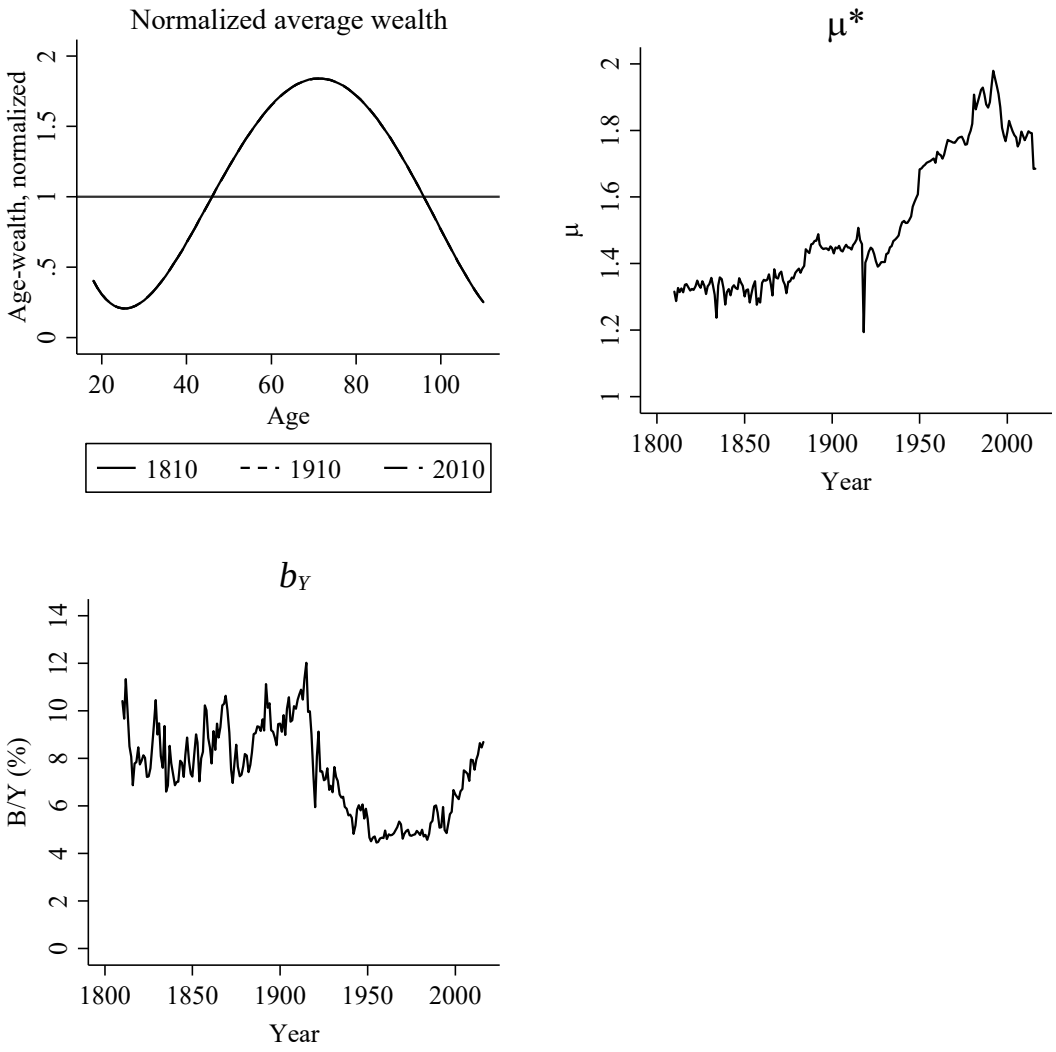


Table A1a: Age-wealth profiles between 1840s and 1890s: Kalmar city

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
1841–1845					
15–19	27	630			
20–34	42	1,652	–1,014,758	–614	–0.71
35–49	56	1,103	2,461,423	2,232	2.58
50–40	72	598	1,162,130	1,943	2.24
65–	19	245	1,054,587	4,304	4.97
All	39	4,228	3,663,382	866	1.00
1871–1875					
15–19	18	924			
20–34	27	2,359	3,693,793	1,566	0.27
35–49	42	2,053	11,721,115	5,709	0.98
50–40	56	1,264	22,269,970	17,619	3.01
65–	72	477	3,672,043	7,698	1.32
All	40	7,077	41,356,921	5,844	1.00
1901–1905					
15–19	18	1,211			
20–34	27	3,104	5,234,230	1,687	0.12
35–49	42	2,388	37,166,680	15,567	1.10
50–40	57	1,707	73,000,918	42,778	3.03
65–	72	1,172	19,756,758	16,857	1.19
All	42	9,581	135,158,586	14,108	1.00

Note: For age group 15–19 years we only have information about the number of individuals. "Average age, weighted" represents the actual average age within each age classes, calculated as the number of adults times their respective age (in yearly age classes) divided by the number of adults using population data from Statistics Sweden. "Normalized average wealth" is the ratio of average wealth of the living in each age class to the average wealth of the living in the whole population. Data come from adjusted data from Lindgren (2002), kindly provided by Håkan Lindgren.

Table A1b: Age-wealth profiles between 1840s and 1890s: Vånga parish

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
1840–1859					
15–19	27	1,133	212,986	188	0.49
20–34	42	807	236,678	293	0.76
35–49	56	518	561,920	1,085	2.82
50–40	72	255	125,527	492	1.28
65–	19	427	72,029	169	0.44
All	39	3,140	1,209,140	385	1.00
1860–1879					
15–19	18	462	21,630	47	0.16
20–34	27	1,079	335,671	311	1.08
35–49	42	891	230,701	259	0.90
50–40	56	471	197,353	419	1.45
65–	72	205	111,157	542	1.88
All	40	3,108	896,512	288	1.00
1880–1899					
15–19	18	446	0	0	0.00
20–34	27	822	237,269	289	0.73
35–49	42	794	206,271	260	0.66
50–40	57	673	269,439	400	1.01
65–	72	410	528,364	1,289	3.27
All	42	3,145	1,241,343	395	1.00

Note: See Table A1a for description of variables. Data come from adjusted data from Perlinge (2005), kindly provided by Anders Perlinge.

Table A1c: Age-wealth profiles between 1840s and 1890s: Kalmar city and Vånga parish

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
1840–1859		1,057	72,029	68	0.10
15–19	27	2,785	–801,772	–288	–0.44
20–34	42	1,910	2,698,101	1,413	2.14
35–49	56	1,116	1,724,050	1,545	2.34
50–40	72	500	1,180,114	2,360	3.57
65–	19	7,368	4,872,522	661	1.00
All	39				
1860–1879		1,386	21,630	16	0.00
15–19	18	3,438	4,029,464	1,172	0.28
20–34	27	2,944	11,951,816	4,060	0.98
35–49	42	1,735	22,467,323	12,949	3.12
50–40	56	682	3,783,200	5,547	1.34
65–	72	10,185	42,253,433	4,149	1.00
All	40				
1880–1905		1,657	0	0	0.00
15–19	18	3,926	5,471,499	1,394	0.13
20–34	27	3,182	37,372,951	11,747	1.10
35–49	42	2,380	73,270,357	30,792	2.87
50–40	57	1,582	20,285,122	12,822	1.20
65–	72	12,726	136,399,928	10,719	1.00
All	42	1,057	72,029	68	0.10

Note: These data are sums of the values for Kalmar city (Table A1a) and the Vånga parish (Table A1b). See further the notes under these tables.

Table A2: Age-wealth profile in 1908

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
20–25	22	2,217	3,670	1,656	0.30
25–30	27	19,500	34,406	1,764	0.31
30–35	32	24,333	47,697	1,960	0.35
35–40	37	48,651	84,110	1,729	0.31
40–45	42	92,686	155,551	1,678	0.30
45–50	47	115,237	275,009	2,386	0.43
50–55	52	130,129	447,122	3,436	0.61
55–60	57	111,116	570,291	5,132	0.91
60–65	62	113,618	680,638	5,991	1.07
65–70	67	118,104	797,013	6,748	1.20
70–75	72	106,644	1,076,455	10,094	1.80
75–80	77	97,414	884,023	9,075	1.62
80–	83	84,839	918,178	10,823	1.93
All	42	1,064,488	5,974,168	5,612	1.00

Note: Data from Flodström (1910, Table K).

Table A3: Age-wealth profile in 1920

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
20–25	22	13,511	140,489	10,398	0.46
25–30	27	29,877	295,449	9,889	0.44
30–40	34	115,335	1,623,130	14,073	0.62
40–50	44	150,211	3,055,765	20,343	0.90
50–60	54	143,099	3,778,595	26,405	1.16
60–70	64	109,791	3,237,024	29,484	1.30
70–	76	60,206	1,978,308	32,859	1.45
All	42	622,030	14,108,760	22,682	1.00

Note: Data from Statistics Sweden (1927), p. 124.

Table A4: Age-wealth profile in 1930

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
20–25	22	21,092	193,332	9,166	0.51
25–30	27	40,907	292,687	7,155	0.40
30–35	32	63,579	493,105	7,756	0.43
35–40	37	81,083	776,190	9,573	0.53
40–45	42	93,689	1,210,785	12,923	0.72
45–50	47	99,087	1,584,295	15,989	0.89
50–60	54	193,389	3,967,681	20,517	1.14
60–65	62	79,322	1,976,612	24,919	1.39
65–70	67	71,227	1,819,991	25,552	1.42
70–	76	101,694	2,865,782	28,180	1.57
All	43	845,069	15,180,460	17,964	1.00

Note: Data from Statistical Yearbook of Statistics Sweden, 1945 (table 254, p. 302-303).

Table A5: Age-wealth profile in 1945

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
20–25	22	37,591	376,970	10,028	0.49
25–30	27	66,145	695,818	10,520	0.51
30–35	32	97,999	1,110,111	11,328	0.55
35–40	37	131,944	1,725,186	13,075	0.63
40–45	42	145,358	2,193,481	15,090	0.73
45–50	47	147,896	2,504,670	16,935	0.82
50–55	52	141,332	2,900,492	20,523	0.99
55–60	57	131,205	3,168,052	24,146	1.17
60–65	62	111,512	2,965,116	26,590	1.29
65–	73	196,709	7,327,399	37,250	1.80
All	43	1,207,691	24,967,295	20,674	1.00

Note: Data come from Statistics Sweden, Statistical Yearbook of 1950, table 303, p. 320–321.

Table A6: Age-wealth profile in 1951

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
16–30	24	293,000	1,743	5,949	0.41
31–50	40	913,000	8,976	9,831	0.68
51–67	58	675,000	12,750	18,889	1.31
68–	75	259,000	7,378	28,486	1.98
All	44	2,140,000	30,847	14,414	1.00

Note: Data come from Statistics Sweden, Statistical Yearbook of 1957, table 388, p. 316.

Table A7: Age-wealth profile in 1966

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
20–29	24	587,511	3,685	6,272	0.21
30–39	35	535,844	8,105	15,126	0.50
40–49	45	589,281	17,402	29,531	0.98
50–66	58	1,080,967	44,890	41,528	1.38
67–	74	567,246	26,863	47,357	1.58
All	46	3,360,849	100,945	30,036	1.00

Note: Data from SOU 1969:54, tables 17 and 18, pp. 217–218.

Table A8a: Age-wealth profile in 1980

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
18–25	21	26,423	277,789	10,714	0.23
25–30	27	19,878	290,353	14,792	0.32
30–35	32	22,064	476,299	21,879	0.48
35–40	37	21,066	709,929	32,893	0.72
40–45	42	16,328	665,902	41,158	0.90
45–50	47	14,557	751,501	51,385	1.12
50–55	52	15,254	878,254	57,839	1.26
55–60	57	16,801	1,101,146	65,827	1.44
60–65	62	16,176	1,371,559	83,188	1.81
65–70	67	15,153	1,200,803	80,209	1.75
70–75	72	12,909	906,172	70,386	1.53
75–80	77	9,159	629,605	68,524	1.49
80–	84	9,756	623,511	61,381	1.34
All	47	215,524	9,882,823	45,855	1.00

Note: Data from Statistics Sweden, LINDA. The register variable on net taxable wealth is called formskp in 1979–1981. The equivalent variables are sfo in 1969–1971 and formskp in 1989–1991.

Table A8b: Age-wealth profile in 2005 (2004–2006)

Age class (a)	Average age, weighted (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
18–25	21	25,267	134,724	4,493	0.04
25–30	27	18,649	105,616	5,751	0.06
30–35	32	20,964	286,154	14,017	0.14
35–40	37	22,103	583,707	26,892	0.26
40–45	42	20,631	1,044,556	51,554	0.50
45–50	47	19,837	1,697,403	84,418	0.82
50–55	52	19,689	2,242,371	115,362	1.12
55–60	57	21,592	3,692,950	172,161	1.68
60–65	62	18,349	4,296,455	228,976	2.23
65–70	67	13,920	3,017,726	217,788	2.12
70–75	72	11,816	2,502,822	212,296	2.07
75–80	77	10,858	2,146,673	196,702	1.92
80–	85	17,939	3,044,973	146,278	1.43
All	49	241,620	24,794,941	102,627	1.00

Note: Data from Statistics Sweden, LINDA. The register variable on net taxable wealth is called fsp.

Table A9: Age-wealth profile in 2004–2006, market-valued wealth (SEK).

Age (a)	Number of wealth holders (N_a)	Sum of wealth ($W_{l,a}$)	Average wealth ($\bar{W}_{l,a}$)	Normalized average wealth ($\bar{W}_{l,a}/\bar{W}_l$)
20	3,691	258,706	63	0.11
30	3,981	578,937	101	0.18
40	4,568	1,711,256	335	0.59
50	3,968	2,775,591	628	1.10
60	4,379	4,397,395	924	1.62
70	2,484	2,479,160	1,016	1.78
80	2,026	1,735,173	892	1.56
90	688	461,297	775	1.36
100	31	11,337	449	0.79
All	243.366	139,027,796	412	1.00

Note: Data from Statistics Sweden's Wealth Register and LINDA. The register variable on wealth is fnettw.

Table A10: Polynomial regressions underlying simulated age-wealth profiles

	Main model	Linear model	No trend-model
Age	–0.116	0.030***	0.021
	(0.201)	(0.002)	(0.200)
Age^2	–0.006		–0.000
	(0.006)		(0.007)
Age^3	0.000		0.000
	(0.000)		(0.000)
Age^4	–0.000		–0.000
	(0.000)		(0.000)
$Year$	–0.011***	–0.004***	
	(0.003)	(0.001)	
$Age * Year$	0.000***		
	(0.000)		
$Constant$	9.110***	6.426*	0.900
	(3.263)	(3.628)	(1.317)
Observations	126	126	126
R-squared	0.631	0.567	0.566

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix B Adult mortality in Sweden

B1. Estimating mortality, population-wide and across age groups

Data on demographic variables for Sweden are available annually since 1751 in the Human Mortality Database.[41] We use the year tables specifying the number of living individuals ("Population size") and the number of deaths ("Deaths") for each age between 0 and 110+. Details on the data series is reported by Glei, Lindström and Wilmoth (2012). The data series reflect residents of Sweden, the *de jure* population. The main data source for the period from 1860 onwards is the population Censuses, launched each decade up to the mid- 20th century. For the period before 1860 data are based on exposure rates reported in five-year intervals.

Data quality is high throughout the time period, but highest from 1860 onwards. Prior to 1860 the accuracy is somewhat lower. For example, for Stockholm the *de facto* population is used. The age-specific numbers are also less reliable due to errors in the reporting routines. Specifically, there is evidence of age-heaping, with death counts being consistently higher in the younger five-year groups within each 10-multiple of age (e.g., 20–24, 30–34 etc.) than in the older five-year groups (e.g., 25–29, 35–39 etc.).

Our analysis of inheritance flows focuses on transfers from deceased adults to their relatives (mainly children). Therefore we only study the adult population and remove all individuals below 18 years of age in the calculations.

We define population mortality m as the relation between the number of deceased individuals during each year, M, and the number of living adult individuals, N, i.e., as:

$$m = \frac{M}{N} \ . \qquad \text{(A3)}$$

We also divide the mortality into age-specific intervals. For each age a the number of adult deaths is M_a and the number of living adults N_a. Age-specific mortality rates is then computed as $m_a = M_a/N_a$ with the population mortality rate thus equaling $m = \sum_a M_a/N_a$.

B2. Correcting for differential mortality across wealth classes

When estimating inheritance flows using mortality rates among people with different age and personal wealth, there may be a need to account for potential mortality differentials existing across groups with different wealth or, more generally, in different social classes.[42] In our particular case, the estimation of the parameter μ^* consists of calculating the average wealth of the deceased and the living populations, and these are numbers based on combining information about age-wealth profiles (either from estate tax returns as in France, see Piketty, 2011, or from wealth tax returns as in the case of Sweden, see this study) and information about age-specific mortality rates. As explained by Piketty (2010, section B2, pp. 77ff), poor people die off more often than rich people do, therefore the raw aggregate mortality numbers across age cohorts found in the demographical databases need to be adjusted for the mortality differentials across social class. The wealthy are less likely to die at any age, and therefore the expected flow of inherited capital from that age needs to account for this lower wealth-adjusted mortality to avoid getting too high inheritance flows.

[41] The HMD database (www.mortality.com) s constructed by demography researchers from different countries and made freely available to other researchers.
[42] See, e.g., the discussion of Atkinson and Harrison (1978), chapter 3, pp. 53ff.

There is a large previous literature studying mortality differences across economic status, especially concerning recent decades. Looking specifically at personal wealth as a measure of status, Attanasio and Hoynes (2000) compute mortality differentials across different age-wealth cohorts in the United States during the 1980s. They find that the mortality among the relatively poor is consistently higher than the mortality among middle- and high-wealth groups. According to their estimates of individuals aged 50 years of higher, the mortality rate in the lowest wealth quartile was between two and three times higher than the mortality in the top three quartiles.[43] Similar evidence has been found by several other postwar studies for different countries.[44] In his study of inheritance in France, Piketty (2011) uses the social mortality differentials found by Attanasio and Hoynes (2000) when adjusting for the recorded mortalities for socioeconomic status over his entire study period 1820–2010. Piketty thereby assumes that these differences are both constant over time and regions.

However, can we be sure that the social gradient in mortality was the same a century ago or even before the industrial expansion? There is a specific literature looking at historical mortality differentials across socioeconomic groups. In a recent review, Bengtsson and van Hopper (2011) find that while such differentials have existed for a long time, the available evidence does not suggest that they were consistently larger in either pre-industrial or industrializing societies than today. Nor was there any seeming impact from industrialization on socioeconomic mortality differentials.

In the case of Sweden across historical eras, one recent analysis of mortality differentials across social classes in Southern Sweden during 1815–1968 fail to find any evidence of a gradient prior to World War II and only some evidence of such a gradient in the postwar era (Bengtsson and Dribe, 2011). Similar results are found by Edvinsson and Lindkvist (2011) in their study of 19th century mortality in a northern Swedish town. Based on these results and earlier studies of Swedish mortality trends, they conclude that mortality trend differences between socioeconomic classes are a very recent phenomenon.

An older Swedish historical investigation of the link between mortality and wealth is Flodström's (1910) study of estates and wealth in the Swedish population in the years 1906–1908. Flodström discusses the mortality differentials and their importance for the computation of mortality multipliers for the Swedish wealth distribution. He refers to an earlier Danish investigation of mortality across three broader social classes in the 1870's and then he adjusts the findings from that study to match the Swedish situation. In Table B1 his mortality rates for Swedish towns around 1908 are presented for men and women across age cohorts and social class.[45] A main message from the table is that there was indeed a clear differential in mortality across classes; the highest class had a lower mortality than the population as a whole, with the differential being smaller in Stockholm than in other towns and smaller the older people get.

For women, the differential across social groups is much smaller than it is for men. In fact, it

[43] See Attanasio and Hoynes (2000), table 4, p. 9.
[44] See further the discussion of Kopczuk and Saez (2004), Appendix B pp. 37–39.
[45] We have merged these two groups into one common group, "Urban Sweden", which is an aggregate wealth-weighted average between Stockholm (0.5) and provincial towns (0.5). The basis for regional wealth weights is property tax assessments, which show that Stockholm had 42 percent of the value of all urban non-agricultural property (SOS Statistisk Årsbok 1910, table 104, p. 138). Adding to this the fact that Stockholm was Sweden's financial center and net financial assets were surely skewed towards Stockholm, and overall 50 percent-share of all the country's wealth is a plausible "educated guess".

is almost insignificant, with the highest class having only a few percent smaller mortality rates than the population as a whole. The social mortality gradient for the whole Swedish urban population is therefore less pronounced than it is for men only. If one also would to include the rural population to achieve a gradient for the entire population, would that be steeper or flatter than the urban one? This is an empirical question for which we have no conclusive evidence, but some evidence is cited by Flodström (1910) from another Danish study of rural mortalities. The main conclusion from these data is that the mortality differentials across social groups are less pronounced in the countryside than in cities. Amending the numbers for Swedish urban males with numbers for women and for the rural population, it seems as the social mortality differentials in Sweden around 1900 were quite modest.

[Table B1 about here]

In comparison with the mortality differentials of Attanasio and Hoynes (2000), which are also used for 19th and 20th century France by Piketty (2011), these Swedish historical findings of small differentials are challenging. Mortality among the richest quartile of 50-year old U.S. household heads (mainly men) was about a fourth of the mortality among the whole population (0.2 percent vs. 0.9 percent).[46] According to Table 1, the mortality among the richest third among Stockholm males was two thirds of the population mortality (1.6 percent vs. 2.4 percent). For the oldest, aged 75 and above, mortality of the richest U.S. quartile was about half the population mortality but one twentieth among Stockholm males (and a fifth among males in other provincial towns).

We conclude from the Flodström (1910) investigation of urban males and females, from the Danish evidence of a smaller mortality differential in the rural regions than in cities, and also the analysis of Swedish historical demographers Bengtsson and Dribe (2011), that the mortality differentials in Sweden in historical time up to at least World War II *were substantially smaller* than those that Attanasio and Hoynes (2000) find for the U.S. of the 1980's.

To estimate Swedish wealth-adjusted mortalities by age, we use the numbers from Flodström (1910) in Table B1 to calculate the differential mortality for the rich. Specifically, we acknowledge the fact that the upper-class males of "Urban Sweden" were the owners of the bulk of the wealth in Sweden around the turn of the century, and this means that we can use the mortality differentials for urban men in the table for our purposes.[47] One may object by saying that also the non-elite urban men, against whom the mortality differential is geared, were wealthier than the rest of the non-wealthy or even poor population. If true the calculated mortality differential in Table B1 would be too small and probably also too flat over the age distribution. However, this is not necessarily the case. First, there were plenty of poor male industrial workers, close to the archetypical "proletariat" class, living in Swedish towns around the turn of the century 1900. Second, some women were surely among the wealthiest, and if we would weight them into the picture we would incorporate some of the even smaller and flatter mortality differential that is apparent among the urban females. Third, it is not obvious that the urban population was all that much poorer than the city population; Sweden had a relatively high share of self-owning farmers and including them into the lower classes

[46] See Attanasio and Hoynes (2000), table 4, p. 9.

[47] "Urban Sweden" is an aggregate wealth-weighted average between Stockholm (0.5) and provincial towns (0.5). Basis for regional wealth weights is property tax assessments showing that Stockholm had 42 percent of the value of all urban non-agricultural property (SOS Statistisk Årsbok 1910, table 104, p. 138). Adding to this the fact that Stockholm was Sweden's financial center and net financial assets were surely skewed towards Stockholm, and overall 50 percent-share of all the country's wealth is a plausible "educated guess".

would not necessarily increase differentials, perhaps quite the contrary.

We therefore feel confident that the Swedish mortality differentials across social classes, and thus also across wealth levels, are appropriately represented by the numbers for urban males shown in Table B1. In our estimations, we adjust these differentials so as to match the methodology set out by Piketty (2011) where the differentials for practical purposes are characterized in terms of two social groups: the poor and the rich. The mortality rate at age a for the poor part of the population is denoted m_a^{Poor}, the mortality rate at age a for the rich population m_a^{Rich}, the mortality rate at age a for the whole population is denoted m_a. The poor, for which mortality rates are relatively high, are assumed to own one tenth of all private net wealth, which is historically is the share of wealth of the bottom half (and even bottom nine deciles) of the Swedish wealth distribution (Roine and Waldenström, 2009).[48] We need to translate the differentials between rich and poor (the rest) in Table B1, which only suggested how to scale down the mortality of the rich, such that the overall mortality rate is the same. This means that the poor have somewhat higher mortality rates than the population average such that the difference between rich and poor (according to Table B1) is sustained. The resulting differential mortality rates are shown in Table B2.

[Table B2 about here]

Our preferred social mortality multipliers are presented in Table B2, and they are used in all the analyses of the paper. However, since the mortality differentials found by the careful analysis of Attanasio and Hoynes (2000) for the U.S. in the 1980s were deemed as quite general, and thus also used for France over the entire 19th and 20th centuries, it would be interesting to see how different the Swedish mortality differentials are. Figure 3 in the main part of the paper contrasts these different assumptions about mortality differentials.

B3. Effects on the estimated inheritance from different assumptions on differential mortality

Given the difficulty in estimating differential mortality we also check the impact of different assumptions. More precisely we study the final resulting inheritance flows in three cases; 1) our benchmark case explained above, 2) using the Attanasio-Hoynes (2000) differentials, and 3) a version where we assume that development and the welfare state eliminates the socio-economic mortality differentials by the year 2000. For this case we linearly interpolate between the value 1 in year 2000 and the values observed for 1910 in Flodström (1910) and then extrapolate this back to 1870 (roughly the start of industrialization in Sweden). For the years before 1870 we use the 1870 values. Table B3 shows the resulting mortality differentials from this exercise. Notably, the wealth-mortality gradient in 1870 is almost the same as found by Attansio and Hoynes (2000) for the US in the 1980s. As shown in Figure 6 in the main part of the paper the end result of the exercise is that the overall trends are quite robust to these different possibilities.

[Table B3 about here]

[48] This wealth share is also assumed by Piketty (2011) in the case of France.

B4. References to Online Appendix B

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Table B1: Differential mortality rates across age and social class, Sweden 1908.

Age, years	Male mortality rate (%):			Female mortality rate (%):		
	All classes	The highest class	Share of the highest class in all	All classes	The highest class	Share of the highest class in all
			Stockholm:			
45 – 55	2.4	1.6	67%	1.2	1.0	88%
55 – 65	3.9	3.1	80%	2.0	1.7	87%
65 – 75	7.2	5.7	78%	4.4	4.3	98%
75 and older	14.7	13.9	95%	12.7	12.0	95%
			Swedish provincial towns:			
45 – 55	1.8	1.2	68%	1.0	0.9	83%
55 – 65	3.0	2.5	84%	1.8	1.8	95%
65 – 75	6.1	5.3	86%	4.3	3.5	81%
75 and older	13.9	11.3	81%	12.1	10.6	87%
			Urban Sweden (Stockholm + Swedish provincial towns):			
45 – 55	2.1	1.4	67%	1.1	1.0	86%
55 – 65	3.5	2.8	81%	1.9	1.8	92%
65 – 75	6.7	5.5	83%	4.4	3.9	90%
75 and older	14.3	12.6	88%	12.4	11.3	91%

Source: Table from Flodström (1910). "Urban Sweden" is an aggregate wealth-weighted average between Stockholm (0.5) and provincial towns (0.5). The basis for regional wealth weights is property tax assessments, which show that Stockholm had 42 percent of the value of all urban non-agricultural property (SOS Statistisk Årsbok 1910, table 104, p. 138). Adding to this the fact that Stockholm was Sweden's financial center and net financial assets were surely skewed towards Stockholm, and overall 50 percent-share of all the country's wealth is a plausible "educated guess".

Table B2: Differential mortality rates across wealth classes in Sweden

	Age group (a)			
	18–54	55–64	65–74	75+
m_a^{Poor}/m_a^{Rich}	150%	124%	121%	114%
m_a^{Poor}/m_a	120%	110%	109%	106%
m_a^{Rich}/m_a	80%	89%	90%	93%
Wealth share of the poor	10%	10%	10%	10%
m_a^{Poor}/m_a^{Rich} in France	200%	180%	150%	130%

Note: The mortality differential for France comes from Piketty (2010), table B4, which is based on evidence in Attanasio and Hoynes (2000).

Table B3: Mortality differentials across wealth groups in Sweden, 1870-2000.

	Age co-hort (years)	**Adjustment of mortality rate by wealth class in Sweden (in addition to age-based mortality)**		
		Rich	Poor	Ratio Poor/Rich
1870	-54	0.65	1.45	*2.24*
	55-64	0.72	1.33	*1.85*
	65-74	0.73	1.32	*1.81*
	75-	0.75	1.28	*1.70*
1890	-54	0.72	1.32	*1.83*
	55-64	0.80	1.21	*1.51*
	65-74	0.81	1.20	*1.48*
	75-	0.84	1.17	*1.39*
1910	-54	0.80	1.20	*1.50*
	55-64	0.89	1.10	*1.24*
	65-74	0.90	1.09	*1.21*
	75-	0.93	1.06	*1.14*
1940	-54	0.87	1.13	*1.31*
	55-64	0.93	1.07	*1.15*
	65-74	0.93	1.06	*1.14*
	75-	0.95	1.04	*1.09*
1970	-54	0.93	1.07	*1.14*
	55-64	0.96	1.03	*1.07*
	65-74	0.97	1.03	*1.07*
	75-	0.98	1.02	*1.04*
2000	-54	1	1	*1.00*
	55-64	1	1	*1.00*
	65-74	1	1	*1.00*
	75-	1	1	*1.00*

Appendix C Measuring "fiscal flows" of inheritance in Sweden

C1. Swedish estate data

This appendix gives details on Swedish estate data, both in the form of estate inventory reports and estate tax data. It also explains what data are available for capturing gifts (*inter vivos*).

Filing estate inventory reports (or probate records) has been compulsory in Sweden since 1734. Estate inventory reports have been carefully kept in Sweden for centuries and have also been easily accessible at the local courts and the regional archives. Over time estate reports have then been moved to the regional archives. In principal, this means that a lot of data exists but it is mainly available in regional archives and typically there are no aggregations or overviews of this material (the existing exceptions will be described below). This raw data material was used by Soltow (1985) for studying wealth in Sweden in the beginning of the 1800s. Some other researchers have also based their studies on data sampled from specific geographic areas.[49]

However, after the first of July, 2001, the responsibility for registering estate inventory reports was moved from the district courts to the Swedish Tax Agency. All estate reports are now registered in the Inheritance Tax Register. There are two main parts of this register: First, there is an electronic database where the basic information from the estate report is registered. Since the repeal of the inheritance tax in 2005, this database is, unfortunately, incomplete with respect to economic variables whereas the demographic information still is complete. Second, all documents in each report are scanned and attached to the database entry. This part of the register is still complete.

This move has enabled the construction of a database of intergenerational transfers (BELINDA) for the years 2002-2005. Since the inheritance tax (as well as the gift tax) were repealed in 2005 there is no data after these years. Statistics Sweden was commissioned to organize data on intergenerational transfers (estates, inheritances, taxable gifts during the previous ten years, and insurance payments) using the Inheritance Tax Register of the Swedish Tax Agency as a starting point. Three data sets have been produced:[50]

• All bequests. The inheritance tax data base provides economic information for all estates 2002-2004. This gives a schematic view of the different aspects of intergenerational transfers. The information is, however, not detailed. The items of the estate are valued at tax values and not at market values. There are about 90,000 observations per year and more than 80 variables in this data set.

• All taxable gifts. The register covers all taxable gifts during the period 2002-2004. From 2005 and on, there are no data because of the repeal of the gift tax. There are about 30,000 observations per year and about 10 variables in this data set.

• Bequests of a representative sample. The scanned estate reports provide much richer information. It is possible to construct detailed balance sheets with several different items of financial assets, real assets, and debts. It is also possible to have data both at tax values and

[49] Lindgren (2002), for example, uses estate reports from the town of Kalmar 1840–1905 to study the use of promissory notes to provide credit.

[50] The Swedish Research Council has funded the data base project. Data are available, subject to the usual standard secrecy examination, for researchers through Statistics Sweden's remote access system MONA.

market values. There is also information on who receives the inheritances and how much they receive. It, however, requires considerable resources to collect and transform these data to become electronically accessible. Our basic approach is to focus on the estate reports of deceased people who were included in Statistics Sweden's LINDA data base. The LINDA sample is 3 percent of the Swedish population; consequently the sample size is approximately 3,000 estate reports annually. Data for 2004 and 2005 are available for research. There are more than 100 variables in this data set.

Before the centralization of the responsibility for registering estate inventory reports a number of attempts to collect and organize data on estates and inheritances have been made, typically in connection to evaluations of the inheritance tax. The official government committee on capital taxes (*Kapitalskatteberedningen*) did a very ambitious study of estate inventory reports registered in 1967. This is reported in Chapter 9 of SOU 1969:54. A decade before the official government on inheritance taxes (*Arvsskattesakkunniga*) published a similar study in SOU 1957:48. Similar data can also be found in SOU 1946:79 (*Statsskatteberedningen*). Furthermore, in the beginning of the 1900s, Isidor Flodström organized a series of empirical studies of economic variables (*Finansstatistiska utredningar*). There is a very detailed account of estate reports 1906–1908 in Finansdepartementet (1910b), corresponding information on inheritances can be found in Finansdepartementet (1910a). Statistics based on estate reports from as early as 1873–1877 can be found in Finansdepartementet (1879).

All these historic studies are ambitious and produce interesting results but we still lack continuous time series for the aggregate estate amounts in Sweden over longer time series. What we do have is the aggregate values of the estates of the deceased in:

- 1873 – 1877
- 1906 – 1908
- 1943 – 1944
- 1954/55
- 1967
- 2002 – 2005

The reported estate wealth data are in tax-assessed values and in one our main fiscal flow series we adjust make a coarse adjustment of postwar observations so as to reflect market valued inheritances (before the 1940s tax-assessed values were statutorily set at market values). Specifically, assume that half of the estate wealth comprises dwellings of the deceased and we multiply this wealth by the sale price ratio (ratio of recorded actual sales with tax values) recorded by Statistics Sweden and reported by Waldenström (2016). The difference in inheritance flows when using raw tax-assessed estate wealth is not large (about one half percent of the national income in the 2000s).

C2. Gift correction

We need to add the annual flow of gifts to estate wealth that is transferred from the deceased to the heirs. Ohlsson (2011) reports the annual tax revenue from inheritance and estates during the period 1884–2004. He also reports the annual tax revenue during the period 1915–2004 when there was also a gift tax. The ratio of the sum of gift tax and inheritance (and estate) tax revenues to the inheritance (and estate) tax revenues is a correction coefficient which can be used to scale up either estate values 1873–1967 or the μ ratio to get the μ^* ratio. Figure C1 shows this correction coefficient over the period 1884–2004 being in the order of 5–18 percent. Note that there are two prominent spikes in the annual series. These spikes

reflect behavioral effects of two tax reforms, both leading to increases in inheritance taxation relative to gift taxation. In 1934, the inheritance tax rate was sharply increased and in 1948, it was not only increased but also combined with an estate tax. For this reason, people started giving away larger shares of their wealth in order to minimize future inheritance taxation for their heirs, and our final series uses a version where we smooth out the gift amounts over a ten-year period after the 1934 reform and a 20-year period after the 1948 reform.

The BELINDA database provides information on the total taxable gift amounts in 2002–2004. The aggregate taxable gift amounts are close to 20 percent of the aggregate estate values. We, therefore, correct the aggregate estate using a factor of 20 percent.

[Figure C1 about here]

C3. Survey evidence on gifts

The 1998 wave of the "Household market and nonmarket activities" survey (HUS) has answers from almost 3,000 individuals about *inter vivos* gifts and inheritances received. The dataset is rich in terms of property transfers. All adult members of the interviewed households were asked: "Have you or anyone else in your household received a gift/an inheritance worth at least SEK 1,000 or an equivalent value?"

These transfer questions were retrospective and concerned all previous transfers although the questions were only asked in one wave of the survey. The respondents could report up to five gifts and five inheritances received. Nordblom and Ohlsson (2011) deflate all amounts to 1998 values using the consumer price index and a zero percent real interest rate.

Among the respondents, 17.7 percent had received gifts, the unconditional average amount was SEK 13,000, while 29.3 percent of the respondents had received inheritances with an unconditional average amount of SEK 63,900. The gift amount is slightly above 20 percent of the inheritance amount. This supports a gift correction in the order of 20 percent.

C4. Insurance correction

There are considerable amounts transferred from decedents to heirs via different insurance arrangements. Most of this wealth does not show up in the estate inventory reports. This is particularly true for insurance policies with premia that have been paid for with money that already has been taxed. Some insurance policies are, however, tax-deferred. When an heir receives the benefits from such a policy, the benefit amount was added to the inheritance amount when the inheritance tax amount was calculated.

The BELINDA database provides us with a lower bound for how important insurance was for wealth transfers from decedents to heirs in 2002 – 2005. Taxable insurance benefits to heirs motivate a correction in the order of 2 percent for these years.

C5. Fiscal flow in Sweden

Figure Y shows the resulting result for our measure of the fiscal flow. We have divided our corrected estate values with national income. It is clear from the figure that the fiscal flow was close to the economic flow during the 1870s and the 1900s. The fiscal flow became considerably smaller than the economic flow during the 1940s, the 1950s, and the 1960s. Our latest observations suggest that the fiscal flow has increased in recent decades. It is, however, still much smaller than the economic flow.

What can explain the large discrepancy between the two flows? We suspect that non-taxable gifts and non-taxable insurance benefits may explain a considerable part of the difference between the two flows. Tax non-compliance might also be an important explanation. It should be stressed though that our last data point concerns 2005 when there no longer were any taxes on inheritances and gifts.

C6. References in Online Appendix C

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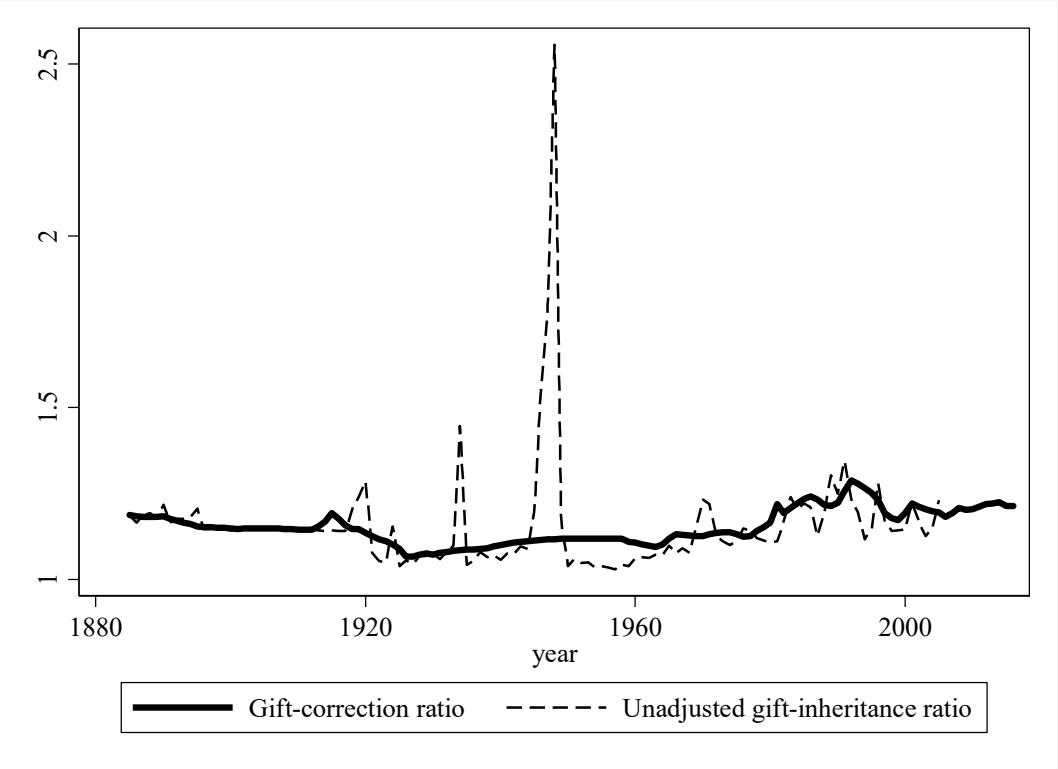
SOU 1957:48. Arvsbeskattning. Betänkande av Arvsskattesakkunniga. Stockholm: Finansdepartementet.

SOU 1969:54. Kapitalbeskattningen. Betänkande från kapitalskatteberedningen. Stockholm: Finansdepartementet.

Figure C1: Correcting for *inter vivos* gifts in Sweden, annual and smoothed series.



Note: The unadjusted ratio (thin, dashed line) shows the sum of gifts and inheritances over the sum of inheritances. The gift correction ratio, μ^* (bold, solid line), shows the same ratio but when account is taken for gift tax increases in 1934 and 1948, leading to spikes in gift flows just preceding these tax increases (see further Ohlsson, 2011; Henrekson and Waldenström, 2016). Gifts in 1933 are smoothed out during the following ten-year period and gifts in 1947 are smoothed out over the succeeding twenty-year period.

Appendix D Private sector pension wealth

The OECD Global Pension Statistics Database gives an opportunity to provide a cross country comparison of private sector pension wealth (pension funds, pension insurance contracts, occupational pension funds, etc). Appendixtable, column (1) reports total assets in private sector pension funds in relation to nominal GDP in 2014 for a selection of countries according to the OECD data. Private sector pension wealth includes all wealth in private sector pension funds in as broad sense as possible. It should, however, be stressed that the numbers do not include the public sector pension wealth, for example in public sector pension reserve funds.

[Table D1 about here]

It is clear from the table that there are considerable differences across countries. Private sector pension wealth is considerable in the U.S, the U.K., Denmark, Switzerland, the Netherlands – and Sweden. On the other end of the spectrum we find large European economies such as Germany, France, and Italy where private sector pension wealth can be viewed as negligible. The same is true for Japan and Korea.

The Regional Consultative Group for Europe of the Financial Stability Board recently published a report by working group on private pension schemes, FSB-RCG-E (2017). The report presents calculations of private sector pension wealth in relation to nominal GDP for European countries, see Appendixtable, column (2). The number are very similar to those presented by OECD.

FSB-RCG-E (2017) also reports data on how the total private wealth is divided up between occupational pension schemes, personal pension schemes, and schemes that are combinations of occupational and personal. It is clear from Appendixtable, column (3) that occupational pension wealth is very important in the countries with high private pension wealth; Denmark, Switzerland, the Netherlands, the United Kingdom, and Sweden. This is the type of wealth that will not show up in estate inventory reports.

The conclusions from the table is that there is no private collective pension wealth in the countries in the bottom part of the table that can give rise to differences between economic flow and fiscal flow measures of inheritances. In the countries in the top part of the table there exist private collective pension wealth creating such differences. For Denmark, Switzerland, the Netherlands, the United Kingdom, and Sweden we know for certain that this is the case because of the considerable occupational pension funds.

TABLE D1: PRIVATE SECTOR PENSION WEALTH IN RELATION TO NOMINAL GDP, 2014

Country	(1) OECD, percent	(2) FSB percent	(3) FSB of which occupa-tional pension wealth, percent	(4) (3)/(2); percent
Denmark	243.1	231.6	158.8	68.6
Switzerland	158.8	125.8	111.9	89.0
Netherlands	155.1	162.3	160.4	98.8
Canada	153.7	na		
Australia	151.8	na		
United States	136.5	na		
United Kingdom	105.9	150.0	150.0/57.3 [a]	100/38.2 [a]
Sweden	85.3	81.5	81.5/57.0 [a]	100/69.9 [a]
Korea	19.2	na		
Japan	17.3	na		
Spain	11.7	12.3	5.5	45.1
France	8.5	7.9	6.4	80.5
Italy	7.4	7.0	5.5	77.7
Germany	6.2	6.4	6.4	100
Poland	4.8	8.6	0.5	6.2

Sources: OECD Global Pension Statistics, OECD (nominal GDP), FSB-RCG-E (2017).
Note: [a] The first number refers to the sum of pure occupational pension schemes and schemes that combine occupational and personal pension schemes, the second number refers to pure occupational pension schemes only.

D1. References to Online Appendix D

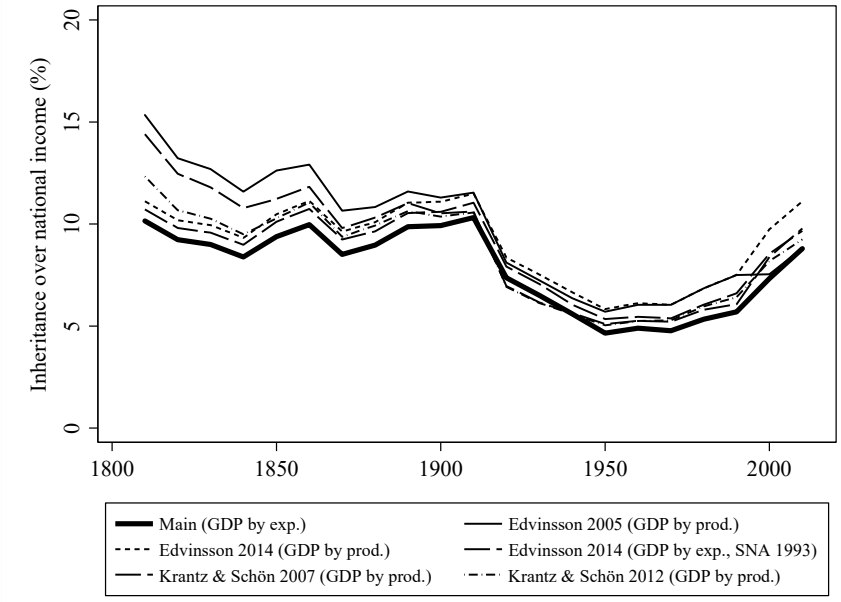
FSB-RCG-E, 2017, "European private pensions schemes: functioning, vulnerabilities, and future challenges", report from Working Group on Private Pension Schemes Resilience, Financial Stability Board, Regional Consultative Group for Europe,

Appendix E Sensitivity of inheritance flows to different historical GDP definitions and of different calculations of μ^*

When the importance of the inheritance flow is expressed in terms of its relation to national income, the different historical series of GDP may of course have an impact on the end result. Below we present sensitivity checks for this as well as the sensitivity of different calculations of μ^*.

GDP: One of the more important sensitivity checks when using historical national accounts is which source for historical GDP that one uses. Sweden has had several different series, not entirely independent of each other, but still based on differing methods for calculation, certain assumptions and also in some of the source materials. Up until the 2000s, the series by Olle Krantz and Lennart Schön and collaborators stemming from the 1970s, 1980 and 1990s (compiled in Krantz and Schön, 2007, 2012) were the going standard. Then Rodney Edvinsson presented in the 2000s and 2010s improvements of these series (Edvinsson, 2005, 2014). We use the series of Edvinsson (2014) as our benchmark as it is the one that is closest to the current baseline GDP by expenditure of Statistics Sweden. Several of the historical sources present GDP by production due to the availability and quality of the historical sources. Below, we graph how the use of different definitions for the historical GDP when computing national income affects the estimated inheritance flow. As is clear, there are some level effects from changing series, and our main series in the paper appears to be in the lower end. The overall trend does not appear to change dramatically by switching between historical GDP series, which is comforting.

Figure E1: Sensitivity of inheritance flow series to using different GDP series.



μ^*: We present in the figure below how the inheritance flow reacts when changing the calculation of μ^*. We do this both for the variants of the age-wealth simulations used (reported

in the appendix) and for using the French series and a social gradient-adjustment based on US data by Attanasio and Hoynes. There are small variations both in level and trends.

Figure E2: Sensitivity of inheritance flow series to using different μ*: