Inheritance Flows in Switzerland, 1911-2011*

Marius Brülhart†
University of Lausanne

Didier Dupertuis‡
University of Lausanne

Elodie Moreau§
VZ VermögensZentrum, Geneva

February 2016

Abstract

We estimate the size of inheritance flows in Switzerland as a share of total wealth and of national income over a long span of data, in close analogy to the study for France by Piketty (2011). We find that inheritance flows had been growing more slowly than national income up until the 1970s, but have been outpacing income growth since. According to our central estimates, the annual flow of inheritance amounted to 2.7% of the stock of private wealth and to 13.1% of national income in 2011. These values are higher than our corresponding (though more approximate) estimates for 1911. The share of total wealth that is attributable to inheritance has remained relatively stable over time, fluctuating between 40% and 50%.

JEL Classification: D31, H24, N34
Keywords: inheritance, Switzerland

< Figures and tables at end >

*We are grateful to Raphaël Parchet and Thomas Piketty for helpful comments. We thank Dominique Chappuis, Jérôme Cosandey, Benjamin Gay, Peter Moser and Willy Stuber for facilitating our access to useful data. Financial support from the Swiss National Science Foundation (Sinergia grant 147668) is gratefully acknowledged.

†Corresponding author: Department of Economics, Faculty of Business and Economics (HEC), University of Lausanne, 1015 Lausanne, Switzerland; marius.brulhart@unil.ch; www.hec.unil.ch/mbrulhar; also affiliated with the Centre for Economic Policy Research (London).

‡didier.dupertuis@unil.ch.

§elodie.ds.moreau@gmail.com.

1 Introduction

Interest in inheritance has recently been revived both in policy debates and in the scientific community. Policy makers' prime concern is with the taxation of bequests - one of the most emotionally and ideologically charged areas of public finance. This debate is of increasing interest also to economic researchers. Wealth inequality, after a prolonged contraction over the 20th century, has been increasing again since the 1980s, and inheritance may be an important channel reinforcing that trend (Piketty and Zucman, 2014). However, direct measures of the economic importance of inheritance have been constructed only rather recently. Piketty (2011) reports a 200-year time series for France, showing that the weight of inheritance - meaning the sum of bequests at death and gifts *inter vivos* - is growing strongly and approaching levels not seen since the early 20th century. Schinke (2012) diagnoses a similar long-run evolution for Germany, as does Atkinson (2013) for the United Kingdom.

We construct corresponding data series for Switzerland, which represents an interesting comparison country, especially as it was spared the mass destructions of the two world wars. If we did not observe the u-shaped evolution of inheritance over the last century that have been found for France and Germany, or if the "u" were less pronounced in Switzerland, the attribution to war destruction of those countries' 20th-century dips in the weight of inheritance would be corroborated.[1] Moreover, Swiss policy discussions about bequest taxation often imply assertions about the perceived level and trend in the importance of inheritance, but to date no time-series evidence exists on the subject.

We find that the importance of inheritance relative to total wealth and to total income is similar in Switzerland to France and Germany. However, Switzerland appears to have witnessed less of a dip in inheritance over the 20th century, confirming the war destruction interpretation of the U-shape evolutions in those countries. Moreover, since the 1980s, Switzerland seems to be witnessing just as rapid an increase in the importance of inheritance as other mature economies.

[1] This is also what Dell, Piketty and Saez (2007) find for the evolution of wealth inequality over the last century: Switzerland did not follow the "u" of other European nations.

The paper is organised as follows. Section 2 describes the estimation method, and Section 3 presents our data sources. In Section 4, we show the results, and Section 5 concludes.

2 Measurement

2.1 Basic definitions

To the extent that our data allow us to, we follow Piketty (2011) by estimating "economic inheritance flows".[2]

Specifically, our first measure of interest is the share of total private wealth that is transferred through inheritance in any given year, where we understand "inheritance"to comprise wealth transfers both at death and *inter vivos*. That share can be computed with the following simple accounting equation:

$$b_{wt} = \frac{B_t}{W_t} = m_t \cdot \mu_t^*, \tag{1}$$

where b_{wt} is the inheritance-wealth ratio, B_t stands for the the sum of private capital transfers between generations ("Bequests") in a particular year t, W_t is aggregate private wealth, m_t stands for the mortality rate over the adult population (defined as 20 years or older), and μ_t^* is the gift-adjusted ratio between the average wealth of decedents and the average wealth of the living.[3]

Unless we factor in gifts *inter vivos*, decedents will look poorer than they really are in terms of life-time wealth transfers. The measure of the relative wealth of decedents is therefore adjusted for gifts in the following way:

[2]We largely retain Piketty's (2011) notation. Piketty (2011) also computed an alternative measure labeled "fiscal inheritance flows", derived from inheritance tax statistics. Since bequests have never been taxed at the federal level in Switzerland, and since we were unable to find sufficiently comprehensive data at the canton level, this alternative measure cannot (yet) be applied to the Swiss case.

[3]$m_t = \frac{N_{dt}^{20+}}{N_t^{20+}}$, where N_{dt}^{20+} is the number of decedents aged 20 or older, and N_t^{20+} is the number of living individuals aged 20 or older.

$$\mu_t^* = (1 + v_t) \cdot \mu_t,$$

where v_t represents the ratio of gifts *inter vivos*, V_t, to total bequest flows $\left(v_t = \frac{V_t}{B_t}\right)$, and μ_t is the unadjusted ratio between the average wealth of decedents and the average wealth of the living.

As a complement to b_{wt}, which compares the flow of inheritance to the stock of wealth, we also report the ratio b_{yt}, which scales the flow of inheritance to the flow of aggregate income:

$$b_{yt} = \frac{B_t}{Y_t} = m_t \cdot \mu_t^* \cdot \frac{W_t}{Y_t}, \tag{2}$$

where Y_t is net national income.

Armed with an estimate of b_{yt}, we can finally compute the share of inherited wealth in the stock of wealth according to the following equation, due to Piketty and Zucman (2015) and Alvaredo, Garbinti and Piketty (2015):

$$\phi_t = \frac{b_{yt}}{b_{yt} + (1 - \alpha_t) \cdot s_t}, \tag{3}$$

where α denotes capital's share of national income (the remainder $1 - \alpha_t$ accruing to labor), and s_t stands for the savings rate.

Wealth is built over the life cycle. Hence, b_{yt}, s_t and α_t are averaged over 30 years, the typical length of a generation, to account for past variations in savings and income that affect present inherited and accumulated wealth.

This formula yields conservative estimates of the weight of bequests, as it implies the assumption that the propensity to save out of labor income is equal to the propensity to save out of capital income, even though the latter is probably higher due to the more unequal distribution of wealth compared to labor income.

Note that ϕ_t as defined by equation (3) is quite different from (and in important respects

more informative than) b_{wt} defined in equation (1). b_{wt} reports the *flow* of bequests as a share of the stock of wealth in a given year, whereas ϕ_t compares the capitalized *stock* of bequests to the stock of wealth. The measure ϕ_t therefore tells us how much of an average franc of wealth is inherited as opposed to being "self made".

2.2 Estimating μ_t^*

The empirically most demanding element of equations (1) and (2) is μ_t^*, as we do not observe the wealth of decedents. We therefore take an indirect approach, by first estimating age-wealth profiles of the living, and then deriving age-wealth profiles of decedents.

Based on tax statistics for Switzerland's most populous canton (Zurich), we know the number of taxpayers per year t, wealth bracket ω and age group a, $T_{t,a,\omega}$, as well as total wealth per year and wealth bracket, $W_{t,\omega}$. We thus compute average wealth per wealth bracket as $w_{t,\omega} = \frac{W_{t,\omega}}{\sum_a (T_{t,a,\omega})}$. Assuming within-bracket averages to be constant across age groups, this allows us to recover age-wealth profiles as follows:

$$w_t(a) = \frac{\sum_\omega (w_{t,\omega} \cdot T_{t,a,\omega})}{\sum_\omega (T_{t,a,\omega})}.^4 \tag{4}$$

Second, we estimate age-wealth profiles of decedents, by combining wealth-dependent mortality rates with our estimated age-wealth profiles of the living. We distinguish between the poor, p, with wealth below the median, and the rich, r, with above-median wealth. The poor tend to have higher mortality rates than the rich at all age groups a ($m_t^p(a) \geq m_t^r(a)$), but the mortality differential typically decreases with age.[5]

[4] Detailed data available for 1995 allow us to compare our approximated age-wealth profile with the age-wealth profile using the exact wealth per age group and wealth bracket. As shown in Figure 1, the two age-wealth profiles turn out to be almost identical. We apply these Zurich-specific age-wealth profiles as measures for the country as a whole, since prior research has shown that correcting for differing age distributions across cantons makes a negligible difference to the estimates (see Daepp, 2003, p. 21).

[5] See, e.g., Hurd and Smith (2001) or Kopczuk and Saez (2004).

Average mortality per age group is given by

$$m_t(a) = \frac{N_{dt}(a)}{N_t(a)} = \frac{m_t^p(a) + m_t^r(a)}{2}.$$

Define $sh_t^p(a)$ as the share of total wealth owned by the poor in year t, for each age group a. In the absence of more detailed data, we follow Piketty (2011) in assuming this parameter to be constant across age groups within a given year. We estimate this share through Pareto interpolation on individual-level data for the canton of Zurich.[6] Combined with (4), this allows us to estimate, for each age group a, the average wealth of the poor $w_t^p(a)$ and of the rich $w_t^r(a)$, respectively:

$$w_t^p(a) = 2 \cdot sh_t^p(a) \cdot w_t(a), \text{ and } w_t^r(a) = 2 \cdot (1 - sh_t^p(a)) \cdot w_t(a).^7$$

Hence, we can compute the average wealth of decedents of age group a as follows:

$$\begin{aligned} w_{dt}(a) &= \frac{w_t^p(a) \cdot m_t^p(a) + w_t^r(a) \cdot m_t^r(a)}{m_t^p + m_t^r} \\ &= \frac{[2 \cdot sh_t^p(a) \cdot w_t(a) \cdot m_t^p(a)] + [2 \cdot (1 - sh_t^p(a)) \cdot w_t(a) \cdot m_t^r(a)]}{m_t^p + m_t^r}. \end{aligned}$$

With age-wealth profiles of both decedents and the living thus defined, we can recover the aggregate ratio of wealth of decedents over wealth of the living, $\mu_t(a)$, as follows:

$$\mu_t = \frac{\sum_a w_{dt}(a) \cdot N_{dt}(a)}{\sum_a w_t(a) \cdot N_t(a)}.$$

[6] We find $sh_t^p(a)$ to be 4.25% on average, with no evident time trend (see Moreau, 2013).

[7] Think for example of a situation where total wealth $W_t(a) = 1000$ and the total population in the age bracket equals 100 (so that the average wealth is $w_t(a) = 1000/100 = 10$), with $W_t^p(a) = 200$ and $W_t^r(a) = 800$. Then $sh_t^p = 200/1000 = 0.2$ and the average wealth of the poor $w_t^p(a) = 200/50 = 4$ which is indeed equal to $w_t^p(a) = 2 \cdot sh_t^p(a) \cdot w_t(a) = 2 \cdot 0.2 \cdot 10$.

3 Data

3.1 Age-wealth profiles

In order to compute μ_t, the ratio between the average wealth of decedents and the average wealth of the living, we need age-wealth profiles either of the former (as in Piketty, 2011) or of the latter. We can draw on age-wealth profiles of the living based on tax records for the canton of Zurich, covering the years 1934, 1945, 1969, 1975, 1987, 1995, 1999 and 2007. Since age-wealth profiles before 1934 are not available, we define μ_{1911} as the linear extrapolation of this ratio based on sample years 1934 to 1987.[8]

Looking at Figure 2, we observe a monotonic increase in μ_t over time, unlike in France, where a drop in this ratio coincides with the two World Wars. This difference seems credible, since Switzerland did not suffer the same capital shocks in the early 20th century as France.[9]

3.2 Adult mortality

Another ingredient to our calculations are mortality rates m_t, defined as the number of adult decedents over the adult population. We take those data from four sources. First, we use the Swiss adult population numbers from Dell *et al.* (2007) for the years 1900-2000. The number of decedents by age group for 1900-1991 is taken from Siegenthaler (1996). This series is updated with the BEVNAT database of the Swiss Federal Statistical Office and completed with the online database "Historical Statistics of Switzerland" hosted by the University of Zurich.[10]

The resulting mortality series is shown in Figure 3, together with the corresponding data for France taken from Piketty (2011). The Swiss mortality rate decreased steadily from 2.1% in

[8] Not considering years since 1987 avoids the sharp increase in this ratio over the last two sample decades, which is unlikely to be representative of the earlier trend. Our computed long-run series of inheritance flows, however, are not noticeably affected by this choice. Another issue is that the Zurich data are for pre-specified age groups which differ over time. As we compute this ratio for people aged 20 and more, we would ideally like the first category to contain people aged 0-19. Fortunately, for 1945, we avail of data for detailed age categories, allowing us to compute the relations between $\mu(20^+)$, $\mu(25^+)$ and $\mu(30^+)$. We then assume these relations to be constant over time to recover $\mu(20^+)$ for all years when correcting for changes in the definition of the first age category. Finally, we apply the 2007 age-wealth profiles to our estimates for 2011.

[9] The values of the estimated data points shown in Figure 2 (as well as those shown in Figures 3, 5 and 8) are reported in Table 2.

[10] See `www.fsw.uzh.ch/histstat/`.

1900 to less than 1% in 2011.[11] Moreover, the Swiss mortality rate has consistently been lower than that of France, although the two series appear to be converging.

For differential mortality rates of the rich and the poor, $m_t^r(a)$ and $m_t^p(a)$, we follow Piketty (2011) in assuming a constant differential over time, corresponding to the US-based estimates by Attanasio and Hoynes (2000). To the extent that American mortality differences accross wealth classes are likely to exceed the corresponding differences in Europe, this choice implies that our estimates of μ_t will be conservative.

3.3 Gifts *inter vivos*

For bequests not to be underestimated, *inter vivos* gifts need to be taken into account. No time-series information exists on this ratio for Switzerland, but we have a number of useful pointers to the size of this variable.

Based on cantonal tax data, Daepp (2003) estimated the gifts-to-bequests ratio v_t for a sample of cantons in the period 1995-2002. We show these estimates in Table 1. Daepp's (2003) data point to a v_t of about one third in the late 1990s.[12]

To project this ratio back in time, we assume that it has tracked the evolution observed in Germany, using the estimates of Schinke (2012). We make this choice for two reasons. First, in the years for which we have data for both countries, German values of v_t are close to those for Switzerland. In 2002, for instance, the German gift-to-bequest ratio was estimated at 34%, very close to the numbers reported by Daepp (2003). Second, Germany seems to offer a better benchmark for backward projection than France, because its tax treatment of gifts and bequests has remained relatively stable, and life expectancy, the main demographic driver of v_t, has increased at comparable rates in Switzerland and Germany (see Moreau, 2013).[13]

[11] Figure 3 shows a spike in 1918, explained by the "Spanish flu" pandemic of that year. This outlier does not affect our estimates.

[12] We were able to cross-validate the reported ratios for Vaud with data obtained from the cantonal statistical office, and found Daepp's (2003) numbers to be accurate. Stutz *et al.* (2007) estimate v_t as being at least 25% in the canton of Zurich in 1997.

[13] In France, however, a pronounced increase in v_t over the last two decades is probably explained by changes in the tax code, making France a less suitable benchmark.

The German v_t, however, increased sharply after 2002. We do not consider it plausible that the incidence of *inter vivos* gifts jumped in a comparable manner in Switzerland, which is why our baseline estimates will be based on a linear extrapolation of the prior evolution of estimated v_t.[14] This implies a moderate increase in the ratio v_t over the most recent decade, consistent with the observed increase in life expectancy. Our imputed Swiss v_t for 2011 is 39%, instead of the 50% observed in Germany. We shall explore the robustness of our estimates to this assumption.[15]

We show the evolutions of μ_t^* in Figure 4, together with the corresponding series for France. A comparison with Figure 2 shows that correcting for gifts makes the recent trends in Switzerland and France resemble each other more closely.

3.4 National income and private wealth

In order to estimate inheritance-to-income ratios b_{yt}, we need to find data on two additional variables: net national income (Y_t) and aggregate bequeathable private wealth (W_t); see equation (2).

For Y_t, we use data series for net national income (NNI), which is gross national income (GNI) minus the consumption of fixed capital. In turn, GNI equals GDP minus primary incomes payable to non-residents, plus primary incomes receivable from non-residents. For the period 1906-1938, we use the NNI estimates reported by Andrist, Anderson and Williams (2000). For the period 1938-1956, the relevant information can be found in the *Annuaire Statistique Suisse* 1957 (p. 347). For the period 1965-1995, the data are obtained from the Federal Statistical

[14] Schinke (2012, 29) explains the observed rise in gifts by stating that "public awareness for the issue of inheritance, taxes and ways to circumvent them has risen considerably during the time". Given the long-standing nature of discussions about bequest taxation in Switzerland, an equivalent shift does not seem probable to us (see Brülhart and Parchet, 2014). The exception is the year 2011, in which many gifts were made in anticipation of a retroactive clause in a pending initiative for the introduction of a federal estate tax.

[15] Through another project we have access to the universe of individual-level tax records in the canton of Bern for the years 2001-2011. In those data, declared inter-vivos gifts fluctuated around 0.75% of net wealth between 2001 and 2010, without a detectable trend (see also Jann and Fluder, 2015). This corroborates our baseline assumption of v_t=39% in 2011 (since b_{wt} is estimated as 2.7% in 2011, see Table 5). These data also confirm that 2011 was a non-representative outlier, with a gift-to-wealth ratio of 3.4% in Bern. Note, therefore, that our reported inheritance estimates for 2011 are based on extrapolated gift-to-wealth ratios and are unaffected by the one-off wave of *inter vivos* transfers in 2011.

Office. Since that series stops in 1995, we use data from OCSTAT Geneva (years 1998-2000) and BAKBASEL (years 2001-2011) for the most recent periods.[16]

Our primary source of wealth estimates are tax data. The main advantage of tax data over wealth surveys is that they have been compiled over a longer period and that they cover the entire population.[17] Moreover, tax series are easily comparable over time and contain a clear definition of wealth.

Federal wealth taxes have been levied intermittently between 1913 and 1957. The cantons have continued to tax wealth ever since. For 1913, 1919, 1969, 1981, 1991, 1997 and 2003-2011, detailed wealth tax data are available for the entire adult population with net worth above CHF 1000.[18] Based on those data, Dell, Piketty and Saez (2007) extrapolated population wealth estimates from the wealth of tax filers, assuming that non-filers' share of wealth in years with incomplete data coverage is identical to their share in the closest year with complete coverage. We use their estimates for 1913-1997 and add the wealth-tax statistics for 2003-2011. We add wealth estimates for 1900 and 1910 based on the assumption that household wealth represented 80% of taxable capital.[19]

Wealth estimates based on wealth tax data have two main drawbacks, both biasing them downward. First, tax valuations of real estate correspond on average to some 70% of market values (see e.g. Stutz *et al.*, 2007). Second, pension fund assets are exempt from wealth taxes and therefore not covered by the tax data. However, and estimated 20-30% of pension assets are not annuitised but withdrawn upon retirement and therefore bequeathable.[20]

[16] See `www.be.ch/portal/fr/veroeffentlichungen/statistiken.searchresult.html?theme=4`. NNI estimates for 1911 and 1969 are not available in our source data, but we can interpolate them from data on adjacent years.

[17] Schinke (2012) compares the two types of data source in the German context. For a discussion of the advantages and disadvantages of tax data over surveys for the study of income distribution in Switzerland, see Foellmi and Martinez (2014).

[18] The compilations for 1913 and 1919 are available in the *Annuaire Statistique de la Suisse* 1914 (p. 226) and 1920 (p. 395). The published statistics the remaining years are accessible on the website of the Swiss Federal Tax Administration: `www.estv.admin.ch/dokumentation/00075/00076/00717/`.

[19] Data on taxable capital for these two years can be obtained from the *Annuaire Statistique de la Suisse*, 1920, p. 395. In 1913 and 1919, the ratio of household wealth to total taxable capital was respectively equal to 81% and 79%.

[20] A third potential source of systematic downward bias is tax evasion, which may come to light after death. We have no way of quantifying the importance of this phenomenon.

We address the issue of undervalued real estate by using data on net private wealth including real estate at market values published since 2004 by the Swiss National Bank.[21] Those data allow us to establish that, given gross real estate wealth is roughly equal to net wealth as measured through wealth taxes, a 30% undervaluation of real estate happens to imply a 30% underestimate of real wealth when based on tax data. As we have no reason to expect the degree of undervaluation of real estate to have increased over time, we consider back-projecting this 30% markup on tax-based wealth data all the way to 1911 to be a conservative adjustment.[22]

To quantify potentially bequeathable wealth inherent in pension funds, we use historical data on total pension fund assets reported by Leimgruber (2008) and corresponding data for 2011 by the Swiss National Bank. Based on unpublished data by the Swiss Federal Statistical Office, we can establish that since a liberalization in favor of lump-sum payouts in 2005, some 30% of pension assets have on average been paid out rather than annuitised.[23] Prior to the 2005 reform, lump-sum payouts were somewhat less common, in the order of 20% of total assets (Bütler and Teppa, 2007). We therefore augment our estimated wealth series by 20% of aggregate pension assets in all years except for 2011, where we apply a share of 30%.[24]

3.5 Capital shares and saving rates

In order to compute the inherited share of private wealth ϕ according to equation (3), we need data for α, the share of national income accruing to capital, and for s, the saving rate.

Capital shares from 1995 onwards are published by the Swiss Federal Statistical Office as a component of the national accounts. For 1910-1947, historical data compiled by reasearchers

[21] See `www.snb.ch/en/iabout/stat/statpub/vph/stats/wph`.

[22] Low valuations of real estate by local authorities have been a matter of contention particularly by federal tax authorities for decades, and harmonization efforts have aimed at imposing minimum tax valuation thresholds in the cantons, currently officially at 60% of market value. Moreover, agricultural real estate, which tends to be undervalued even more strongly by tax authorities, has been more important as a share of wealth in the past, a factor further confirming the conservativeness of our assumption. The combined share of land and housing in total assets, however, seems to have remained relatively stable over time. Goldsmith (1981), for example, reports this share as 24.9% in 1938 and 23.5% in 1978.

[23] We are grateful to Jerôme Cosandey and Willy Stuber for those data.

[24] The available historical series for aggregate pension fund assets are not at an annual frequency. We therefore use linear interpolation to compute the required values for our sample years of interest.

at the University of Zurich provide a credible and consistent series.[25] No data of comparable quality exist for the period 1948-1994. We therefore interpolate these years based on capital shares for Germany as reported by Alvaredo *et al.* (2015), as they track Swiss capital shares quite closely in the periods for which we have data in both countries.[26]

Saving rates from 1991 onwards are available from Eurostat. For 1948-1990 we can draw on comparable series from the Swiss Federal Statistical Office.[27]

4 Results

4.1 Inheritance flows relative to private wealth

In Figure 5, we present how the share of private wealth that is transferred annually through inheritance (b_{wt}) has evolved over the last century. For comparison, we also show the corresponding series for France and Germany. Our estimates suggest that Switzerland has shared in the u-shaped evolution of inheritance observed in other European nations over the 20th century, but that the amplitude of the long-run swing was comparatively smaller. This need not surprise, given that Switzerland was largely spared the destructions wrought by the two world wars. Our observed trend mirrors the relative stability of Swiss wealth distributions previously detected by Dell *et al.* (2007).

Figure 5 shows a pronounced increase in the importance of inheritance apparent since the 1990s. From the 1910s up to the late 1980s, b_{wt} seemed relatively stable around 2%, but since then this ratio has increased by a third to over 2.7%. Hence, the recent size of annual inheritance flows relative to total private wealth is unprecedented in the last century and of similar magnitude to that observed in neighboring countries. As evident from equation (1), the increase is the logical implication of falling mortality (Figure 3) that is more than compensated

[25] See `www.fsw.uzh.ch/histat/main.ph`.

[26] Up to 1994, national accounts statistics separately reported income shares of labor, capital and closely held corporations, the latter category comprising both capital and labor according to our definitions. The evolutions over time in the (partial) series for Switzerland and those for France and Germany match quite closely.

[27] For 1980-1990, these data are compiled using the same accounting standards as the later Eurostat data (ESA1995). Prior to that, the accounting standard OECD64 is applied. For the purposes of our study, these series are comparable.

by strongly rising wealth of decedents (including previously made gifts) relative to wealth of the living (Figure 4).

Our computations underlying Figure 5 are based on a backward projected value of μ_t^* in 1911. This strikes us as the most plausible approach, but given that 1911-1945 was a period of considerable economic upheaval also in Switzerland, it is not the only defendable assumption. In Figure 6, we therefore explore the robustness of our findings to two alternative hypotheses: either that μ_t^* in 1911 was identical to its level in 1934, or that the Swiss μ_t^* was identical in 1911 to the value of this variable observed in France (see Figure 4). While the latter assumption most likely leads to overestimate Swiss inheritance flows in 1911, we note that even with this very high estimate of inheritance in 1911, the corresponding value for 2011 is still higher.

Our available evidence therefore suggests that the intensity of wealth acquisition through inheritance observed in Switzerland in 2011 was unprecedented over at least a century.

4.2 Inheritance flows relative to national income

It is of interest to scale inheritance flows not only to the stock of wealth but also to the flow of income. This is given by the ratio b_{yt} of equation (2). The computation of this ratio requires us to enlist also data on aggregate wealth and net incomes. We therefore begin by presenting what our data construction described in Section 3.4 implies for wealth-to-income ratios in Switzerland ($\frac{B_t}{Y_t}$). These estimates are reported in Figure 7. The graph clearly shows how our tax-based wealth data series is consistently lower than our preferred series that is adjusted for undervalued real estate and omitted pension fund assets. We observe that wealth-to-income ratios have shown a steep increase since the 1970s and are now approaching 500%. In that respect, Switzerland conforms to a trend shared by all the mature economies for which we have comparable data (Piketty and Zucman, 2014).

In Figure 8, we show the evolution of the inheritance-to-income ratio estimated for Switzerland, together with comparable series for France and Germany. The marked increase in inheritance over the last three decades is even more pronounced when expressed in this way than when

scaled to total wealth. The ratio b_{yt} fell from 8.2% in 1911 to 5.1% in 1975 and then almost tripled to 13.1% in 2011. Relative to the flow of income, therefore, intergenerational transfers now appear to be 50% more important than they were in 1911. The implied value of bequests in 2011 is 61 billion Swiss francs.

As a final robustness check, we compare our baseline estimated series of b_{yt}, reported in Figure 8, to corresponding data series based on varying assumptions on *inter vivos* gifts. Figure 9 shows that our qualitative findings are not affected by our baseline assumption in this respect.

4.3 The stock of inherited wealth as a share of total wealth

In Figure 10 we show the evolution of ϕ, the share of total wealth that can be attributed to inheritance, computed using equation (3) with 30-year moving averages. According to our calculations, this share has historically fluctuated in an interval roughly between 40% and 50%, with less of a pronounced u-shape than those observed in France and Germany. We observe an increasing trend in ϕ since 1990, with an estimated value of 0.47 in 2011. Given that this method likely underestimates the weight of inheritance (as it imputes relatively too much savings to pure labor earners; see Piketty and Zucman, 2015), our computations suggest that about half of Swiss private wealth has been acquired through inheritance.

It is evident from Figure 10 that in the early decades of our sample period the share of inherited wealth was lower in Switzerland than in France and Germany. ϕ depends positively on the inheritance flow b_y, negatively on the saving rate s and positively on the capital share of income α. It turns out that the relative levels of all three variables in Switzerland were such as to lower ϕ compared to the other two countries. Most of the difference is due to the relatively low Swiss inheritance shares b_y shown in Figure 8. Using average values over the period 1906 to 1948, it can be shown that inheritance flows b_y account for around 87% of the between-country variance in the share of inherited wealth ϕ.

As discussed in Section 3.5, the historical data on capital shares an saving rates that underly Figure 10 might not be perfectly precise. We have therefore explored the implications of using

alternative data approximations. The main variants are illustrated in Figure 11. We find that our estimated ϕ in the early decades are somewhat higher with our alternative approximations, but the differences are relatively small.

5 Conclusions

We have reported estimates of inheritance flows in Switzerland over the last century. The importance of inheritance relative to total wealth and to total income is similar in Switzerland to France and Germany. Switzerland appears to have witnessed less of a reduction in this wealth acquisition channel in the early 20th century, but it seems to be witnessing just as rapid an increase in the importance of inheritance as other mature economies.

Due to an absence of federal-level inheritance tax data, our analysis had to be based on estimating "economic inheritance flows", requiring some strong assumptions particularly for the early part of our sample period. Given that bequests have long been taxed in a majority of cantons, it might therefore be worthwhile investigating further if some cantonal archives offer more detailed long-term data on gifts and inheritances. Cantonal bequest-tax data might allow researchers to track the evolution not only of the volume of inheritances but also of the distribution across bequest sizes and heir categories. Such information is essential for optimal policy design but remains beyond the reach of the data material currently at our disposal.[28]

References

[1] Alvaredo, Facundo; Bertrand Garbinti and Thomas Piketty (2015) On the Share of Inheritance in Aggregate Wealth in Europe and the United States, 1900-2010. *Mimeo*, Paris School of Economics.

[2] Andrist, Felix; Richard G. Anderson and Marcela M. Williams (2000) Real Output in Switzerland: New Estimates for 1914-47. *Federal Reserve Bank of St. Louis Review*, May issue, 43-70 .

[3] Atkinson, Anthony B. (2013) Wealth and Inheritance in Britain from 1896 to the Present. *CASE Working Paper* #178, London School of Economics.

[4] Attanasio, Orazio P. and Hillary W. Hoynes (2000) Differential Mortality and Wealth Accumulation. *Journal of Human Resources*, 35(1): 1-29.

[28] Research on Danish data suggests that bequests have increased wealth inequality overall but reduced the top-1% wealth share (Boserup, Kopczuk and Kreiner, 2016).

[5] Boserup, Simon H.; Wojciech Kopczuk and Claus T. Kreiner (2016) The Role of Bequests in Shaping Wealth Inequality: Evidence from Danish Wealth Records. *American Economic Review, Papers and Proceedings*, forthcoming.

[6] Brülhart, Marius and Raphaël Parchet (2014) Alleged Tax Competition: The Mysterious Death of Inheritance Taxes in Switzerland. *Journal of Public Economics*, 111: 63-78.

[7] Bütler, Monika and Federica Teppa (2007) The Choice between an Annuity and a Lump Sum: Results from Swiss Pension Funds. *Journal of Public Economics*, 91: 1944-1966.

[8] Daepp, Martin (2003) Zum Einnahmenpotenzial einer Bundes-Erbschafts- und -schenkungssteuer. *Mimeo*, Swiss Federal Tax Administration.

[9] Dell, Fabian; Thomas Piketty and Emmanuel Saez (2007) Income and Wealth Concentration in Switzerland over the 20th Century. In: Atkinson, A.B. and T. Piketty (eds) *Top Incomes over the Twentieth Century*, Oxford University Press.

[10] Foellmi, Reto and Isabel Martinez (2014) Volatile Top Income Shares in Switzerland? Reassessing the Evolution between 1981 and 2009. *CEPR Discussion Paper* #10006.

[11] Goldsmith, Raymond W. (1981) A Tentative Secular National Balance Sheet for Switzerland. *Schweizerische Zeitschrift fr Volkswirtschaft und Statistik*, 2: 175-187.

[12] Hurd, Michael D. and James P. Smith (2001) Anticipated and Actual Bequests. In: Wise, David A. (ed.) *Themes in the Economics of Aging*, NBER and University of Chicago Press, 357-392.

[13] Jann, Ben and Robert Fluder (2015) Erbschaften und Schenkungen im Kanton Bern, Steuerjahre 2002 bis 2012. *University of Bern Social Sciences Working Paper* #11.

[14] Kopczuk, Wojciech and Emmanuel Saez (2004) Top Wealth Shares in the United States, 1916-2000: Evidence from Estate Tax Returns. *National Tax Journal*, 57(2): 445-488.

[15] Leimgruber, Matthieu (2008) *Solidarity without the State? Business and the Shaping of the Swiss Welfare State, 1890-2000*. Cambridge University Press.

[16] Moreau, Elodie (2013) *Inheritance Flows in Switzerland, 1911-2009*. Master's Thesis in Economics, University of Lausanne.

[17] Piketty, Thomas (2011) On the Long-Run Evolution of Inheritance: France 1820-2050. *Quarterly Journal of Economics*, 126(3): 1071-1131.

[18] Piketty, Thomas and Gabriel Zucman (2014) Capital is Back: Wealth-Income Ratios in Rich Countries 1700-2010. *Quarterly Journal of Economics*, 129(3): 1255-1310.

[19] Piketty, Thomas and Gabriel Zucman (2015) Wealth and Inheritance in the Long Run. In: Atkinson, Anthony B. and Francois Bourguignon (eds.) *Handbook of Income Distribution, Volume 2B*, Elsevier, 1303-1368.

[20] Schinke, Christoph (2012) Inheritance in Germany 1911 to 2009: A Mortality Multiplier Approach. *SOEP Papers on Multidisciplinary Panel Data Research* #462, DIW Berlin.

[21] Siegenthaler, Hansjörg (1996) *Statistique Historique de la Suisse*. Chronos Verlag.

[22] Stutz, Heidi; Tobias Bauer and Susan Schmugge (2007) *Erben in der Schweiz*. Verlag Rüegger.

Figure 1: Average age-wealth profiles of the living in 1995 (canton of Zurich)

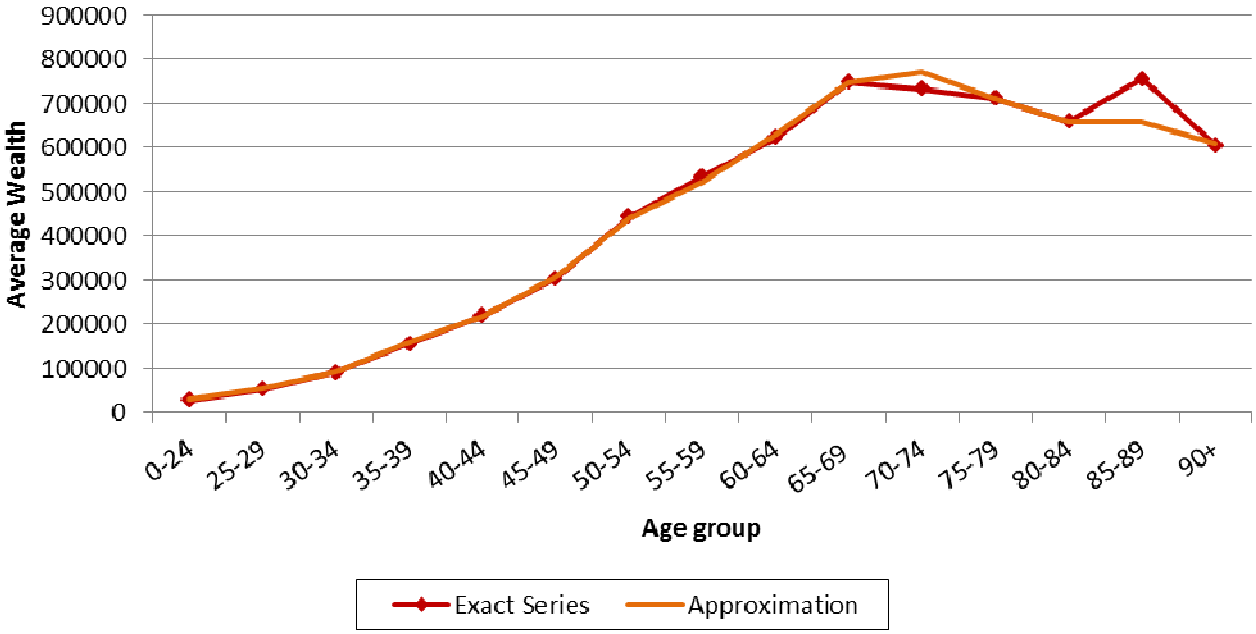
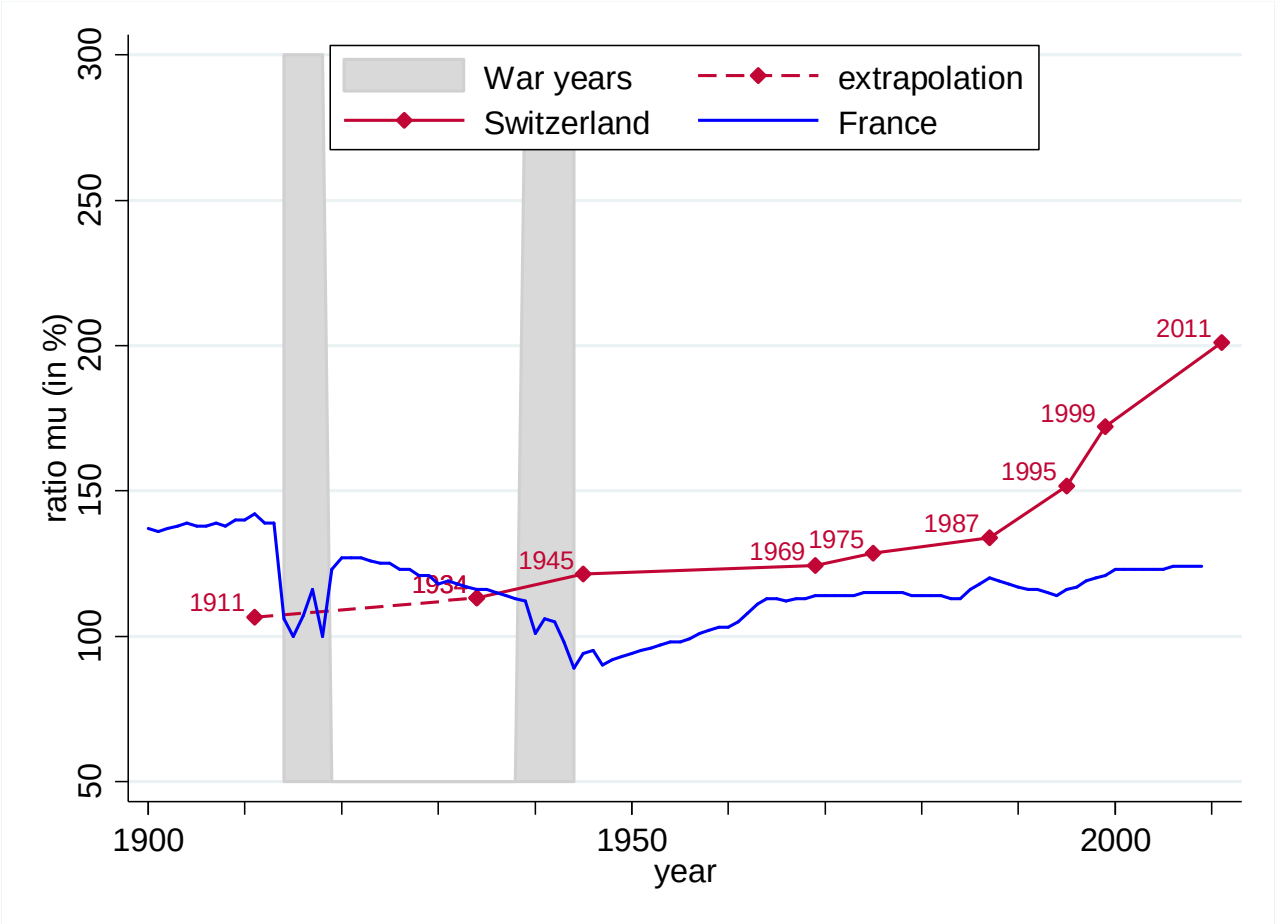
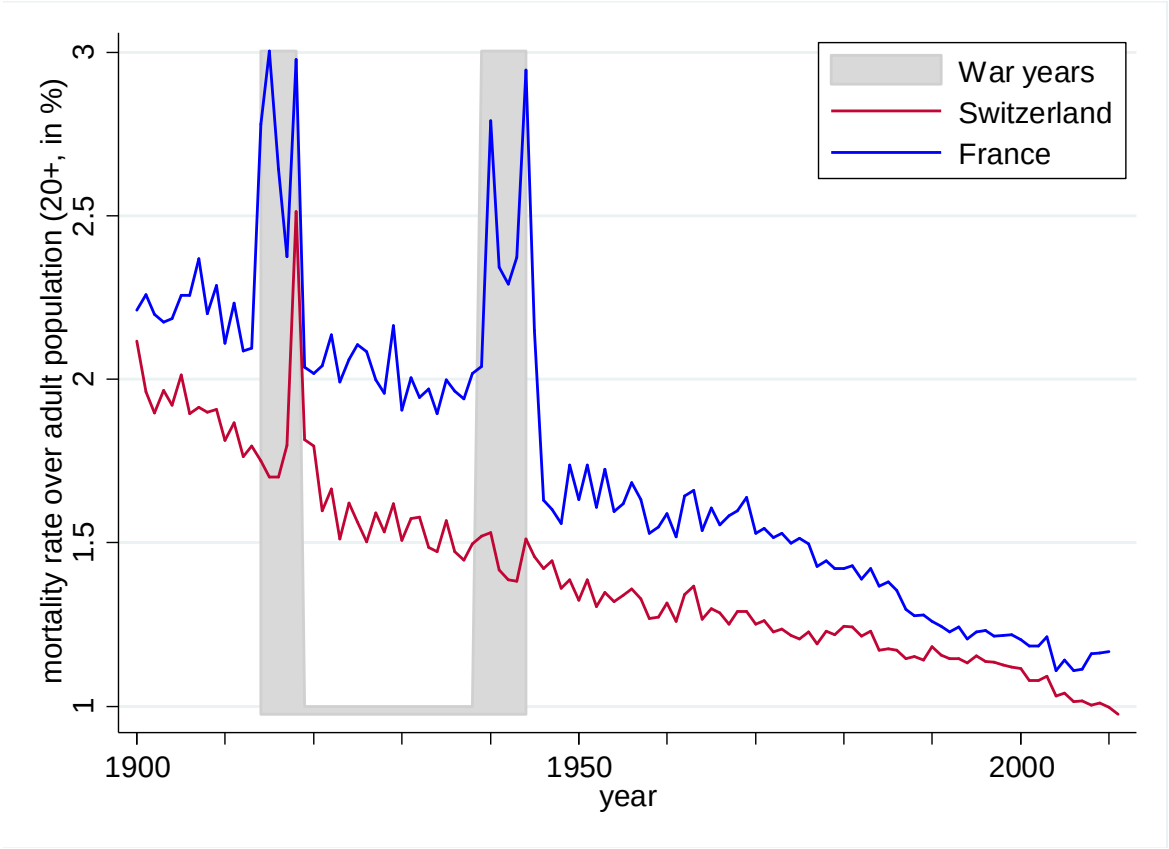


Figure 2: Evolution of μ_t in Switzerland and France



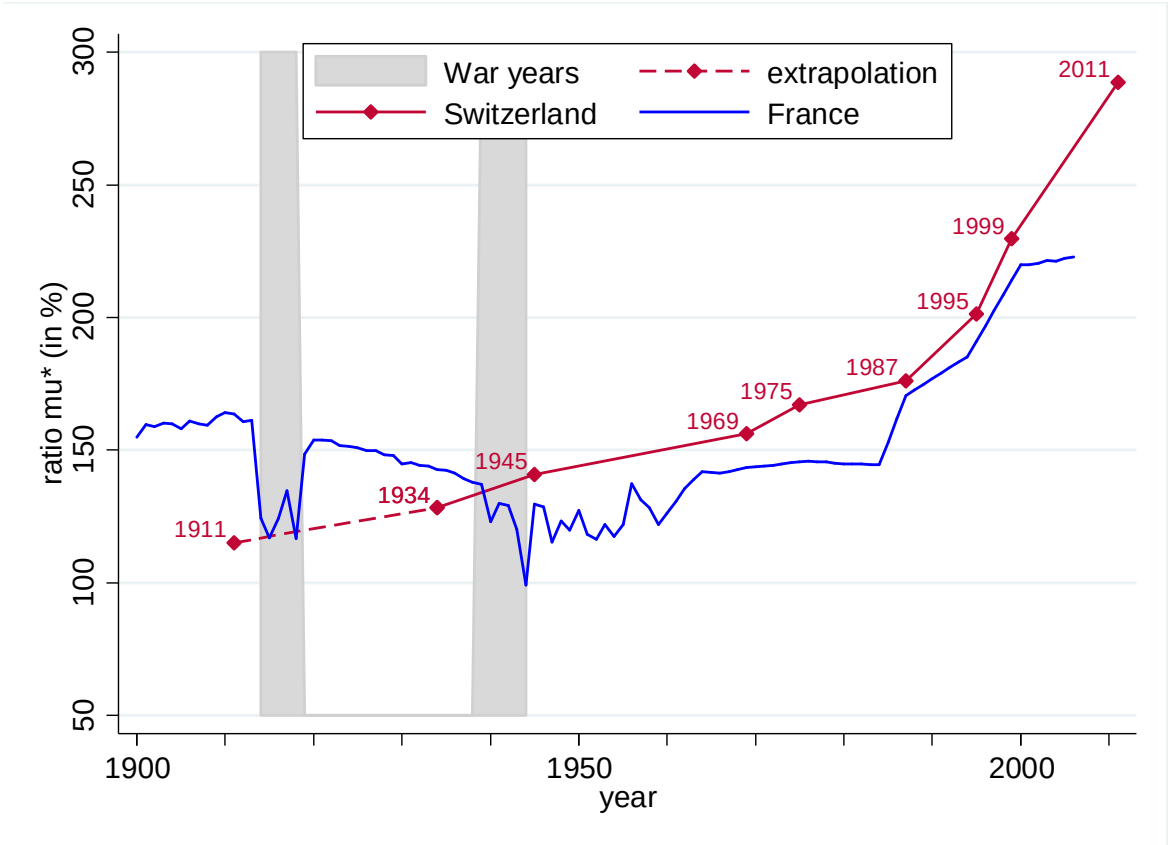
Notes: Data for France from Piketty (2011). See text for Swiss data sources, and Table 2 for data points.

Figure 3: Adult mortality rates



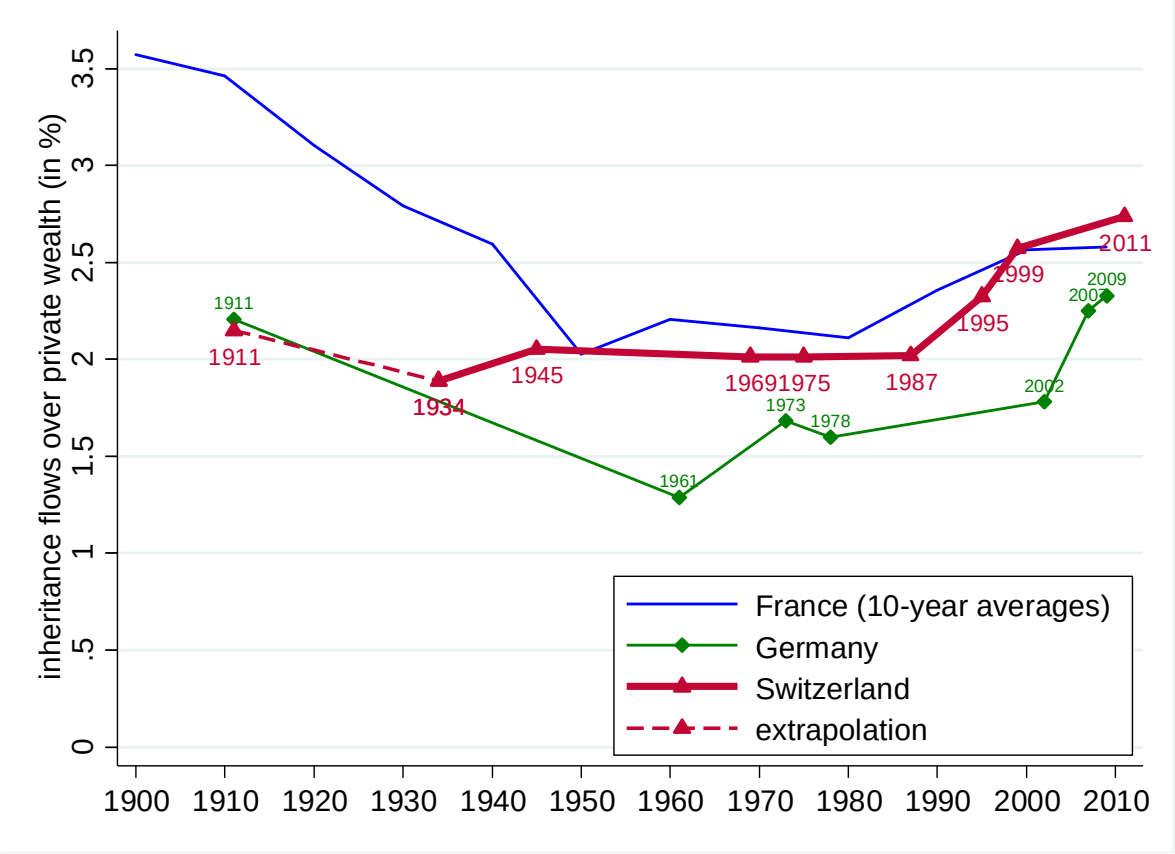
Notes: Data for France from Piketty (2011). See text for Swiss data sources.

Figure 4: Evolution of μ^*_t in Switzerland and France



Notes: Data for France from Piketty (2011). See text for Swiss data sources, and Table 2 for data points.

Figure 5: Annual inheritance flow as a fraction of private wealth: Switzerland, France and Germany



Notes: Data for France from Piketty (2011). Data for Germany from Schinke (2012). See text for Swiss data sources, and Table 2 for data points.

Figure 6: Annual inheritance flow as a fraction of private wealth: robustness to extrapolations pre-1934

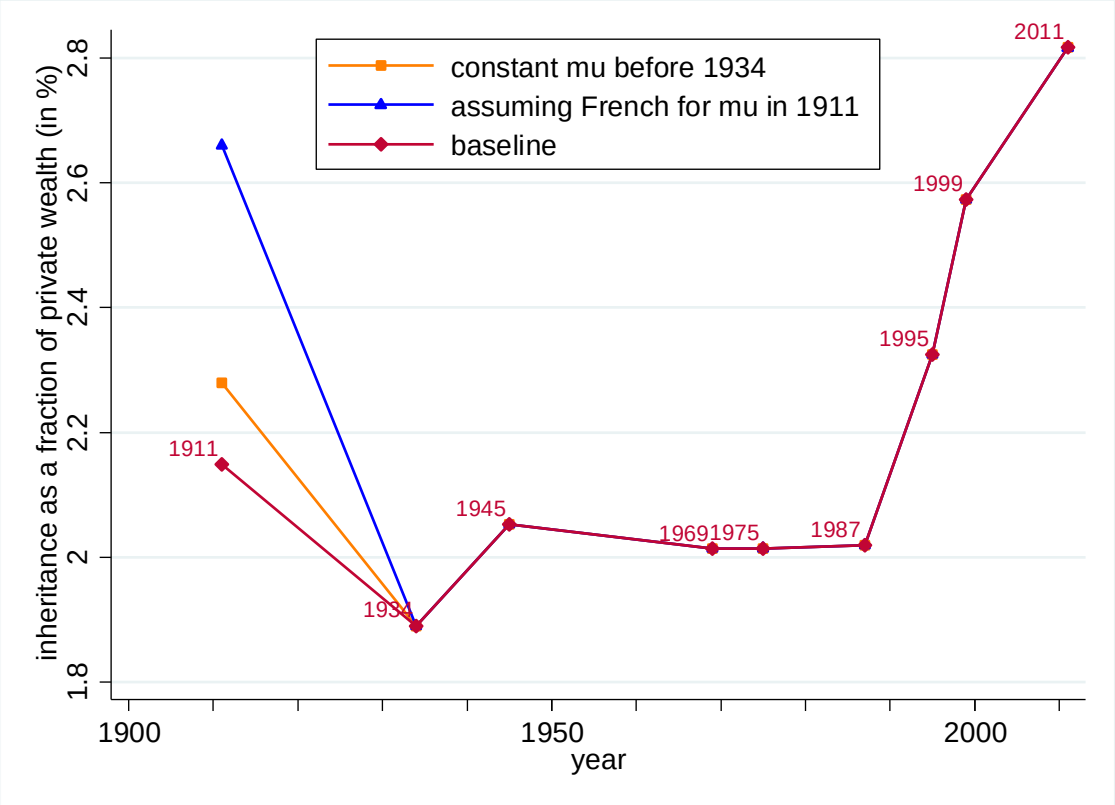
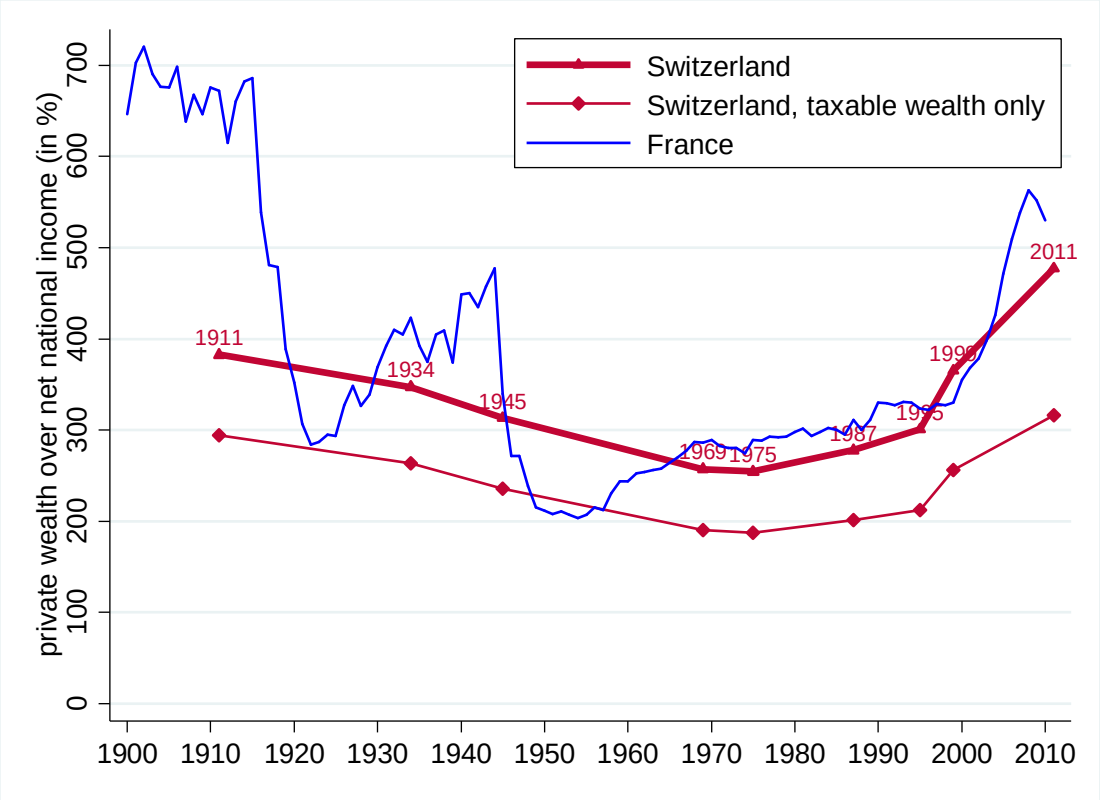
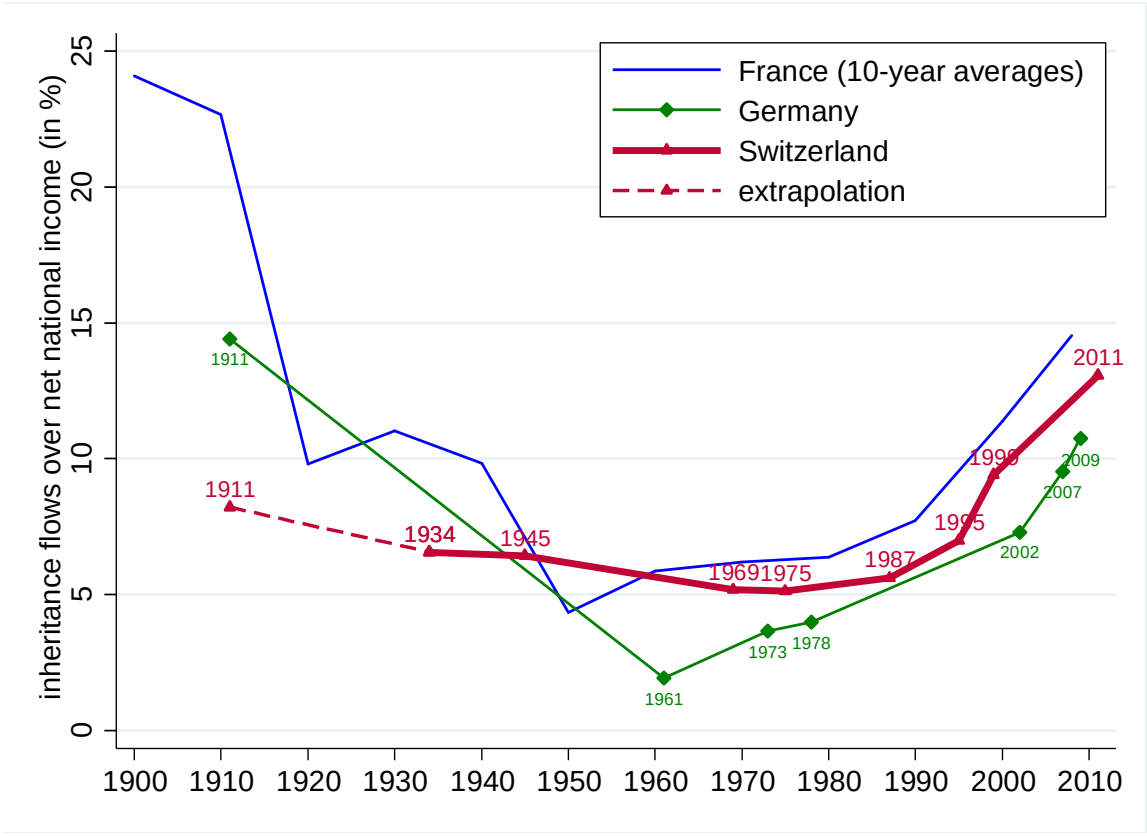


Figure 7: Private wealth as a fraction of net national income: Switzerland and France



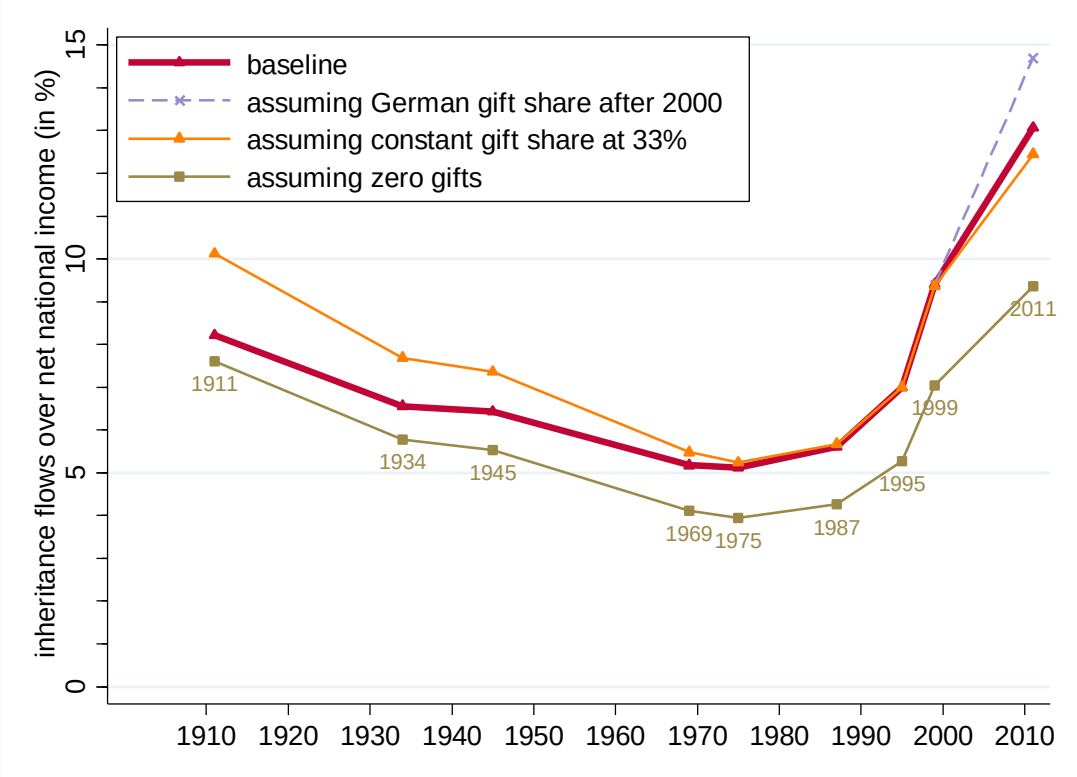
Notes: Data for France from Piketty (2011). See text for Swiss data sources.

Figure 8: Annual inheritance flow as a fraction of national income: Switzerland, France and Germany



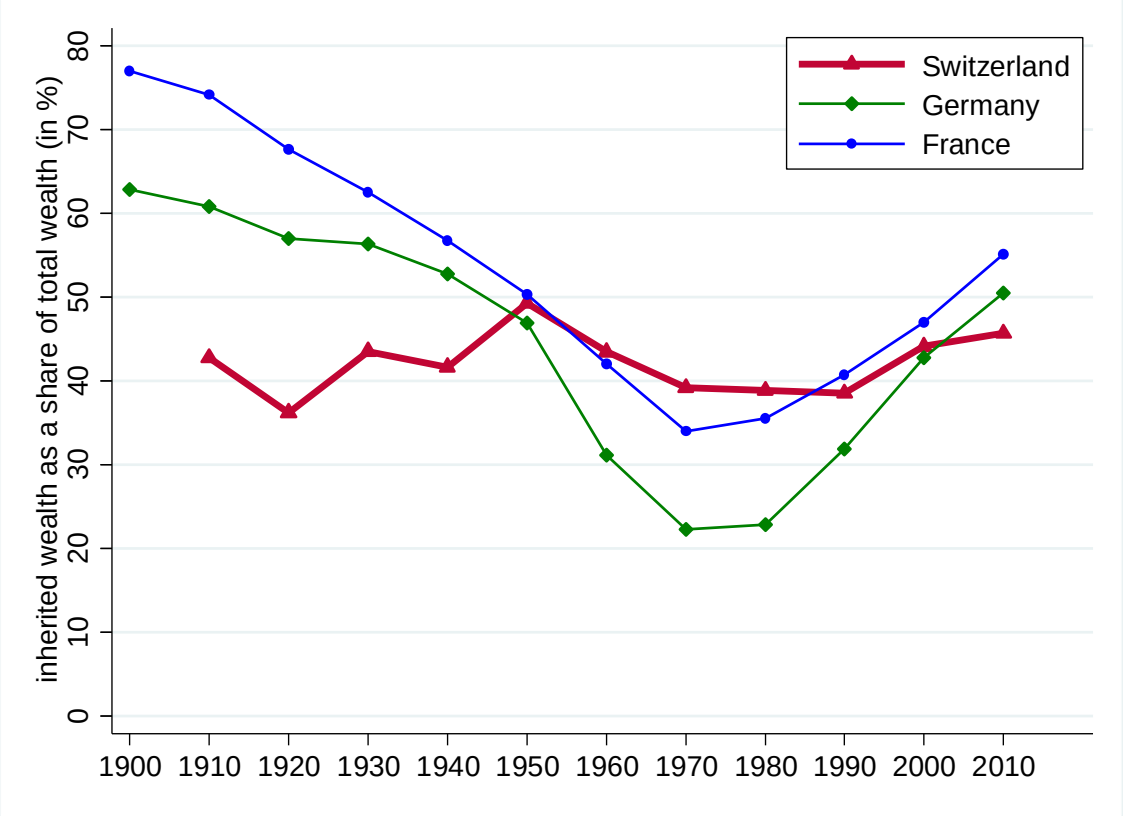
Notes: Data for France from Piketty (2011). Data for Germany from Schinke (2012). See text for Swiss data sources, and Table 2 for data points.

Figure 9: Annual inheritance flow as a fraction of national income: Robustness to assumptions on *inter vivos* gifts



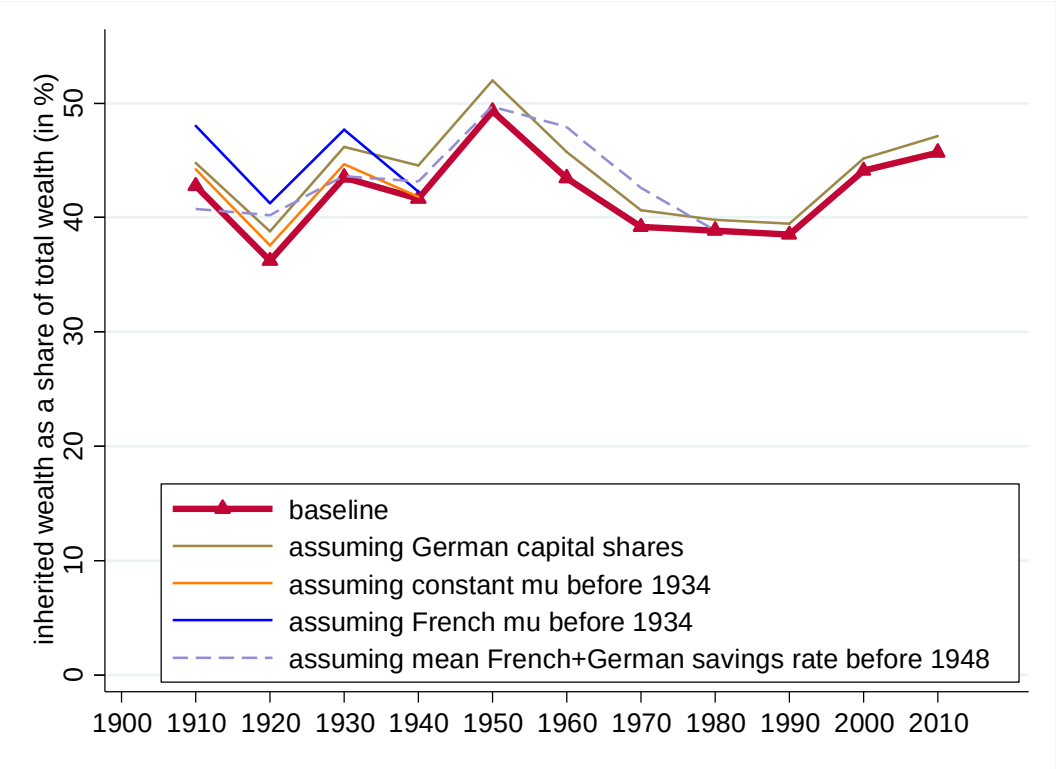
Notes: See text for data sources.

Figure 10: Cumulative stock of inheritances as a fraction of private wealth: Robustness



Notes: Data points are 30-year moving averages, reported every 10 years. See text for Swiss data sources. Data for France and Germany from Alvaredo *et al.* (2015).

Figure 11: Cumulative stock of inheritances as a fraction of private wealth: Robustness



Notes: Data points are 30-year moving averages, reported every 10 years. See text for data sources.

Table 1: The importance of *inter vivos* gifts

Inter vivos gifts in percent of the volume of bequests

year	Zurich	Bern	Ticino	Vaud	Germany
	Source: Daepp (2003)				Source: Schinke (2012)
1911					8
1961					18
1973					30
1978					30
1995		30.6			
1996		41.8			
1997		42.2	42.4		
1998	49.1	39.3	31.1		
1998*	36.9				
1999		27.5	40.2		
2000		23.4			
2001		34.4		17.9	
2002		33.5		43.9	34
2007					58
2009					59
Average		*33.5*	*36.5*	*30.4*	

* excluding wealth transfers larger than CHF 200 million.

Table 2: Data points for estimated Swiss inheritance series

	μ_t in % (Figure 2)	μ^*_t in % (Figure 4)	b_{wt} (Figure 5)	b_{yt} (Figure 8)
1911	106.6	115.1	2.1	8.2
1934	113.1	128.3	1.9	6.6
1945	121.3	140.8	2.1	6.4
1969	124.3	156.2	2.0	5.2
1975	128.6	167.1	2.0	5.1
1987	134.0	176.2	2.0	5.6
1995	151.6	201.4	2.3	7.0
1999	172.1	229.7	2.6	9.4
2011	201.1	280.7	2.7	13.1