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## Inheritance in Germany 1911 to 2009: A mortality multiplier approach

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**Inheritance in Germany 1911 to 2009:  
A Mortality Multiplier Approach**

Christoph Schinke

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# Inheritance in Germany 1911 to 2009: A Mortality Multiplier Approach

Master Thesis by Christoph Schinke

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This version: July 2012

## **Abstract**

We estimate the size of inheritance and gift flows in Germany for selected years over the last century. Applying the methodology used by Piketty (2011) for France, we combine national accounts, tax statistics and survey data (mainly the German Socio-Economic Panel, SOEP). The data supports the finding of a U-shaped evolution. The annual flow of inheritance and gifts was almost 15% of national income in 1911 and declined to less than 2% by the middle of the last century. Over the last five decades, it has risen steadily to over 10% of national income in recent years, amounting to €220 billion in 2009. The pattern is close to the evolution in France, but at a slightly lower level. Evidence on transfers based on pure household survey data or inheritance tax statistics yields much lower values. We can decompose the gap between the taxed and the aggregate inheritance flow: controlling for valuation and tax evasion effects, the taxed flow would be at least twice as high; tax exemption effects account for the rest.

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# 1 Introduction

“The wave of inheritance is sweeping across the nation.” Such or similar headlines appeared frequently in the German media over the last years. A recent study on behalf of Postbank claims inheritances “of historical dimensions” to be occurring (*Handelsblatt*, June 1, 2012, p. 16). There is a common perception that inheritance is getting more and more important, particularly motivated by the characteristic structure of the age profile of the German population, which implies a big amount of wealth to be transmitted from the actual retiree generation to their offspring in the next few decades. Inheritance is likely to play a major role for a long time, given that the baby boom generation is now close to its retirement age. It is a time when a big part of the wealth that was accumulated by Germans in the time of the economic upswing in the postwar period is being transmitted.

But what is the exact size of this “wave of inheritance”?<sup>1</sup> What is the annual amount of wealth that is transferred between generations in Germany? Sound empirical evidence on this question is scarce. Few people have tried to provide transparent and reliable estimations of the amount; academic scholars are rather absent on the field. The reason may be the lack of readily usable good data. Indeed, measuring inheritance is not an easy undertaking. People are unlikely to give true answers when they are asked about it in surveys, and tax data suffers from the shortcoming that only big estates are taxed. Furthermore, there are huge valuation issues. However, there are a lot of reasons to be interested in the true size of inheritance, which motivate an empirical approach to this open question. Such an analysis provides insight into the wealth distribution and allows us to make statements on inequality and intergenerational mobility. It is necessary in order to design an optimal tax system. And it opens a box with a lot of matters as to why people accumulate wealth and how wealth holding varies over a life time. Moreover, it is of interest to put private wealth flows like inheritance and gifts into a broader perspective when it comes to analyzing the public pension system, given that the two systems of redistribution work in the opposite direction.<sup>2</sup> However, whereas the scope of the public pension system is well documented, no well-established estimate for bequest flows is available in the literature or from governmental publications.

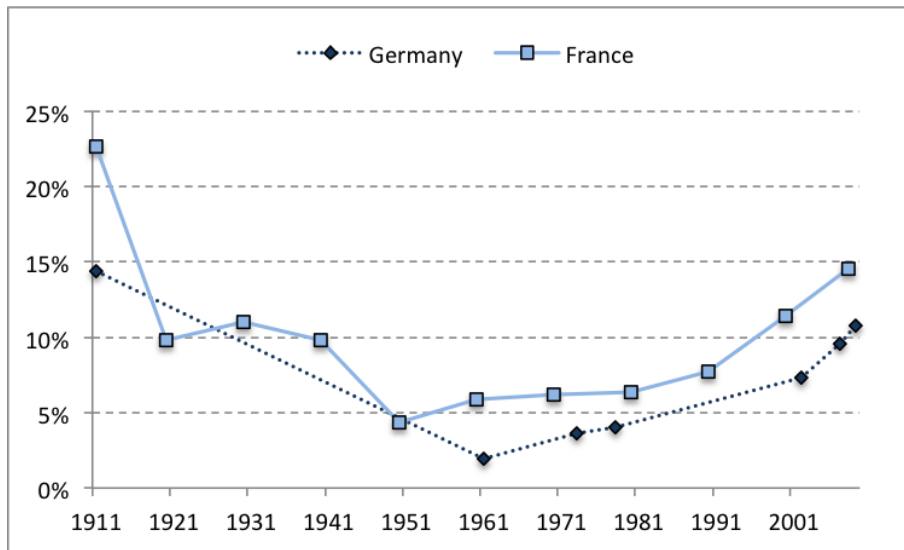
This research is furthermore motivated by evidence and ongoing research concerning the aggregate amount of inheritance in the long run in other countries, notably France, the United Kingdom and Sweden. To answer the question for the German case, we use the same accounting approach to inheritance as Piketty (2011), a methodology that consists of combining data from three fairly different sources and making use of their individual advantages: survey data on the wealth distribution, national accounts data on aggregate

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<sup>1</sup>A word on terminology: in this thesis, “estate” means the amount of wealth that people hold when they die, whereas “inheritance” and “bequest” are synonyms for the transfer of wealth to heirs—this distinction is necessary in the given context. “Inheritance” does not include inter vivos gifts.

<sup>2</sup>Motel & Szydlik (1999) elaborate this relationship from a sociological viewpoint.

Figure 1: Economic flows of inheritance and gifts as a share of national income, France and Germany, 1911 – 2009



Note: For France, decennial averages are reported. Values for Germany correspond to single years.  
Sources: Table 10 and Piketty (2011, French series).

wealth and income, and data from inheritance and gift tax statistics. This individual-based approach enables us to do the analysis over a long period, so we try to estimate the economic flow not only for the recent period, but also for prior years, establishing a data point even for the time before the first world war. This allows us to gauge the huge changes that have taken place over the last century and how they affected inheritance flows, and we can compare the results to other countries, mainly France. Indeed, the main findings, presented in Figure 1, show that the evolution of inheritance in Germany, measured as a share of national income, has followed the same U-shaped pattern as in France: down from high levels of inheritance at the beginning of the 20<sup>th</sup> century, the yearly flows have been rising again in the last decades. For Germany, we will also remark a strong difference between the economic flow and the taxed flow, i.e. between the aggregate flow of inheritance and what is captured in tax statistics.<sup>3</sup>

The economic flow approach is useful because it identifies three key variables that serve to assess private wealth transfers, measuring mortality rates, the aggregate amount of wealth in the economy, as well as the relationship between decedents wealth and average wealth of the population. Any change in underlying factors, such as the demographic structure, can be translated into different values for these variables and then allows us to compute the effects on aggregate transfers, a tool that can be used for going back in time as well as for making projections for the future.

<sup>3</sup>Note that Piketty (2011), in addition to the economic flow, also estimates a fiscal flow, which by construction is supposed to be close to the economic flow since it corrects fiscal data for tax-exemptions and non-filers. The data available for Germany does not permit these two independent approaches. Thus, what is called taxed flow in the present work is to be distinguished from Piketty's fiscal flow concept.

The analysis of inheritance is very close to an analysis of the wealth distribution. One can relatively easily translate findings on bequest and inheritance to findings concerning the wealth distribution through the use of mortality multipliers. Here, the approach goes through inheritance, also because the public policy instrument (i.e. taxation) is based on inheritance, and hence tax records are on these grounds, too. Recall that the wealth tax has not been levied in Germany since 1995. We will treat inheritance taxation issues for recent years in some detail. In any case, since both issues are that closely related, this thesis also contains findings concerning the wealth distribution in Germany.

This work is organized as follows: Section 2 reviews the theoretical and empirical literature. Section 3 summarizes the legal rules concerning succession as well as inheritance and gifts taxation in Germany. The empirical approach and the data sources used are described in Section 4. The empirical evidence and robustness checks are provided in Section 5, and Section 6 contains perspectives for the future evolution and comments on policy issues. Section 7 concludes.

## 2 Related literature

The basic reference for this thesis is Piketty's (2011) article on the long-run evolution of inheritance in France. In a macroeconomic approach, he finds a strongly U-shaped pattern of inheritance levels as a fraction of national income in the country for the last two centuries and develops a model that accounts for this evolution. The basic logic of the model is that in a low-growth environment with a substantially higher rate of return to capital, inheritance plays a key role for wealth accumulation dynamics. In the article, Piketty shows that for typically observed numbers like GDP growth rate of 1-2% and a rate of return on private wealth around 4-5%, we can expect yearly inheritance flows of about 20% of national income in the long run. This logic applied to the French society in the 19<sup>th</sup> and early 20<sup>th</sup> century,<sup>4</sup> and is likely to be pertinent in the 21<sup>st</sup> century again. In the meantime, high economic growth decreased the relative importance of inheritance flows. For the last three decades, Piketty finds a steady increase of annual inheritance flows, and the level of inheritance at the last data point in 2008 is about 15% of national income. The data used are of exceptional quality, since French inheritance legislation has been remarkably stable in the last two centuries and the universal application of taxation leads to the coverage of the predominant part of cases of succession.

Atkinson (2012) and Ohlsson *et al.* (2012) are estimating similar series on the long-run evolution of inheritance for the United Kingdom and Sweden, respectively. The present research is to be seen in the context of this intentional research project.

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<sup>4</sup>Another paper by Piketty *et al.* (2011) shows empirically that the Parisian society between 1872 and 1937 indeed featured these characteristics, allowing top successors to enjoy high living standards by consuming part of the returns to inherited wealth.

In what follows, we provide a brief review of other literature related to inheritance. We start with revising more general or theoretical literature, since the main ideas expressed there matter for the interpretation of our results, before proceeding to existing empirical estimates of the size of inheritance flows in Germany and related questions.

## 2.1 On wealth and inheritance

Why do people accumulate wealth? Several theories compete. On the one hand, there is the life cycle theory brought forward by Modigliani (1966), which states that during working ages, people save and accumulate assets, in order to finance the expenditures they need for living at old ages, when they dissave. This implies that wealth is at its highest level when people retire and that it is zero when they die. Reaching zero wealth at death can be achieved by full annuitization of assets.

On the other hand, there are models that include bequest. Bertola et al. (2006) describe for instance a model where a bequest left for the next generation enters the utility function of agents due to a “warm-glow”<sup>5</sup> motive, i.e. agents feel better when leaving wealth to their children, even if they do not care about their children’s consumption *per se*. In the more extreme form of dynastic models, agents maximize utility over an infinite horizon, which includes consumption of all offspring (see for instance Barro, 1974). These preferences would lead to a profile where an individual’s wealth is less related to its age but rather to total income of the dynasty over all periods, and we would in any case observe high wealth levels at old ages.

Even if people were rather saving for life-cycle motives, inheritance could still occur if it was “incidental”, i.e. if people could not manage to have consumed all their wealth when they die. This would be the case if annuity markets were imperfect and people were holding wealth for insurance reasons. Davies and Shorrocks (2000) remark that considering inter vivos gifts helps to cast light on the issue of whether wealth transfer is incidental or intentional, since gifts are certainly an intentional form of intergenerational transfers. Hence, if private gifts occur, there is also a case for intentional bequest. Page (2003) find that the size of bequest taxes is positively related to inter vivos gifts, suggesting that at least some part of bequest is intentional.<sup>6</sup>

We will see that in reality the shape of age-wealth profiles is in between the extremes implied by the theoretical models. This has created a scientific debate that attempts to quantify the relative importance of savings out of life-cycle vs. intergenerational saving motives in capital formation (see Kotlikoff and Summers, 1981, for the seminal paper, and Modigliani, 1988).

Beckert (2007) points to a number of issues that are important for the analysis of

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<sup>5</sup>See Andreoni (1990) for the origins of this term.

<sup>6</sup>For a recent empirical contribution to the question of intentional bequests and decumulation of assets in old age, including a cross-country dimension, see also Christelis & Weber (2011).

inheritance from a philosophical point of view. His observation is that the prevalent rules for inheritance reveal a lot about “macrosocial” aspects of the society. First, one should see that the development of inheritance laws is related to the process of dissolution of households as economic units in the times of industrialization, which led to an individualization of property rights and hence the increasing need to provide legal rules to reallocate wealth after the death of its owner. However, as we will see, particularly in Germany there is still a strong tendency to regard property as family property. Second, we can observe the interference between the idea of free individual disposal of private property and the principle of the social obligation of property (as fixed in article 14 of the German constitution). Third, Beckert states that inheritance laws evolve out of a conflict of four areas, namely economic interests, state demand, social institutions and cultural values.

Furthermore, advancing to an economic analysis, Beckert emphasizes that inheritance is highly concentrated, as is the wealth distribution in general. From an efficiency perspective, he argues that inheritances “undercut the allocation function of the market, because capital is being removed from competition” (p. 16). In general, he sees two opposite ways in which private inheritance can change people’s behavior: on the one hand it can be an additional incentive for testators to work hard since they know that wealth will remain in the family, on the other hand it can have a negative incentive effect on heirs who may enjoy being in a comfortable financial position without the need to work any more.

In any case, there is the widespread view that inheritance reduces intergenerational wealth mobility (Davies & Shorrocks, 2000). A comprehensive summary of theories on intergenerational mobility is available from Piketty (2000). It becomes clear that wealth transmission from parents to children is not the only mechanism reducing intergenerational mobility, but an important one.<sup>7</sup> He develops a model explaining why the intergenerational income correlation is larger than the intergenerational labor earnings correlation, a finding that is supported by empirical evidence. Another model shows the mechanisms for inequality to be persistent in the long run.

Beckert (2007) also evokes the importance of inheritance for the public budget. Arguments in the early 20<sup>th</sup> century advocated the use of these resources for financing of social and educational policies, however the taxation issue may be seen more generally and analyzed in a framework of optimal taxation. Since this thesis also deals with the specificities of the German tax system, it is appropriate to refer to a few publications on the economics of wealth and inheritance taxation. Radical theoretical results come from dynastic models with infinite horizon (Lucas, 1990), which imply a zero optimal tax rate on inheritance and capital per se. However, as Piketty (2000, p. 444) argues: “The question of its empirical relevance usually receives far less attention than the careful derivation of its theoretical implications.” Indeed, zero tax rates on capital are hardly observed in the real world. Instead, a proper welfare analysis would involve a comparison of the

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<sup>7</sup>Other channels include ability transmission, imperfect credit markets and self-fulfilling beliefs.

distortionary costs of taxation and the redistributive gains. Nevertheless, the conclusion about the optimal tax rate depends crucially on the motivation for leaving bequests. If bequests occurred “incidentally”, then the welfare costs of taxation were rather low. But the conclusion changes if leaving inheritance is really a choice of agents when it comes to allocating wealth between current and future periods. Unfortunately, there is still no firm consensus in the literature regarding the importance of different motives for leaving bequest.

Last but not least, a recent review of theoretical and empirical evidence on estate taxation is provided by Kopczuk (2010). He develops the idea of taxing inheritance in order to correct negative externalities. These externalities can be twofold: first at an individual level, i.e. between donor and donee, and second at the society level due to wealth concentration and inequality. Externalities at the individual level raise efficiency concerns, since non-labor income may have an impact on the individual’s labor supply decision. Kopczuk regards the second type of externalities as a potential main argument in favor of a positive estate tax rate, although the existence and the scope of these externalities is still an issue for ongoing research. Finally, he reviews evidence on the occurrence of inter vivos gifts as a way of tax avoidance, finding that the evidence is mixed, but that this is likely to be due to heterogeneity between the samples. In conclusion, taxable gifts prove to be responsive to tax considerations, but mainly of the wealthier part of the population.

## 2.2 Empirical estimates for Germany

We will now turn to estimates in the literature that are related to the empirical question we address in this thesis. Most studies have been trying to measure inheritance based on survey data. Jürges (2005), for instance, uses the SHARE (Survey of Health, Ageing and Retirement in Europe)<sup>8</sup> data set among selected European countries and finds that about one third of survey respondents report having received gifts or inheritances of €5,000 or more, but with considerable differences across countries. Next, he finds evidence of a very unequal distribution of inheritances, with the top 5% of households receiving about two thirds of total inheritances. Moreover, he tries to break down household wealth into inherited wealth and life-cycle wealth and finds the proportion of capitalized inheritance in total wealth decreasing with total wealth of respondents, even though he admits that this exercise gives only a very broad indication and he does not analyze the issue further. Finally, looking at bequest expectations, he finds that current household wealth is positively related to the share of respondents expecting to receive sizable bequest in the next ten years, and that this relationship is similar if potential donors are asked about the size of inheritance they will probably leave to their decedents. Again, there is

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<sup>8</sup>A list of the acronyms used in this work can be found in the Appendix.

clear evidence against Modigliani's life cycle saving theory, and in favor of a reduction of intergenerational mobility through inheritance.

When it comes to evidence for Germany, the Socio-Economic Panel (SOEP) is the primary data source. Schupp (2004) finds yearly inheritance and gift flows of around €50 billion (of which around €12.5 billion accrue from gifts) between 1999 and 2001 with an average amount of around €65,000 per inheritance and €30,000 per gift, based on a SOEP survey question explicitly asking for wealth transfers. 1.5% of households report receiving inheritance each year, and around 1% of households in the sample received gifts. In addition, the article provides a brief discussion of the German inheritance legislation and a comparison with other European countries, as well as its fiscal importance. One year later, Schupp (2005) compares the survey evidence with official tax data from the newly published inheritance and gift tax records. Given reported inheritances of around €12 billion in the statistics (treated more detailed in Section 4.3.4 below), he interprets the difference by concluding that around 33% of national wealth transmitted is submitted to taxation.

Westerheide (2004) studies the effect of inheritance and gifts on wealth accumulation. Analyzing the SOEP 2001 and 2002 waves and data on bequests and gifts received in the past, he finds that individuals between 30 and 50 years old save on average 80% of received inheritances and gifts, with the saving propensity being higher for real estate than for financial assets. Furthermore, looking at the distributional aspects, he concludes that the differences in saving propensities tend to work towards a more equal wealth distribution across households.

Regarding the wealth distribution in Germany, Frick & Grabka (2009) find, using SOEP data, that wealth inequality in Germany has increased between 2002 and 2007, and so have the inequalities between East and West Germany. In fact, the SOEP is—besides the official, household based Income and Consumption Survey (EVS by its initials in German)—the main data source for the government concerning issues of social policy and income distribution. Indeed, the Poverty and Wealth Report published by the Federal Ministry of Labour and Social Affairs (2005) refers to Schupp's (2004) estimate of around €50 billion which are transferred between generations each year.

The wealth distribution across ages in Germany has been estimated by Boersch-Supan (1994) for the year 1984, using survey data at the household level from SOEP and EVS. He finds profiles that are not in line with pure life-cycle theory, since financial wealth is remarkably high at old ages, and he calls for “a more careful analysis than the (...) SOEP data can provide” at the time (p. 308). In recent years, Frick & Grabka (2007) have estimated age-wealth profiles using SOEP wealth data for 2007 at the individual level, separately for employment status groups. In a very promising approach, they also try to integrate entitlements to public pension schemes into the wealth measure by matching data from SOEP and the German Social Security Administration, and they find the public

pension system playing a dominant role in determining wealth aggregates in Germany.

Another approach to inheritance, which has already been indicated, is to use tax statistics. A detailed analysis providing descriptive statistics on the official data of the inheritance and gift tax statistics for the year 2002 was implemented by Lehmann & Treptow (2006); a summary of the statistics is also available by Zifonun & Schöffel (2004).

In addition to this, there are various recent approaches to inheritance that are if anything semi-academical, since they do not provide any transparency on the way results were obtained. Here, a study on behalf of the Postbank (Meyer, 2011) is worth mentioning, since it has experienced considerable media attention in recent times. The authors conclude that the amount of inheritance in 2011 is about €233 billion, without revealing the methodology behind that estimate. Another study by Sieweck (2011) estimates an overall volume of inheritance between 2011 and 2025 of about €4.6 trillion, i.e. an average of about €300 billion per year for this period. However, given the price of €1,487 for this study (as of May 2012), it is generally not accessible for academic scholars, so that the methodology can not be verified. These two publications, presumably aimed at banks and large insurance companies, illustrate the financial and political relevance of the issue of inheritance, but given that their sources and methods are not made public, they hardly contribute to economic research.

Another rough and rather old estimate of yearly inheritance flows comes from the Bundesbank (1999) which quantifies yearly bequest flows at the time to around €100 to €130 billion. This number has been cited a lot in the literature, but in this case, again, the methodology of estimation is unknown.

The reference on inheritance for Germany that is probably the closest to this work is a recent study published by the German Institute for Old-Age Provisions (Braun *et al.*, 2011). They use data about household wealth in 2008 from the EVS and mortality projections to predict a volume of inheritance of €2,584 billion for the 2011-2020 period, i.e. around €258 billion per year (in 2010 prices). Furthermore, they also refer to national wealth accounts estimates for comparison. Yet, they do not make the step to include them in the estimation of inheritance volumes, and they do not take inter vivos gifts into account in their calculations. Moreover, EVS does not appear to be the most suitable data source for this purpose, as we will argue later. Then, the authors try to predict the evolution of the amount of inheritance after 2020, claiming that the increase of volumes will slow down and that inequalities of bequests will increase, but some of their assumptions are questionable (for example, when it comes to forecasting real estate prices). Finally, another part of the study is based on a survey among 1000 heirs with the aim to create a typology of heirs as to socio-economic characteristics and the presumed use of the inheritance. However, the questions are only qualitative, hence they do not allow us to calculate saving propensities.

A summary of estimates of yearly inheritance flows in Germany available in the liter-



Table 1: Estimates of yearly volume of inheritance in Germany in existing literature

Study	Inheritance volume (in €billion)	Reference years	Sources
Bundesbank (1999)	100 – 130	1999	unclear
Schupp (2004)	37.5	1999 – 2001	SOEP
Schupp (2005)	12	2002	Inheritance and gift tax records
Meyer (2011)	233	2011	unclear
Braun <i>et al.</i> (2011)	258	2011 – 2020	EVS and mortality projections
Sieweck (2011)	300	2011 – 2025	unclear

Note: Estimates are given in current prices, note that CPI inflation between 1999 and 2011 is 21.1% (Statistisches Bundesamt, 2012). These estimates do not include inter vivos gifts. See text for further details on data sources and methodologies.

ature is provided in Table 1. We notice that several attempts to gauge inheritance flows have been done, but they are not integrated and suffer several shortcomings.

### 3 Legal framework: Inheritance laws in Germany

Since for the estimation of inheritance flows we partially rely on tax data, it is useful to provide some background information on the legislation concerning inheritance in Germany. In a first part, some general facts concerning the issue of wealth and death will be presented shortly, and the second part will deal more precisely with the taxation of bequests. Without losing correctness, we will slightly simplify, since a comprehensive description of the legislation would clearly go beyond the scope of this thesis.

#### 3.1 Wealth and death

When dealing with inheritance, it matters who will be the owner of the wealth that was held by the decedent. The legal rules are stated in the German Civil Code, §§ 1922 ff. and are roughly similar to the French Civil Code. In principle, the law grants testamentary freedom, i.e. people can decide freely who shall get their wealth in the event of death. However, limits are set by the legislator as far as close relatives, i.e. spouse, offspring or parents of the decedent, are concerned. In case the decedent disinherits someone through his last will, that person can still claim a legitimate share of the estate (in general, half of the amount that he or she would have obtained in the absence of a last will).

If the decedent does not leave a last will—which, according to the Postbank study, happens in 47% of the cases (Meyer, 2011)—then intestate succession applies, following the Civil Code rules. These prescribe that in first place, the surviving spouse and children

inherit at fixed shares. Only if these do not exist, living parents or eventually more distantly related persons inherit. In the exemplary case of a surviving spouse and two children, the spouse would get one half and each child one quarter of the estate.

Furthermore, the partition of wealth within a marriage is of interest in the context of inheritance, since this may determine the amount of the estate to be passed in the case of death of the first spouse. In principle and if nothing else is agreed on through means of a marriage contract, the couple lives in a community of acquisitions, which means that all wealth that individuals held before wedding day remains personal, whereas all income that is received afterwards is split between spouses (Civil Code, § 1363). Inheritance that a spouse receives after wedding is an important exception: it is added to his personal wealth and not shared with the marriage partner.

### 3.2 Inheritance taxation

Germany has an inheritance tax, similar to countries like France, the Netherlands, or Belgium and opposed to an estate tax as it is prevalent in Anglo-Saxon countries like Great Britain and the United States. This means that the tax is assessed on the acquisition of each beneficiary of the legacy, and not directly on the amount of assets left by the decedent. Hence, there is a separate tax file for each beneficiary, and the tax to be paid, depending on the relationship between decedent and heir and the size of the transfer, is calculated separately.

Taxation of inheritance was introduced in Germany in 1906, except for transfers to spouses and children which were only subject to taxation from 1919 on. The spirit of the system has not changed since then: As we will see, inheritance of close relatives is still very much exempted from taxation, which is an effect of the family-oriented understanding of property in Germany.<sup>9</sup>

Now, in the event of death, what is the process that leads to tax assessment? Civil registry offices, courts, notaries and financial institutions as well as any beneficiary are obliged to notify any inheritance case to tax authorities, as soon as German natives are concerned as decedent or beneficiary, or domestic wealth (such as real estate) is transferred.<sup>10</sup> If tax authorities infer from this information that tax exemptions are likely to be exceeded, a formal file is started and the transferred wealth has to be declared in detail. At this point it is worth reminding that the assessment of asset prices is a complicated issue. Different standards of valuation are used, eg. tax accounting values for business property, and market values for financial assets and real estate.

The net inheritance is taxed, i.e. liabilities of the decedent are subtracted from the gross transfer, as well as the costs related to the succession (funeral etc.). Gifts received in the past ten years are added, and personal tax exemptions are subtracted, following the

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<sup>9</sup>Cf. Beckert (2007b).

<sup>10</sup>Information for this part is taken from Reis (2005), and more details can be found there.

Table 2: Personal tax exemptions (in €) for inheritance and gifts according to degree of kinship

	Legislation	
	until 2008	since 2009
Spouse (inheritance)	563,000	756,000
Spouse (gifts)	307,000	500,000
Children and grandchildren if children deceased	205,000 <sup>1</sup>	400,000 <sup>1</sup>
Grandchildren if children alive	51,200	200,000
Great-grandchildren and Parents (for inheritance)	51,200	100,000
Parents (for gifts), siblings, nieces, nephews, stepparents, divorced spouse, children-in-law and parents-in-law	10,300	20,000
Civil partner	5,200	500,000
Other beneficiaries	5,200	20,000

<sup>1</sup>In addition, children younger than 27 who inherit benefit of a special benefit “for caring” (*Versorgungsfreibetrag*) of up to €52,000, depending on their age. Source: Inheritance and gift tax records 2009, German Federal Statistical Office. Legal basis: §§16 and 17, Inheritance and Gift Tax Law.

scheme shown in Table 2. We see that personal tax exemptions can reach up to €756,000 in the case of a transfer between spouses. Furthermore, household effects (€41,000) and other consumer durables (€12,000) can be exempted for each transfer. To give a practical example, assume a couple with two children living in a community of acquisitions with wealth of €2m and no inter vivos gifts. When the first spouse dies, his estate of €1m will be split between the other spouse (€500,000) and the children (€250,000 each), all tax free since transfers are below the personal tax exemption thresholds. At death of the second spouse, the remaining €1.5m is split between the two children, each of them receiving €750,000. Since this exceeds the €400,000 threshold, each of them will have to pay inheritance tax on the taxable transfer of €350,000.

Based on the amount of taxable acquisition that results from these calculations, the tax to be paid is then calculated by applying the tax rates displayed in Table 3. Figure 2 shows the average overall tax rate by size of the couple’s wealth in the exemplary case outlined above. Up to an estate of of €1,066,000, the whole transfer is tax free. Only at around €3.5m, the average tax rate is above 10%, and it exceeds 20% for estates above €15m. For very high estates, say of €50m, the average tax rate would be above 28%. Clearly, we observe a progressive tax schedule. However, in reality, rates will be lower than displayed here if inter vivos gifts occur and further exemptions are drawn upon (e.g. for business assets).

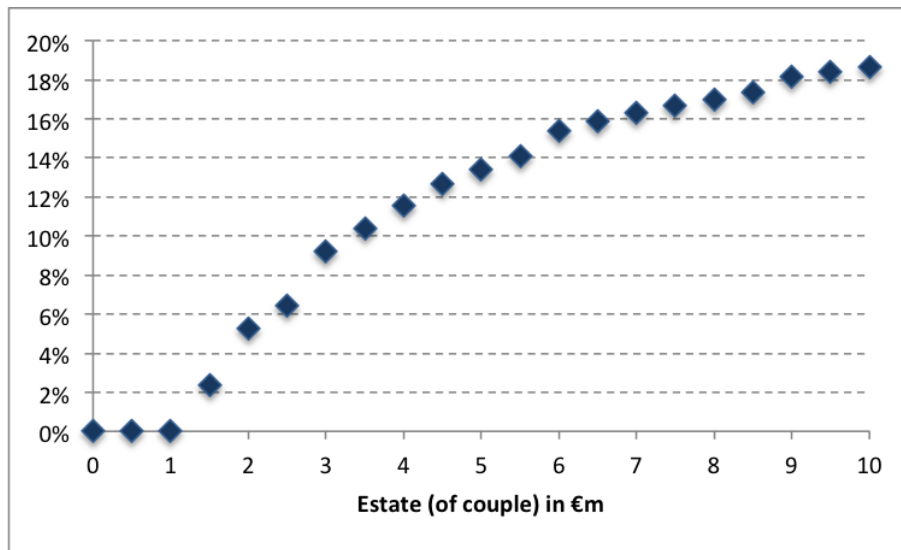
In the case of inter vivos gifts, the proceeding is similar. Gifts are subject to taxation under the same rules as inheritance. The same duties of notification to tax authorities as in the inheritance case apply, although in the great majority of cases, the notification is

Table 3: Tax rates (in %) according to amount of taxable acquisition  
(Taxable acquisition: inheritance minus personal exemptions, see Table 2)

<b>Legislation until 2008</b>			
Taxable acquisition up to ...€	I (Spouse and offspring)	II (close relatives)	III (other beneficiaries)
52,000	7	12	17
256,000	11	17	23
512,000	15	22	29
5,113,000	19	27	35
12,783,000	23	32	41
25,565,000	27	37	47
> 25,565,000	30	40	50
<b>Legislation since 2009</b>			
Taxable acquisition up to ...€	I (Spouse and offspring)	II (close relatives)	III (other beneficiaries)
75,000	7	15	30
300,000	11	20	30
600,000	15	25	30
6,000,000	19	30	30
13,000,000	23	35	50
26,000,000	27	40	50
> 26,000,000	30	43	50

Source: Inheritance and gift tax records 2009, German Federal Statistical Office. Legal basis: § 19 Inheritance and Gift Tax Law. Tax class I includes spouse, offspring and parents (for inheritance cases). Tax class II includes parents (for gifts), siblings, nieces, nephews, stepparents, divorced spouse, children-in-law and parents-in-law. Tax class III includes civil partners (until Dec 12, 2010; tax class I afterwards) and other beneficiaries. Tax rate for tax class II was equal to the tax rate for tax class III during the year 2009. The tax schedule furthermore contains a special rule that smooths the transition to the higher tax rate at each threshold.

Figure 2: Average overall inheritance tax rate by size of estate (simulation based on the current legislation, assuming a couple with two adult children, community of acquisitions, no inter vivos gifts and standard rules of succession)



For explanations see text. Sources: own calculations based on Inheritance and Gift Tax Law.

effected by a notary. Tax exemptions and tax rates (see Tables 2 and 3) are also identical to those for inheritance cases, except for the further exemptions for caring purposes, which do not apply. Furthermore, tax exemptions can be drawn upon every ten years. This means that for instance a couple with two children can transfer €1,600,000 untaxed to the next generation in every ten year period (i.e. €400,000 per spouse and child).

Inheritance and gift tax laws have seen major changes in a reform that was conducted in 2009. Overall, tax exemptions for close relatives as well as tax rates for other beneficiaries were raised. The main reason for the reform was a decision of the German Constitutional Court, which judged that the laws in force were contrary to the rule of equality.<sup>11</sup> Hence, all assets are now supposed to be assessed at market value, which for instance for real estate was not the case before, and similarly for business property. In fact, *Steuerwerte* (tax values) were used for business assets before the recent reform. Real estate was assessed based on the *Einheitswert* of each property, values which basically were assessed in 1964 and not changed ever since. Maiterth *et al.* (2009) estimate that *Steuerwerte* corresponded to only little more than 50% of market values, and that real estate is evaluated at around 70% of its market value.

Furthermore, generous rules for the inheritance of business property were fixed. In particular, a transfer is tax free if a successor continues running an inherited company for at least seven years without reducing the wage bill.<sup>12</sup>

In earlier years—we focus on those for which we estimate inheritance flows—the law

<sup>11</sup>Decision no. 1 BvL 10/02, November 7, 2006.

<sup>12</sup>For more details, see Schrinner (2012) and Schwarzer (2012).

was as follows. In 1911, spouses and children were fully exempted from inheritance taxation. Other persons were subject to a proportional tax scheme, depending on the degree of kinship to the decedent. Still, personal exemptions of RM10,000 applied for inheritance to parents and children born out-of-wedlock.<sup>13</sup> For comparison, average adult wealth, calculated as the ratio of aggregate private wealth and the number of adults, was around RM6,100 at the time. Spouses and children were taxed from 1919 on. In 1961, the effective personal exemption was DM250,000 for spouses and DM30,000 for children,<sup>14</sup> compared to around DM8,900 of average adult wealth at the time. After a reform in 1974, exemptions were set to DM500,000 for inheritance to spouses and DM90,000 for children, and exemptions for other individuals were up to DM50,000<sup>15</sup>—again considerably above the level of average adult wealth of around DM38,000 at the time. We notice that throughout the time, tax exemptions have been substantial.

For comparison, we will briefly outline the current inheritance tax system in two other countries. In the UK, the system is much simpler than in Germany: The tax is based on the whole estate, there is a fixed minimum threshold of currently £325,000, and a single rate of 40% is applied on the value of the estate and transfers made during the previous three years that exceeds the threshold (Adam & Browne, 2011). In contrast, the French system rather resembles the German one. The tax is personal for each beneficiary, tax allowances decrease and tax rates increase with distance in the degree of kinship between decedent and beneficiary, and tax rates increase with the size of the transfer. The allowance for a transfer from parent to child, for instance, is currently €150,000 (Piketty, 2010).

## 4 Estimation strategy and data

The empirical approach we pursue in this thesis differs from the earlier strategies that were applied for Germany. In particular, we will integrate micro evidence about the age distribution of wealth and macro evidence taken from national accounts. This approach is based on the concept used by Piketty (2011) for France. In this section we will present the strategy in detail, before turning to a description of the data used.

### 4.1 Empirical strategy

To estimate the amount of aggregate wealth that is transmitted between generations every year we will estimate the following equation:

$$b_{yt} = \mu_t^* m_t \beta_t \tag{1}$$

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<sup>13</sup>Reichs-Gesetzblatt, 1906, pp. 657 ff.

<sup>14</sup>Bundesgesetzblatt, 1959, pp. 193 f.

<sup>15</sup>Bundesgesetzblatt, 1974, pp. 939 f.

with  $b_{yt} = \frac{B_t}{Y_t}$  and  $\beta_t = \frac{W_t}{Y_t}$ ,

where  $B_t$  stands for the aggregate bequest flow in year  $t$ ,  $W_t$  denotes aggregate private household wealth and  $Y_t$  is national income. Equation 1 estimates the amount of inheritance flows as a percentage of national income in year  $t$  as the product of the ratio of average wealth of decedents over average wealth of the living ( $\mu_t^*$ ), the adult mortality rate ( $m_t$ ) and the ratio of aggregate private wealth over aggregate income ( $\beta_t$ ) in the economy.

Equation 1 is a mere accounting equation, i.e. it does not rely on any specific theoretical framework. To grasp the intuition behind this approach, assume for a moment that each individual in the economy holds the same wealth, i.e.  $\mu_t^* = 1$ , and let the mortality rate  $m_t$  be equal to 1%. In this setting, yearly inheritance flows must mechanically be equal to one percent of total wealth, or relative to national income, inheritance flows  $b_{yt}$  must be equal to one percent of the wealth income ratio  $\beta_t$ . Now, to be more realistic,  $\mu_t^*$  is most likely not equal to one. For instance, in a Modigliani framework where people die with zero wealth,  $\mu_t^*$  is equal to zero, which yields  $b_{yt} = 0$ . Conversely, if people accumulate wealth over their life time and die with wealth higher than the average wealth of living individuals,  $\mu_t^*$  will be higher than one, yielding greater bequest flows.

When implementing a country specific analysis, for instance for fiscal questions,  $B_t$  is probably the most meaningful estimate. However, for the purpose of international comparison and the evolution of inheritance over time, as well as for comparison with other macro variables, we also report the size of inheritance as a share of national income.

Whereas  $m_t$  and  $\beta_t$  are—at least for recent years—relatively easily estimated from official publications by the German Federal Statistical Office, the estimation of the ratio of average wealth of decedents over the average wealth of the living,  $\mu_t^*$ , is not straightforward. No estimate of the wealth of decedents is easily available from official publications, and statistics from inheritance tax records can not help, either, since sizable tax exemptions lead to a substantial part of inheritance cases unreported in these statistics. However, the wealth of the living population is measured more precisely. Aggregate wealth is measured in national accounts data, and the distribution of wealth can be drawn from wealth surveys. In this situation, the best measure for  $\mu_t^*$  proves to be the one derived using the mortality multiplier approach.

## 4.2 Mortality multipliers and further methodological issues

Mortality multipliers allow us to recover the distribution of wealth at death from the distribution of wealth of the living, and vice versa, by weighting individuals' wealth with their mortality rate. For a more detailed explanation of the method and the application to estimate top wealth shares in the United States, see for instance Kopczuk and Saez (2004) who recover the wealth distribution of the living from estate tax data. In the given setting,

we will use the method in the opposite sense, i.e. we use observed wealth of the living to compute the wealth of decedents. In any case, since what matters most for differences in mortality rates among individuals is age, this methodology requires information on the relationship between wealth and age, i.e. we need to calculate age-wealth profiles of the population. Then, using the probability of death for each observation and taking into account the demographic structure of the population yields an estimate for average wealth of decedents.

Age is an important determinant for mortality. Naturally, average wealth of older people will be weighted more heavily in the calculation of the average wealth of decedents. However, mortality varies in other dimensions, too. First, sizable differences in mortality derive from the socio-economic status. It has been empirically established that wealthy people have a higher life expectancy than individuals of a lower social standing. This phenomenon is called “differential mortality” in the literature and is assessed, for instance, in Brown *et al.* (2002). We will take this into account by using estimates from the available literature, which assign a higher weight in the average wealth of decedents measure (given other characteristics) to individuals from a lower social standing. Second, mortality also differs by sex. Given that women on average have a higher life expectancy than men, their weight in the average wealth of decedents measure (once again, given other characteristics) will be lower than those of men. Hence, we will estimate age-wealth profiles separately by sex.

Another issue is important to take into account in order to implement a meaningful assessment of the economic importance of inheritance. When estimating age-wealth profiles of the living from the SOEP data, this is not the true distribution of wealth held by individuals before making intergenerational transfers. Inter vivos gifts make a difference. These can be seen as a substitute of inheritance at death, or as advanced inheritance. Hence, from the observed age-wealth distribution we would underestimate the true relationship between average wealth of decedents and average wealth of the living, since people have already given away part of their wealth. To circumvent this and to estimate the “true”  $\mu_t^*$ , we have to inflate the  $\mu_t$  obtained from the observed age-wealth profiles with an estimate of the importance of inter vivos gifts by using the following equation (again, taken from Piketty, 2011):

$$\mu_t^* = \mu_t(1 + v_t), \tag{2}$$

where  $v_t$  denotes the ratio of inter vivos gifts over bequests for a given year and is measured using inheritance and gift tax data. To see that the equation makes sense, assume first  $v_t = 0$ , i.e. there are no inter vivos gifts. In this case, the true  $\mu_t^*$  is identical to the observed  $\mu_t$ . However, if for instance  $v_t = 1$ , i.e. decedents have given away the same amount of wealth through inter vivos gifts as they leave through inheritance, then the true  $\mu_t^*$  is twice as much as the observed  $\mu_t$ .



A remark on the type of wealth we are looking at: at the core of the analysis, we consider assets that are subject to taxation, as these are also the type of assets that are part of an estate. This means that we include tangible assets like real estate and consumer durables, and financial assets, both in net value. One reason for doing this is that this work partially relies on data from tax returns, hence this is appropriate. Furthermore, these kind of assets can be relatively precisely measured by market values (even if measurement still is a complicated issue, see Section 4.3 below). Ideally, one may want to consider the transfer of non-tangible assets like human and social capital as well, in particular for an analysis of social justice and social mobility. However, these type of assets are extremely difficult to assess, since market values are not observed.

Note that the empirical strategy implies an approach to inheritance that is based on each individual. Whenever an individual dies, we consider the personal wealth he or she leaves as an inheritance. It is a great advantage that the data enables us to do this kind of computation, and to abstract from issues like marriage and household composition. This distinguishes the present work for Germany from those by other authors like Braun *et al.*, 2011, who decompose inheritance volume estimate into transfers within and between generations by using rough assumptions, namely that 50% of inheritance remains within each generation in cases when the spouse is still alive. In fact, the reasons for such an approach are unclear, they may just be related to the use of household based data. In any case, inheritance to spouses are not too important with respect to total transfers. From the tax records for 2002 and 2007 we know that taxable acquisitions based on transfers to spouses account for around 7% of total taxable acquisitions, compared to around 50% for transfers to children.<sup>16</sup>

## 4.3 Data

We will now present in more detail the data sources used, and provide some descriptive statistics. The empirical evidence will then be shown in the next section.

### 4.3.1 SOEP

To estimate age-wealth profiles, we will mainly rely on the German Socio-Economic Panel (SOEP), which is provided by the German Institute for Economic Research (known as DIW Berlin by its initials in German). This sample of roughly 20,000 individuals is representative for the German population and data has been collected since 1984. Participants are surveyed once a year about socio-demographic characteristics and they stay in the sample as long as possible. In fact, more than half of the households that were surveyed in 1984 are still part of the sample in 2007 (see Kroh, 2008, for detailed statistics on at-

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<sup>16</sup>Yet, because of higher tax exemptions for spouses than for children, this is a lower bound of the true share.

trition). Over the years, the sample was extended by including additional subsamples of certain characteristics, for instance in 1990 by including households in the former German Democratic Republic. In 2002, a new subsample of 1500 households, which aimed exclusively at representing individuals with relatively high incomes, was added (Frick *et al.*, 2007b; Pischner, 2007). To this end, only households with net yearly incomes greater than €54,000 in 2003 were considered, which increases the statistical power of the SOEP at the upper end of the income and wealth distribution. In the same year, the questionnaires were augmented by adding seven questions on wealth to all individuals aged over 17, whereas the normal survey only contains questions on income. This was repeated in 2007, which allows us—at least for these two years—to compute age-wealth profiles from this data. A wealth module had already been part of the SOEP questionnaire in 1988, but only at household level (Frick *et al.*, 2007a), which is why a combination of wealth data with individual characteristics is not possible. Afterwards, wealth data was not surveyed between 1988 and 2002, since the interviewers noted a substantial increase in attrition following the wealth survey questions in the 1988 wave (Frick *et al.*, 2007b).

An alternative data source that was already mentioned and which is comparable to the SOEP is the EVS, which is conducted by the German Federal Statistical Office every five years since 1964 and is supposed to measure the living conditions of Germans. In addition to the longer time horizon, the sample size is bigger than for SOEP, covering around 50,000 households as opposed to around 10,000 in the latter case. Yet, the EVS suffers two major shortcomings. First, it is exclusively based on households. This prevents researchers from drawing conclusions about the intra-household distribution of resources, and hence, from computing age-wealth profiles at the individual level. Second, the EVS is top-coded at a monthly net household income of around €18,000 in 2008 (Statistisches Bundesamt, 2008), thereby strictly excluding high net wealth individuals. For these reasons, SOEP is the first choice reference for age-wealth profiles. However, the EVS still contains some useful information for comparisons over a longer time horizon, when no other data is available (used in Section 5.4).

Another promising panel data set for the analysis seemed to be the SHARE data, which aims at comparing the living conditions of citizens over the age of 50 in Europe (Jürges, 2005). However, the sample size for each country (around 2,000 observations for each of the 13 countries) appears to be too limited to draw firm conclusions on the relationship between age and wealth, and data is only available after 2004 (in three waves). Therefore, we do not make use of it in this work.

In general, using survey based evidence to conclude on the wealth distribution may have some shortcomings. Surveys are prone to measurement error, and this problem is probably particularly important for wealth questions, first because individuals self-report their wealth and may simply not know the correct figures, and second because people may be reluctant to give the true value for different reasons.

Furthermore, it is true that wealth is highly concentrated, and we will see this in this work, too. Hence, a special emphasis lies on the upper part of the distribution, and it is likely that the top wealth holders are not adequately represented in a survey. This may be because they are unwilling to respond survey questions, but not necessarily. The simple fact that people at the very top of the distribution are few make them unlikely to appear in a random sample, for statistical reasons. Hence, to circumvent this we would ideally want to use exhaustive data on the upper part of the distribution. However, it is extremely difficult to get access to this kind of data. The best thing would be data from wealth tax statistics, but since the wealth tax in Germany has not been levied since 1995, this kind of data is not available for recent periods. Alternatively, the inheritance and gift tax data could be used, but access to the micro data set is very much restricted by the German Statistical Office, in particular for foreign universities. Hence, we use micro data from the SOEP survey, which is not ideal, but given the constraints we face should lead us as close as possible to the true distribution. Concerning the aggregate values, Section 4.3.3 shows that SOEP evidence fits the aggregate data provided by national accounts fairly well, although some limitations exist.

Note that measuring wealth entails problems that go beyond matters of sampling and errors due to self-reporting, namely valuation. As we will see in the next sections, there are different principles of measuring wealth, such as using market values, purchase prices, assessed tax values etc. Different types of assets pose different problems. For instance, whereas financial wealth is typically assessed at market value, this value is often unknown for real estate. Conceptually, we try to use market values in this work whenever possible, since this appears the most reasonable when it comes to adding up wealth held in different types of assets. SOEP clearly aims at measuring market values.<sup>17</sup>

In order to account for problems of non-response and inconsistent response in the wealth questionnaire, we draw on existing work by Frick *et al.* (2007a). They improve the raw survey data by editing inconsistent data on logical grounds, and imputing values in the case of non-response through logistic regressions and Heckman selection models. In particular, they also preserve the variance of the underlying data. The changes they make are sizable, as more than two third of observations are at least partially affected, and the estimated net overall wealth increases by around 32% through this operation. It is clear that the data they provide are a considerable improvement over the raw data, hence we use these estimates.

After all, the SOEP data appears to be of a good quality, even given the possible sources of bias we mentioned. It is worth noting that we use the data only to estimate the relationship between age and wealth. This means that if measurement or sampling

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<sup>17</sup>For instance, the survey question aimed at real estate ownership is as follows: “If you were to sell today, how much would you receive for your house/apartment including land?” (Infratest Sozialforschung, 2002, p. 24)

errors in the wealth variable were to affect the results, these would need to vary with age groups or sex. We can only hypothesize on this question. It may seem reasonable to argue that age-wealth profiles of the very top wealth holders will show less asset decumulation at old age than those of the rest of the population. This would mean that there is more life-cycle saving (i.e. more hump-shaped age-wealth profiles) for the majority of the population than for the very top of the distribution, which is in line with dynastic models as presented in Section 2.1, where only individuals belonging to wealthy dynasties leave sizable bequests to their heirs. It is difficult to argue the contrary, which leads to the conclusion that, if anything,  $\mu_t^*$  estimated from the SOEP underestimates the true value. Moreover, if this effect exists, it is probably more pronounced for men, since the data shows that individuals at the top of the distribution are more likely to be male than female.<sup>18</sup>

Another question is whether any sampling or measurement error can lead to biases in measuring the evolution of  $\mu_t^*$ . Here, we can be even more confident. Since, due to the panel nature of the data, we observe mainly the same individuals between 2002 and 2007, it seems safe to assume that any bias is stable over time and does not affect the sample differently at different points of time. Then, conclusions about the evolution of  $\mu_t^*$  over time must be robust to this kind of error.

Table 4 shows descriptive statistics on the SOEP sample for 2002 and 2007. We use sample weights provided by the DIW, which serve two purposes: the longitudinal weighting corrects for sample attrition, and the cross-sectional weighting takes the sampling probability into account and ensures the data to fit the marginal distribution (Pischner, 2007). Figure A.1 in the Appendix shows that the weighted sample fits the underlying population well in terms of age and sex of the population.<sup>19</sup> The sample consists of 23,135 observations in 2002 and 20,623 observations in 2007. The mean income is €79,837 in 2002 and it rises slightly to €83,840 in 2007. The median is considerably lower (€14,339 and €15,000 in 2002 and 2007, respectively), which indicates that the wealth distribution is strongly concentrated, with few people holding big parts of the wealth. High levels of inequality are also indicated by the Gini index, which amounts to 0.79 and 0.8 for 2002 and 2007, respectively, in this data set. Although this is quite high, it still falls in the typical range of Gini coefficients in wealth distributions (0.6-0.8, following Davies, 2008) and is consistent with the value that Sierminska *et al.* (2006) find, using the same data. Worth noting, it is much above Gini coefficients based on income (around 29% in Germany in the year 2007, according to Frick & Krell, 2009).

Still, we face a problem of sampling in the upper part of the distribution. When it comes to analyzing subsamples of the distribution, such as age groups, we are left with too

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<sup>18</sup>In the SOEP sample for 2002 (2007), only 27.8% (30%) of the 205 (210) individuals with wealth above €1,000,000 are female.

<sup>19</sup>Slight differences in the distributions are due to household composition effects, since sample weights aim at fitting age and sex data to the marginal distribution at household, not individual level.

Table 4: Socio-Economic Panel - descriptive statistics

		(2002)		(2007)	
		absolute	relative	absolute	relative
Number of observations		23,135		20,623	
Sex	male	10,800	46.7%	9,926	48.1%
	female	12,335	53.3%	10,697	51.9%
Age	17-19	850	3.7%	535	2.6%
	20-24	1,600	6.9%	1,454	7.1%
	25-29	1,510	6.5%	1,478	7.2%
	30-34	2,029	8.8%	1,348	6.5%
	35-39	2,359	10.2%	1,798	8.7%
	40-44	2,218	9.6%	2,171	10.5%
	45-49	1,993	8.6%	1,933	9.4%
	50-54	1,891	8.2%	1,755	8.5%
	55-59	1,603	6.9%	1,594	7.7%
	60-64	2,082	9.0%	1,318	6.4%
	65-69	1,622	7.0%	1,859	9.0%
	70-74	1,299	5.6%	1,351	6.6%
	75-79	1,015	4.4%	933	4.5%
	80-84	637	2.8%	677	3.3%
	> 85	427	1.8%	417	2.0%
Wealth distribution (values in €)	mean	79,837.03		83,840	
	sd	419,903.8		309,326.1	
	minimum	-3,692,144		-1,500,000	
	q0.1	0		0	
	median	14,339		15,000	
	q0.9	205,000		210,000	
	q0.99	720,000		770,100	
	maximum	62,542,500		30,800,000	
	Gini index	0.786		0.799	

Source: SOEP v27. *sd* means standard deviation. q0.1, q0.9 and q0.99 denote the 10%, 90% and 99% percentile, respectively.

little observations of the wealthiest people. Single observations of very wealthy individuals can considerably change the estimated age-wealth profiles; a scenario that we want to avoid. Clearly, there is a trade-off between biased results (assuming that age-wealth profiles of richer and poorer people differ) and precision of the estimate when deciding to ignore certain observations. We decided to put an upper threshold of €2.5 million in current value and a lower bound of €−200,000, which means dropping 75 observations from the 2007 wave and 59 observations from the 2002 wave. This threshold is chosen considering the trade-off mentioned above, and also given the fact that €2.5 million is a common threshold in wealth tabulations (like the inheritance and gift tax records we are using). Similarly, the lower threshold aims at excluding observations with extreme high debt burden, which may even be misreported and are certainly not representative for subsamples. In any case, the results are not too sensitive to this proceeding, as the robustness checks in Section 5.3 show.

In addition to the wealth information we have been treating up to know, since 2000 the SOEP also contains a survey question that is directly aimed at inheritance.<sup>20</sup> A first piece of evidence about the total flow of inheritance may then be taken from the SOEP data set. The drawback is, however, that the information is collected only at the household level. Still, we can use this information to get a first idea of the amount of wealth that people self-report as received through inheritance or gift.

### 4.3.2 National accounts

The distributional evidence on wealth derived from SOEP will be complemented with data on aggregate wealth and income at the economy level. National accounts data has a lot of advantages. One of them is the great degree of comparability across countries, since the data is calculated based on the United Nations System of National Accounts, which is also the basis for the European System of Accounts (ESA).

National accounts data is provided by the German Federal Statistical Office and the Deutsche Bundesbank. Generally, the Bundesbank measures financial assets in its financial accounts publications, whereas the Statistical Office publishes data on non-financial assets and national income. Recently, estimates that revise earlier data for national wealth between 1992 and 2010 have been compiled jointly by both institutions (Statistisches Bundesamt, 2010); we use these series. The series until 1991 are taken from Statistisches Bundesamt (1992) and Deutsche Bundesbank (1994) separately. DM values are converted to Euros at the official euro conversion rate of 1,95583 : 1 (throughout this work).

For wealth we use aggregate values that correspond to net worth of households and

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<sup>20</sup>The exact question is “Did you or another member of the household receive a large sum of money or other forms of wealth (car, house, etc.) as inheritance, gift, or lottery winnings last year? We refer to money or other forms of wealth worth more than 5,000 DM.” (Infratest Burke Sozialforschung, 2000, p. 10)

non-profit institutions serving households (NPISH), including consumer durables of households.<sup>21</sup> This is the best wealth definition for our purposes, since it constitutes wealth that can be transmitted through inheritance, as opposed to net wealth held by the state and corporations, which is relatively small but not negligible either (23% of net household wealth in 2009). The inclusion of consumer durables is not in line with the common practice in national wealth accounts, where this type of assets is not part of the official statistics but only given in an additional table. Yet, in the context of inheritance it is justified to include them into the aggregate wealth measure, because they are usually part of an estate. The fixed assets series are estimated by the Statistical Office using the perpetual-inventory method, which amounts to measuring the flow of assets that are added to the capital stock each year, at their market prices, while also taking into account depreciation (see Schmalwasser & Müller, 2009, on the capital stock, and Schmalwasser *et al.*, 2011, on consumer durables).

Some remarks about the aggregate wealth series are necessary. When analyzing long-run series, we have to be aware of the fact that the sectoral classification of households has changed when the new accounting standard ESA 95 was introduced. The earlier standard was ESA 79. Basically, the classification of the household sector was changed from a functional to an institutional concept, including households as producers (Schmalwasser & Radke, 2007). Furthermore, the official series before 1991 do not contain values for land nor consumer durables, as opposed to the later period. These aspects lead to an underestimation of aggregate wealth before 1991 by a size of around 27%, considering the 1992 shares in total household assets. Another reason for the structural break between the two sets of series is the German reunification in 1990. Here, it seems safe to assume that the size of household assets in the Eastern part of Germany was relatively low, hence the impact on the aggregate wealth measure is probably limited. Evidence for this comes from Lipschitz (1990), for instance, who finds that the ratio of households' financial assets to income in the German Democratic Republic around 1990 was similar to this ratio for the Federal Republic of Germany 30 years earlier.

For aggregate income we use net national income, taken from Statistisches Bundesamt (2011) for the years 1992 to 2010.<sup>22</sup> Figures for earlier years (1960 to 1991) are obtained from the Statistical Yearbook 1994, provided by the Statistical Office (Statistisches Bundesamt, 1994). Each of the two series is homogenous, but again, there is a break in 1991 that is due to the reunification. It may be worth reminding that net national income corresponds to gross domestic product net of capital depreciation, adding net foreign factor income.

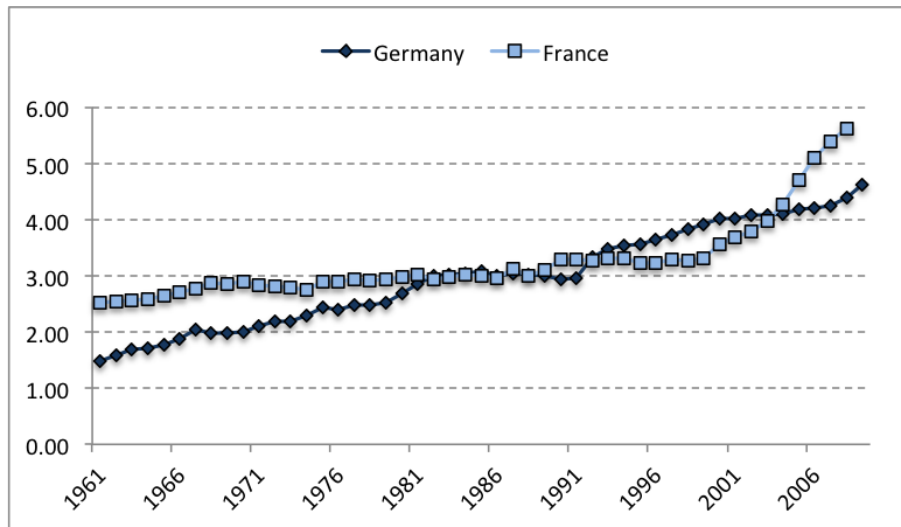
Figure 3 shows the evolution of the wealth-income ratio between 1961 and 2009 for

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<sup>21</sup>NPISH assets are usually tabulated together with household wealth. Ideally we would not want to include them, but in any case their importance is relatively limited in size.

<sup>22</sup>This is the first release of national accounts data after a major revision in 2011 (Räth & Braakmann, 2011), hence values may slightly differ from earlier publications.

Figure 3: Wealth-income ratio (private wealth over net national income), France and Germany, 1961 – 2009



Note: Wealth for Germany is measured at the beginning of each year. The structural break in the German series in 1991 is due to the German reunification in 1990 and to the non-inclusion of land and consumer durables in the series before 1991. Sources: German Federal Statistical Office, Deutsche Bundesbank and Piketty (2010, French series).

Germany and, for comparison, France. The underlying values for Germany can be found in Table A.2 in the Appendix, and the French series are taken from the data appendix in Piketty (2010). The results are consistent with other estimations of German private wealth (eg. Dell, 2008). We can observe a quite steady increase of the ratio by around 300 percentage points over this period in Germany. The ratio in France was at a higher level in 1961 and remained rather flat until around the year 2000 when it increased to levels over 100 percentage points above the German level for recent observations.

### 4.3.3 Wealth data: SOEP vs. national accounts

Given that the two data sources just presented are fundamentally different, we will now compare the evidence they yield. Recall that the SOEP contains information about the distribution of wealth. The question is how well the aggregate numbers that can be inferred from SOEP fit the national wealth accounts estimates.

Table 5 shows that wealth data in the SOEP (using the given sample weights to account for the number of people in the population that each SOEP observation represents) accounts for 74.3% of national wealth in 2002, and 64.2% in 2007. This means that average wealth per adult in 2007 is €83,840 in SOEP, as compared to €130,592 in national wealth accounts. Hence, we get closer to the national accounts estimates than what other authors (e.g. Braun *et al.*, 2011) find from other surveys like the EVS,<sup>23</sup> which further justifies our choice of data. However, we still observe a considerable gap between the

<sup>23</sup>EVS 2008 covers 45% of aggregate net financial wealth and 76% of aggregate real estate wealth.



Table 5: Comparison of SOEP and national accounts data for private household wealth (in € billion)

	2002		2007	
	SOEP	national accounts	SOEP	national accounts
Assets	6,507.4	8,834.9	6,915.8	10,553.4
Fixed assets	4,516.1	4,350.6	4,623.5	5,230.0
Consumer durables	92.5	878.1	81.1	924.7
Financial assets	1,898.9	3,606.2	2,211.2	4,398.7
Liabilities	1,085.0	1,535.8	1,149.6	1,566.6
Net worth	5,422.3	7,299.0	5,766.2	8,986.8

Source: SOEP v27 and national accounts (Statistisches Bundesamt, 2010).

two sources, which calls for some explanations. In particular, the SOEP estimates for consumer durables only account for about 10% of the national accounts aggregate, and in the case of financial assets, the reporting ratio is about one half. By contrast, SOEP financial liabilities amount to around two thirds of the aggregate, and in the case of fixed assets (mainly real estate), the numbers are quite close. In terms of the evolution between 2002 and 2007, the SOEP data gives the right indications for the direction (except for consumer durables), but the size is not completely satisfying; whereas national accounts indicate an increase of net worth by 23.1%, SOEP only finds 6.3%.

Several factors are likely to play a role. Whereas the SOEP estimates are based on the answers of survey respondents to not more than seven questions regarding wealth, national accounts use statistical methods on aggregate data for the calculations. Of course, one could attribute the discrepancy to measurement error and to the exclusion of high net worth individuals in surveys (as mentioned in Section 4.3.1), which may indeed explain part of the difference. However, there is more to say on the issue.

First, there are differences in the classification of the group of individuals we are looking at. Most importantly, national accounts indicate wealth of households and NPISH (like the churches, unions etc.) together, whereas the latter are not part of the survey sample. Another part of the population that is not covered by SOEP, either, consists of individuals in homes and institutions, notably residential homes for the elderly. These facts may explain a part in the discrepancy for financial assets.

Second, the SOEP questions aim at seven components of wealth: real estate (first and secondary properties) and mortgages; financial assets in the form of a saving balance, bonds, shares or investments; other financial assets such as life insurance, private pension plans or a buildings savings account; assets in commercial enterprises; tangible assets

like gold, jewellery, coins or valuable collections; and liabilities.<sup>24</sup> These questions can give an indication of total wealth, but to reveal precise values, many more questions would be needed (as it is usually done when income or consumption expenditures are measured). For instance, the question aimed at tangible assets measures only a small part of personal belongings, excluding cars and other things that may constitute a sizable share of household wealth and show up in the aggregate figure for consumer durables.

For several wealth categories, it is likely that households simply do not have the means to correctly assess market values of certain assets (Frick *et al.*, 2007a). This may hold especially for insurance claims (like life insurance and private pension funds), but also for real estate, notably older or inherited objects. In general, we can assume that the difficulty for individuals to correctly assess market values leads to higher volatility in the data, complicating precise measurement and hence potentially hiding the underlying evolution.

An interesting item are the numbers for fixed assets, which consist mainly of real estate. We observe that the SOEP estimate almost perfectly matches the national accounts estimate. It seems that the undercoverage of high net worth individuals in the sample does not lead to a substantial underreporting in our case. This makes sense if we consider housing as a good whose share in total wealth decreases with the amount of wealth, which seems plausible. As total wealth increases, people hold bigger shares in financial assets and less in real estate. Evidence for this fact comes from the inheritance and gift tax records 2010, for instance. Whereas for bequests between €500t and €2.5m the share of real estate in the total bequest is 50%, this share decreases to 15% for bequests above €5m (Statistisches Bundesamt, 2012a, p. 26).

It is worth reminding that we cannot assume the national accounts figures to be the “true” values either. The methodology requires several assumptions and raises some issues. Sometimes it relies on weak data sources, e.g. for assessing the value of land where a lot of price information is missing. Furthermore, as Schmalwasser & Müller (2009) emphasize, fixed assets of the household and NPISH sector are in some cases measured as a residual, which makes the estimation more dependent on the precise measurement of other sectors. It is because of these uncertainties that some figures are not given at a more disaggregated level.

After all, the discrepancy between the two data sources adds some uncertainty to the final estimates. We have to keep this in mind, but there is little we can do about it.

#### 4.3.4 Fiscal data

Furthermore, we draw on publications by the Statistical Office that contain detailed statistics on the inheritance and gift tax. In 2002, such data has been published for the first

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<sup>24</sup>The survey questions can be found on pp. 24-25 of Infratest Sozialforschung (2002).

time since 1978, and since 2007 there are yearly publications. The latest statistics available refers to the year 2010.<sup>25</sup> It is the only official source related to the amount of intergenerational transfers in Germany.

The advantage of the statistics is that it covers all cases for which in the given year the payment of a tax on inheritance or gifts was assessed, so there is no uncertainty due to sampling. It is based on the data that was collected by tax authorities at the regional level and contains information on the size of transfers broken down by tax brackets, estate size, type of assets, and the steps undertaken to calculate the final tax. Although in principle there is one file for each transfer, which implies several files per estate, there is also information on the size of estates before splitting among heirs, which is useful for our purposes.

However, at the same time there is a significant drawback. Whereas there is no error due to sampling, there is clearly a selection problem. The reason is that cases where no tax had to be paid because of tax exemptions are not part of the statistics. In contrast, for those who are part of the statistics we also know the way the tax was assessed, i.e. the underlying estate, the deductions, tax rates etc. But this setting means that we do not have information on transfers in the lower part of the wealth distribution. As we have seen in Section 3.2 above, personal allowances can amount to up to €756,000 under the new legislation, and €563,000 under the old one. We are losing a great part of transfers here: the tax statistics contains 57,899 estates in 2002 and 67,838 estates in 2007, compared to roughly 800,000 decedents in the country for these years, which yields a coverage ratio of around 8%. Recall that wealth is highly concentrated, so the share of total wealth that is part of the statistics is much higher than the proportion of cases. Still, the selection issue exists and we have to account for it. The ratio of coverage in the statistics is at least larger than in tax records for the USA (where it amounts to 2-3%, following Kopczuk and Saez, 2004), but it is much lower than the 65% that Piketty (2011) reports for France, and the 45-50% coverage in the UK (Atkinson, 2012).

Unfortunately, the tax incident for inheritance (i.e. the date of death) does not always coincide with the year in which the tax is assessed and hence the time when the estate appears in the tax records, due to delays in the taxing process, legal proceedings about the division of the estate among heirs, etc. As one can see from Table 6, roughly half of the bequest flow in the tax records for a given year corresponds to the year before, and only around 10% of bequests is filed in the same year. In addition, the data shows that cases with higher amounts of wealth transmitted tend to have a bigger delay than cases with less assets at stake. As far as gifts are concerned, the statistics does not provide information on time lags, but we can assume that these are much less important, since less parties are involved and transfers are voluntary, so there should be less proceedings and a faster taxing process.

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<sup>25</sup>Published in Statistisches Bundesamt (2012a), and references for earlier years are available there.

Table 6: Time lags in tax assessment

year of death	year of inheritance tax assessment ( $t$ )				
	2002	2007	2008	2009	2010
$t$	9.4%	13.8%	14.5%	4.5%	12.7%
$t - 1$	50.1%	52.7%	50.7%	61.8%	50.8%
$t - 2$	25.0%	19.1%	20.8%	22.9%	24.5%
$t - 3, t - 4$	12.4%	12.3%	9.8%	8.3%	9.8%
$< t - 4$	3.1%	2.4%	2.1%	2.5%	2.2%

Reading: 9.4% of inheritance (in value) submitted to taxation in 2002 was based on a tax incident in the same year, 50.1% was based on a tax incident in 2001, etc. Note: Due to changes in tax legislation, tax incidents before 1996 are not included in the statistics. Source: Inheritance and gift tax records, German Federal Statistical Office.

Indeed, this is a shortcoming of this kind of data, which complicates to some extent the combination with other data sources we use. Since yearly statistics are only available since 2006, there is no easy way around the problem. To cope with it, we use tax data from 2008, which in roughly half of the cases corresponds to tax incidents in 2007, to conclude about fiscal transfers in 2007. In fact, the values are very close for both years, so this does not have much impact. For 2002, this is not possible, since SOEP data covers 2002 and tax statistics for 2003 are not available. This issue may be a minor source of bias for the final estimation. Assuming that the underlying trend is an increase in the size of yearly transfers, tax delays are expected to lead to an underestimation of the true values of inheritance flows for each year.

Another issue are the legislative changes that took place in 2009. The increase in tax exemptions means that the results for 2010 are not directly comparable to earlier results, since the selection process for estates to show up in the statistics changes. The statistics for the year 2009 is probably still very little affected by the changes, precisely because of the time lags in assessment described above. The law that is applied is the one that was in force at the time the transfer occurred. The reform is particularly important for the gift-bequest ratio since the increase in tax exemptions are not proportionate, but relatively more sizable for gifts (since exemptions that apply for both inheritance and gift were increased, whereas further personal exemptions for caring purposes, which apply only for inheritance, remained stable). This does not reduce the comparability of results for the years 2002 to 2009, but when it comes to analyzing the very recent evolution in the tax records, changes in tax exemptions may play a role.

Furthermore, as for the other data sources, we have to worry about the way of measuring transferred wealth at market values. In principle, tax values are supposed to be close to market values, but in reality this is often not the case, particularly for business assets and real estate. Hence, these assets are potentially severely underestimated in the

tax records. Similarly, we have to consider the existence of tax evasion, for instance by holding financial assets in tax havens. Whereas it appears difficult to avoid taxation of real estate and financial assets held in Germany due to extensive obligations to notify, a potentially large part of financial assets that residents hold abroad may circumvent registration with the tax authorities when it is transmitted.<sup>26</sup>

The values of the flows of inheritance and gifts that can be obtained from the tax statistics are shown in Table 7.<sup>27</sup> The increase in the volumes of gifts and bequests between 2002 and 2007 is substantial, and so is the increase in the gift-bequest ratio. The best explanation for this increase appears to be the fact that public awareness for the issue of inheritance, taxes and ways to circumvent them has risen considerably during the time. Even the decision of authorities to publish tax statistics and the demand for the data seems to emphasize this point and may have contributed to the development. In 2007, for each euro inherited, additional 59 cents were given away *inter vivos*. This ratio was much lower in earlier years. By contrast, little evolution of the values can be observed between 2007 and 2009. In 2010, the effects of the 2009 tax reform become visible, decreasing the gift-bequest ratio by 9 percentage points with respect to 2009. However, despite of the increase in tax exemptions we observe a rise in the total taxed flow to over €32 billion, indicating that the true value has presumably augmented even more strongly. Note that the total amount of tax assessed in 2010 was €4,596 million, which corresponds to an average tax rate of around 14.3% (13,6% in 2007, before the reform) for those who paid the inheritance and gift tax, and an overall ratio of inheritance tax revenue to net national income of 0.21%.

Concerning the gift-bequest ratio, there is an additional timing problem. For the economic analysis we would ideally want to compute the amount of wealth that people had given away before the day they die, in order to be able to assess the “true” wealth that belonged to each person, for instance for the computation of age-wealth profiles. However, in the statistics we can only observe transfers that were taxed in a given year, and bequests and gifts are most likely not to correspond to the same individuals. Other studies are facing the same problem, and there is hardly any way to circumvent it. In fact, the bias should be limited, since the ratio is not very volatile from year to year. Assuming an underlying positive trend in gift-bequest ratios, we would tend to overestimate the wealth that decedents in a certain year have already given away earlier. On the other hand, when thinking about intergenerational transfers as a tax base, it is clearly more the transfers in a given year and not of a given person that matter, which somehow justifies the approach.

Table 7 also underlines that the coverage of the tax has been low for all the shown years. We have already seen that only around 8% of estates is covered in recent years.

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<sup>26</sup>Cf. Bach (2005, p.76).

<sup>27</sup>For 1973 to 1978, the taxed flow and the fiscal gift-bequest ratio can be taken from tax records that have been published in Statistisches Bundesamt (1981, p. 438). Data for 1911 and 1953–1962 is available from the Statistical Yearbooks (1913, p. 355, and 1966, p. 459).

Table 7: Yearly taxed inheritance flows, gift-bequest ratio and coverage of inheritance tax statistics, 1911 – 2010

	1911	1953-62	1973-78	2002	2007	2008	2009	2010
Gifts (in €bn)	0.062 <sup>1</sup>	0.115	0.849	5.225	11.447	11.949	11.170	10.725
Bequests (in €bn)	0.817 <sup>1</sup>	0.516	2.023	15.259	19.494	20.465	19,065	21.527
Total taxed flow (in €bn)	0.879 <sup>1</sup>	0.632	2.872	20.485	30.941	32.414	30,235	32.252
$v_t$	0.08	0.18	0.30	0.34	0.59	0.58	0.59	0.50
Total taxed flow / $Y_t$	2.09%	0.47%	0.56%	1.15%	1.46%	1.52%	1.47%	1.50%
No. estates covered	–	–	–	57,899	67,838	68,634	63,123	57,430
No. transfers covered	110,362	32,150	78,709	161,748	153,326	140,588	132,922	110,396
<i>Memo:</i>								
No. adult decedents	635,602	529,927	709,998	836,436	822,844	840,420	850,632	854,996

<sup>1</sup>measured in RM billion. Note For 1953-62 and 1973-1978, the average over the period is reported. Early publications do not contain information on the number of estates covered. Due to a major tax reform in 2009, values in 2010 are only partly comparable to those for 2002-2009. Sources: Statistical Yearbook and inheritance and gift tax records, German Federal Statistical Office.

For earlier years, where unfortunately no information on estates is available, we can still conclude from the number of taxed transfers that in the great majority of deaths, no inheritance tax was paid.

The main information we retrieve from these publications is the ratio of inter vivos gifts and inheritance. But in addition, comparing the economic flow of inheritance and gifts that we will estimate to the numbers in the tax records allows us to conclude about the extent to which the tax system covers the underlying processes, hence also the absolute values matter.

Note that the gift-bequest ratio we retrieve from tax data might not be exactly the same as the ratio in the population as a whole. For the calculation of aggregate inheritance flows, we would ideally want to know the latter. But we do not see strong arguments why the two should differ strongly. If anything, the ratio estimated from tax records probably constitutes a lower bound, since we should expect more gifts among close relatives, where higher exemptions apply, than for more distant degrees of kinship. Here, in the absence of universal tax records, we have to proceed assuming the gift-bequest ratio observed in tax records to be representative for the population.

Finally, considering the particularities of the German history, it is interesting to look at the distribution of taxed flows across regions. Using micro-file data, Zifonun (2005) finds that the average acquisitions submitted to taxation in former German Democratic Republic regions were less than one tenth of those in the West in 2002. It is obvious that the communist system successfully prevented people from establishing large estates.

#### 4.3.5 Population data

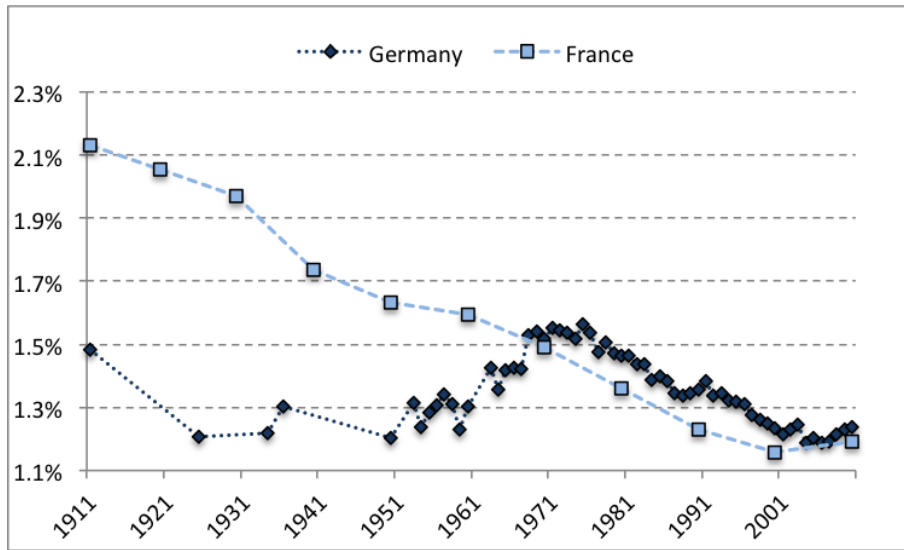
The last type of data we need is demographic data, both on the population age structure as on the number of decedents and adult mortality rates for each year. This type of data is readily available from the German Statistical Office, and it is highly reliable, since there is no issue of sampling and hardly any measurement problems.<sup>28</sup>

The evolution of the mortality rate of adults over the last century, which is used to calculate the economic inheritance flow, is shown in Figure 4. Data is not available for every year before 1970, so the number of data points is reduced, particularly before 1950. The data points we can compute from official data imply that mortality was as high as 1.5% before the first world war and has then decayed to lower levels of 1.2-1.3% where it remained between 1925 and 1960. Note that adult mortality during wars is not shown in the graph. After a sharp rise between 1960 and 1970, we can observe a steady decline from 1.55% in 1970 to 1.2% in 2005. Following official projections (UNPD, 2011), that year

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<sup>28</sup>On <http://www-genesis.destatis.de>, population data since 1970 is available in Table No. 12411-0005. Decedents per year, by age and sex can be found in Table No. 12613-0003. Links were lastly accessed on May 15, 2012. For earlier periods, the Statistical Yearbook contains these informations (for instance Statistisches Jahrbuch, 1913, p. 8/9 for population data and p. 28/29 for mortality data for 1911).

Figure 4: Adult mortality rate (Number of deaths per adult inhabitant per year, in %), France and Germany, 1911 – 2010



Note: Values for Germany before 1990 cover only Federal Republic of Germany, and the German Reich before 1945. Adulthood is defined as being over 17 years old. For data availability reasons, the threshold is set to 15 years before 1970. French values are decennial averages and refer to inhabitants over 20 years old. Sources: German Federal Statistical Office and Piketty (2010).

constitutes a turning point, with mortality rates starting to increase again for the years to come. The comparison with French mortality rates, taken from the data appendix of Piketty (2010) reveals a similar evolution since around 1970, whereas mortality was considerably higher there in earlier decades.

## 5 Empirical evidence

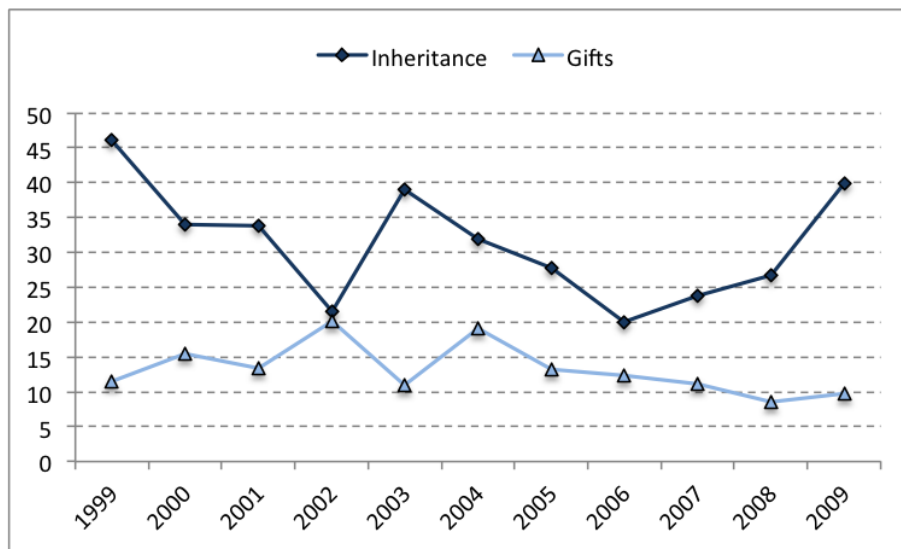
### 5.1 Inheritance in SOEP

To start with the empirical analysis, we first provide estimates of gift and inheritance flows as reported by SOEP participants at the household level. This can be understood as a first, “naive” approach to the attempt of calculating aggregate transfers. Estimates for the time between 1999 and 2009 are shown in Figure 5. We use the information of households who claim that they have received an inheritance or gift of a certain amount in the given year. We then make use of the sample weights provided in the SOEP to calculate the corresponding aggregate amount of transfers at the country level.

In fact, this exercise can only give us a very rough idea of the size of inheritance and gift flows. What it yields, for instance, is an estimated average gift-bequest ratio for the whole period of 42.2%, which confirms the magnitude of the ratio we find in the tax records. But the approach suffers from a series of problems. First, as the estimation is based on survey information, we have to assume again that transfers are probably underreported



Figure 5: Inheritance and gift flows estimated from SOEP, 1999–2009, in current €billion



Source: SOEP v27, own calculations.

because people either do not remember the exact size, they do not include all elements of the transfer, or they do not want to reveal the true value if it is very high. There is also a relevant share of non-response in the data. We do not try to correct for that. Second, we definitely face a problem of sampling. Even if the whole data set is quite large, containing between 14,967 and 18,838 observations, there are naturally relatively few cases in which inheritance or gifts occur. For each year, between 1.3% and 1.7% of households report receiving a bequest, and between 0.9% and 2% of households report receiving a sizable gift. These rates are relatively low, provided that mortality rates at the aggregate level are around 1.2% and a household usually consists of several members. Furthermore, the threshold for reporting set in the question (€2,500) is fairly low, so it can not explain much of the low rates. Anyway, this leaves us with around 200 – 300 cases each year, which implies still a relatively high level of uncertainty and sensitivity of the results to single observations. The estimation is highly volatile, as for instance the years 2001 to 2003 show. Considering furthermore that high net worth individuals or households are by nature fairly rare in the SOEP sample (see Section 4.3.1 on this problem), uncertainty is even higher because few individuals in the sample who by chance receive a very large transfer in a given year and become part of the subsample we analyze can change the results by potentially large amounts. And it is likely that high net worth individuals are underrepresented in the sample.

For these reasons, we should take this estimation as nothing more than a first very rough estimate of inheritance and gift flows, and should refrain from drawing firm conclusions regarding level or trend of transfers. Indeed, survey based evidence can only yield a lower bound of the true size of inheritance flows. Earlier publications, like Schupp and Szydlik (2004), use this data and calculate averages over several years, which is a way

of smoothing the series. But here, we propose to proceed directly to a more precise and credible assessment of aggregate inheritance flows in Germany, using Piketty's accounting approach.

## 5.2 Calculating $\mu_t$ for 2002 and 2007

To apply the main accounting equation for estimation of the economic inheritance flows, we already have seen the values for adult mortality rates,  $m_t$ , wealth-income ratios,  $\beta_t$ , and the fiscal gift-bequest ratio,  $v_t$  from the previous section. What is left to estimate is  $\mu_t$ , the ratio of average wealth of decedents over average wealth of the living, which involves some more steps of calculation. Most importantly, we need to compute cross-sectional age-wealth profiles.

There is a large literature about the calculation of age-wealth profiles. In fact, as Poterba (2001) emphasizes, the relationship between age and asset holding can be decomposed into three different effects: one is the pure effect of age-specific asset demand, another is due to time-periodic shifts in wealth (e.g. a decrease in asset prices in times of crisis), and the third comes from birth cohort-specific differences (people born in different times may experience different wealth accumulation and decumulation paths over their lifetime). Considerable efforts have been made to separate the different components, which requires time series data and additional assumptions.<sup>29</sup> Fortunately, life is easier for us, since we do not need the pure age-wealth profile of individuals, controlling for cohort and time-periodic effects. Instead, for the purpose of this work, cross-sectional profiles for the year of interest are sufficient, because this is what we then want to combine with demographic data for the same year, applying mortality multipliers. Nevertheless, it is worth reminding that the effects leading to the age-wealth profiles that we observe in reality are threefold.

The cross sectional age-wealth profiles estimated from SOEP for the years 2002 and 2007 are shown in Figure 6. Recall that we work with the truncated sample, excluding observations of wealth over €2.5m or indebted by more than €200,000. The results are displayed separately for men and women and by five-year brackets. First, we can observe considerable differences between sexes, which justifies to proceed treating both sexes separately and using the respective mortality rates for the following calculations. The profiles are steeply rising from wealth of around zero at the beginning of adulthood until a peak shortly before retirement age. Contrary to life-cycle theories, they do not decay strongly then but remain at high levels. Interestingly, they feature the particularity of a second peak at the age of around 80. Candidate explanations for this are the concentration of wealth on the widow or widower in cases where the spouse has died, and differential mortality, i.e. that we observe mainly rich people at high ages.<sup>30</sup> Furthermore, we can observe

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<sup>29</sup>For example, see Jappelli (1999) for an application to Italy.

<sup>30</sup>Cf. Frick & Grabka (2010).

birth cohort effects, especially for women, for instance between individuals born by the end of the second world war (born between 1943 and 1947, aged 60-64 in 2007) who are wealthier than those who lived all their early childhood in war time (born between 1938 and 1942, aged 65-69 in 2007).

From these figures, we can easily calculate the denominator of  $\mu_t$ , i.e. the average wealth of the living, since we know the number of people in each age bracket from population statistics. For this sample, the calculations yield an average wealth of the living of €73,368 in 2002, and €74,311 in 2007.<sup>31</sup>

The next step is the calculation of the wealth of decedents. This is done by computing a weighted sum out of the wealth distribution of the living, where the weights depend on the number of people in each bracket that died in a given year. Of course, the wealth observed at older ages will enter the measure more heavily than at younger ages. This calculation is done separately for men and women, and only after knowing the average wealth of decedents from each sex, the overall average wealth is computed by weighting these with the share of men and women among all decedents.

### 5.2.1 Differential mortality

However, this is not sufficient—we want to take into account differential mortality by socio-economic status as well. Different living conditions, the size of the budget to be spend on health expenditures, etc. will lead to higher life expectancy for the rich. This means that for younger age groups, we will have proportionately more poor decedents than rich. At higher ages, this gap will close, since there will be less poor left, and for the remaining people, life expectancy can not be extended much, even at high costs. This has been dealt with, for instance, by Attanasio & Hoynes (2000) who estimate differential mortality across selected percentiles of the wealth distribution for the United States and show the impact of this correction on US age-wealth profiles. Another study by Brown *et al.* (2002) estimates differences in mortality among social subgroups in the US, depending on race, ethnicity and education, and separately for men and women.

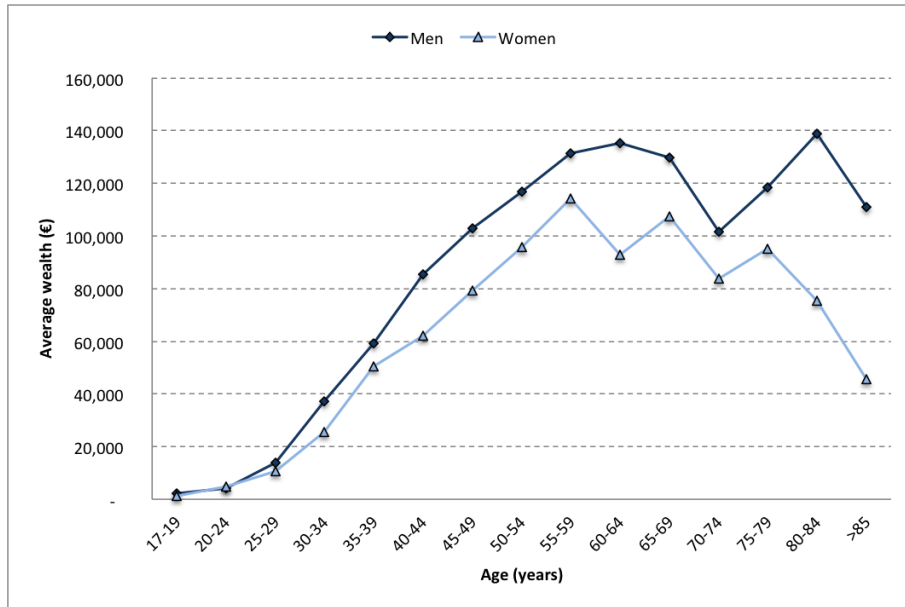
For Germany, the only study we are aware of comes from von Gaudecker & Scholz (2007). The insight is limited, since their sample is restricted to men over 65 who are part of the public pension scheme, and therefore does not extend to the top of the distribution where people are mainly self-employed. Still, they find a lower bound of six years on the difference in remaining life expectancy between the bottom and the top of the analyzed earning distribution at the age of 65, proving that a differential mortality effect exists.

Note that studies on differential mortality tend to focus on income, not wealth. But

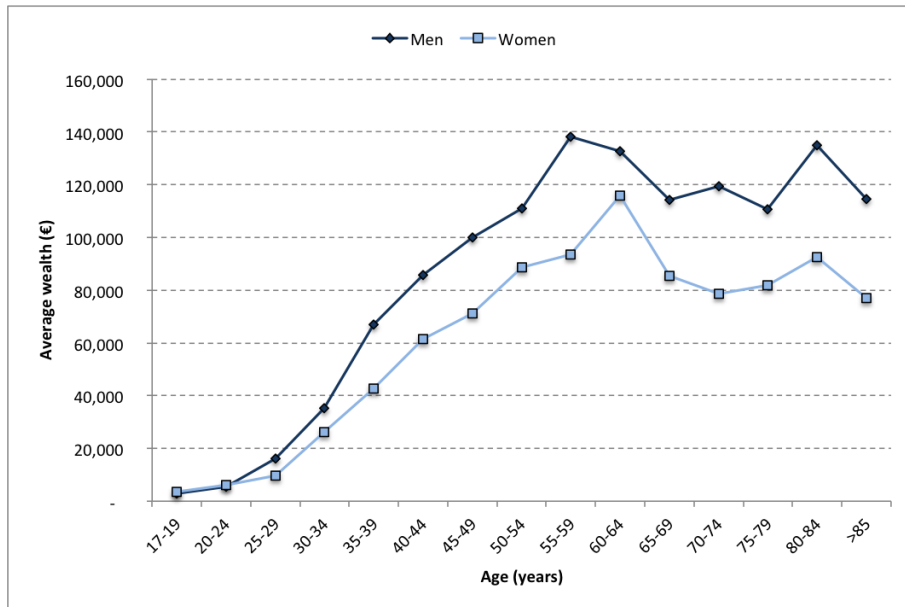
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<sup>31</sup>The fact that private wealth covered in SOEP has increased much less than aggregate private wealth may be seen as indirect evidence of an increase of the top wealth share in Germany between 2002 and 2007, considering the undercoverage of high net worth individuals in the survey. We do not investigate this issue further.

Figure 6: Age-wealth profiles of German population by sex, 2002 and 2007



(a) 2002



(b) 2007

Source: SOEP v27, own calculations.

Attanasio & Emmerson (2003) relate the position in the wealth ranking to survival probabilities for the UK and also find evidence for differential mortality. So, considering the available evidence, and given that ranks of individuals in income and wealth distribution are closely related, we have enough reasons to take differential mortality into account when it comes to estimate  $\mu_t$ .

We borrow the estimates from the literature that suit the present setting best, which are those from Brown *et al.* (2002, p. 4 ff.), comparing mortality of white college graduates, as representatives of high socio-economic status, with the rest of the population, both for men and women. The values of the parameters are shown in Table A.1 in the Appendix, they are close to the ones Piketty (2011) uses for France. For the computations, we assume different mortality rates between the upper and the lower half of the wealth distribution. Lacking better data, these kind of simplifying assumptions are needed. In any case, we provide robustness checks below, which confirm that taking differential mortality into account matters, but the exact parameters not so much.

Concretely, this means that—separately for men and women—we divide the sample into poor and rich, and when computing the average wealth of decedents, mortality rates are inflated by the differential mortality parameters for the poor, and deflated for the rich. This procedure yields an average wealth of decedents of €79,067 in 2002 and €88,081 in 2007, or  $\mu_{2002} = 1.078$  and  $\mu_{2007} = 1.185$ . These are our favorite estimates. Recall from the discussion in Section 4.3.1 that this values are probably lower bounds of the true values because of the survey nature of the data.

### 5.3 Robustness checks

The main changes that we applied to the SOEP data is that we truncate the wealth distribution by eliminating extreme values. As we have seen, the reason for this comes from the trade-off between bias and precision of the estimation. Table 8 shows different results for  $\mu_t$ , depending on the cut off levels for reported wealth. We can observe that the resulting  $\mu_t$  ratio varies slightly, depending on the truncation pattern. The differences are bigger for 2007, and the direction is not clear:  $\mu_{2002}$  increases with the number of excluded observations, but it is the opposite for  $\mu_{2007}$ . Given the evidence, the chosen pattern appears to be a safe specification, since the implied ratios are in the middle or even at the bottom of the range of possible values.

Another assumption that we can test is related to the parameters used to model differential mortality. Table 9 reports different resulting  $\mu_t$  ratios, depending on the underlying differential mortality scheme. We compare the values resulting from calculations using the parameters from Brown *et al.* (2002) with those that would result using Piketty’s scheme and those under the assumption of uniform mortality. It becomes clear that once again, our preferred estimates are rather conservative. Using Piketty’s parameters would lead

Table 8: Effects of truncation of the sample on resulting  $\mu_t$  estimates, 2002 and 2007

Wealth range (€)	$\mu_{2002}$	excluded obs.	$\mu_{2007}$	excluded obs.
no truncation	1.032	0	1.220	0
[−200t; +10m]	1.065	22	1.214	21
[−200t; +5m]	1.064	33	1.197	33
[−200t; +2.5m] (favorite)	1.078	59	1.185	75
[−200t; +1m]	1.096	220	1.183	226
[−100t; +1m]	1.094	236	1.181	244
[−100t; +800t]	1.100	345	1.190	333

Source: own calculations based on SOEP v27 and mortality statistics.

to almost the same outcome. In contrast, the estimated  $\mu_t$  ratios would be considerably higher under a uniform mortality scheme. Ignoring the existence of differential mortality across socio-economic groups would lead to an increase in the estimate of bequest flows by around 15%.

Table 9: Resulting  $\mu_t$  estimates by differential mortality scheme, 2002 and 2007

Differential mortality scheme	$\mu_{2002}$	$\mu_{2007}$
Benchmark (Brown et al., 2002)	1.078	1.185
Piketty (2011)	1.101	1.198
Uniform mortality	1.256	1.350

Source: own calculations based on SOEP v27 and mortality statistics.

## 5.4 Calculating $\mu_t$ for earlier years

We can be quite confident about the estimation of  $\mu_t$  for the last decade, since the available data at the individual level seems fairly reliable. Now, it would be desirable to go back further in time and see how the  $\mu_t$  ratio has evolved over a longer period. Unfortunately, the data sources are worsening, the farther we go back. As it was mentioned earlier, the data that can yield age-wealth profiles is, if anything, only available at the household level, i.e. linking household wage with the age of the household head, who is defined as the person who gains the principal income. If we still want to calculate the ratio of average wealth of decedents over average wealth of the living, we need some further assumptions that may not hold strictly or lead to biased results. However, this is all we have, so we will proceed with the estimation, using data from the EVS from 1973 on.<sup>32</sup>

<sup>32</sup>The survey results are published by the Federal Statistical Office, see Statistisches Bundesamt (1975) for the 1973 wave and Statistisches Bundesamt (1981) for the 1978 wave, subsequent tabulations can be found in the same series of publication as for 1978.

The problem with EVS is that since the beginning, wealth has not been measured in its totality. In particular, real estate assets were only recorded in brackets, and based on *Einheitswerte*, i.e. market values were severely understated. This is why for earlier years  $\mu_t$  can only be estimated based on net financial wealth (savings accounts, credit balances from building society savings, bonds and shares; life insurance only since 1993), possibly leading to a bias if the composition of wealth between financial assets and real estate differs across age groups or changes over time. In any case, it does not allow us to capture the full relationship between wealth and age. It is only for the years 2003 and 2008 that there is relatively reliable information on real estate assets, estimated at market values, which makes a comparison of the results from EVS and SOEP data possible.

For the computation of the  $\mu_t$  ratio with EVS data, we are again assuming that children under 17 do not own wealth. Furthermore, we assume that the same parameters for differential mortality we borrow from Brown *et al.* (2002) are valid over the whole period since 1973. There is no evidence or reason why parameters should have experienced a considerable change over this time.<sup>33</sup> In contrast, given the evidence from above, we should certainly take differential mortality into account.

The fact that we have no information on sexes appears to be more constraining. We do not observe age-wealth profiles for men and women separately. Therefore we simply assume that all household heads are men. This is probably closer to the reality than the contrary assumption would be, but it hides gender effects. Furthermore, we do not know the exact composition of households and potential changes over time. We are regarding each household as one male individual when it comes to apply mortality multipliers. The underlying assumption would be that in case that the household head dies, all wealth that the household owns is transmitted to another household.

Thus, the problem with this household based approach to inheritance is that changes in the decomposition of households and in the allocation of wealth within the household can not be observed and hence may bias the results over time. Especially given the particularity of German laws that ensure that not all wealth is shared in marriage, this is not totally satisfying. However, we have to cope with it.

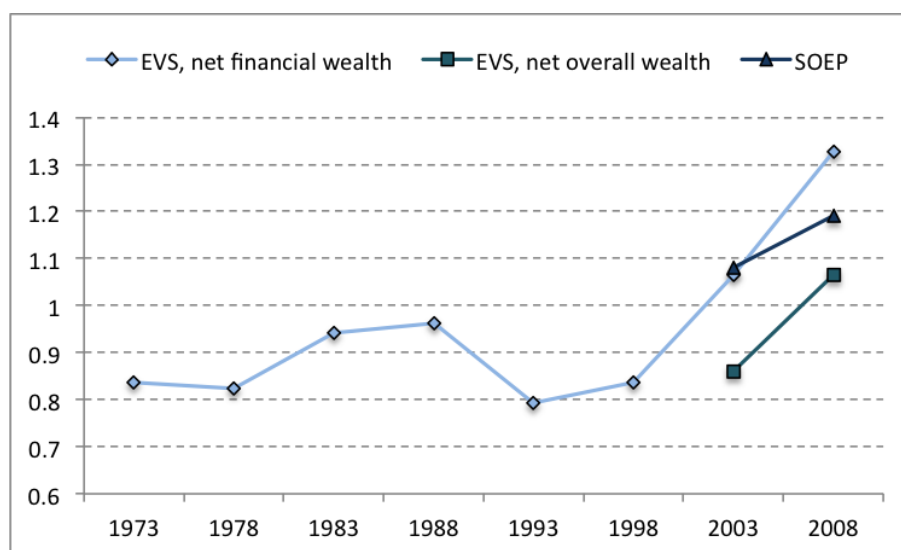
The estimates for the ratio of average wealth of decedents over average wealth of the living, based on EVS data, are shown in Figure 7, and the corresponding age-wealth profiles can be found in Figure A.2 in the Appendix.<sup>34</sup> We can observe that EVS data yields a similarly important increase in the  $\mu_t$  ratio than SOEP data for recent years, which confirms the earlier finding and the use of EVS to conclude on age-wealth profiles.

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<sup>33</sup>Piketty uses the same parameters over two centuries.

<sup>34</sup>The analysis of the changes in age-wealth profiles over time yields three interesting results. First, profiles have become steeper over time (see panels 1 and 2 of Figure A.2). Second, the inclusion of life insurance policy as assets matters, making age-wealth profiles more hump-shaped (compare panels 2 and 3). Third, net financial wealth is only a small part of net overall wealth in the sample, and the shape of age-wealth profiles derived from both measures differs (panels 4 and 5).

Figure 7: Estimates for  $\mu_t$  derived from EVS and SOEP, 1973 – 2008



Note: There is a structural break between 1988 and 1993, due to the inclusion of life insurance assets and the reunification. Sources: Own calculations based on EVS, SOEP and mortality statistics.

However, the level is not exactly the same:  $\mu_t$  ratios from EVS are between 12 and 22 percentage points below the level of the ratios based on SOEP data. The best explanation seems to be that EVS does not capture the changes in household composition that take place at old ages. In addition, the broader age brackets may also play a role in explaining the difference (there are only two brackets for household heads aged above 70, compared to four in the computations based on SOEP), since the measure for average wealth of decedents is relatively sensible to wealth differences at higher mortality rates, and the age-wealth profiles from SOEP (Figure 6) show that there are differences in terms of wealth holding at old ages that are not negligible.

However, when calculating  $\mu_t$  ratios for 2003 and 2008 from EVS only based on net financial assets, the values are quite similar to the ones that we find from the SOEP or even higher (1.065 and 1.328, respectively). Thus, the level of  $\mu_t$  from net financial assets in EVS may not be too different from the one derived from SOEP, after all. In the absence of other arguments, we may assume that this similarity would hold for earlier years, too.

In any case, EVS provides us with estimates of  $\mu_t$  since the 70s that are based on sound empirical grounds, even if the computation relies on some strong assumptions. We find values for  $\mu_t$  that are around 20 percentage points lower in the 70s than in 2002, and 30 percentage points below the 2007 level. The series for net financial wealth exhibits a steady upward trend of  $\mu_t$ . The decrease we observe between 1988 and 1993 is probably rather a structural break that results from the inclusion of life insurance policies as assets from 1993 onwards, as well as from the reunification.



Table 10: Economic inheritance and gift flows in Germany, 1911 – 2009

	1911	1961	1973	1978	2002	2007	2009
$\mu_t$	1.38	0.84	0.84	0.82	1.08	1.19	1.19
$1 + v_t$	1.08	1.18	1.30	1.30	1.34	1.58	1.59
$m_t$	1.48%	1.30%	1.54%	1.50%	1.23%	1.19%	1.23%
$\beta_t$	6.55	1.48	2.20	2.49	4.08	4.24	4.63
$b_{yt}$	14.41%	1.91%	3.65%	3.99%	7.29%	9.53%	10.74%
$B_t$ (current €bn)	6.052 <sup>1</sup>	2.544	13.460	20.564	130.337	201.868	220.308
<i>Memo: Taxed</i> flow (% of $Y_t$ )	1.96%	0.47%	0.78%	0.56%	1.15%	1.46%	1.47%

<sup>1</sup>measured in RM bn.

The notation is as follows:  $\mu_t$  denotes the ratio of average wealth of decedents over average wealth of the living.  $v_t$  denotes the ratio of gifts over bequests.  $m_t$  denotes the adult mortality rate.  $\beta_t$  denotes the ratio of aggregate private wealth over national income.  $b_{yt}$  denotes the aggregate flow of inheritance and gifts relative to national income ( $Y_t$ ).  $B_t$  denotes the aggregate flow of inheritance and gifts. Source: own calculations based on SOEP v27, EVS, national accounts, Helfferich (1914), Piketty (2011), inheritance and gift tax records and mortality statistics.

## 5.5 Estimate for $b_{yt}$

At this stage, we have gathered all the ingredients to calculate  $b_{yt}$  for different years throughout the last century, by applying Equation 1.

The resulting values are shown in Table 10, and graphically in Figure 1. To calculate the economic flow in 2009, we assume  $\mu_{2009}$  to take on the same value than in 2007 since we do not have separate data. The other components for 2009 come from available data. Similarly, the available data does not allow us to calculate  $\mu_{1961}$ . The computation of a data point for 1961 is interesting because it is the first year where official wealth series on both financial and fixed assets are available, and we have inheritance tax data, too. The problem of missing information for  $\mu_{1961}$  is treated by assuming  $\mu_{1961} = \mu_{1973}$ . Given the general upward sloped trend of  $\mu_t$  over the last decades, this may be slightly above the true value.

The computation of a data point for inheritance flows before WWI is more problematic than for more recent years. There is no major reason for choosing 1911 in particular, except for the availability of an estimate of  $\beta_t$  by Helfferich (1914, p. 99 for national income and pp. 108 ff. for private wealth) for this year. The point is to look at a year closely before important changes in Europe initiated in 1914.  $v_t$ ,  $m_t$  and  $\beta_t$  take on similar values for the years around.  $v_t$  and  $m_t$  can be estimated the same way as for more recent years from data in the Statistical Yearbook of 1913 (Kaiserliches Statistisches Amt, 1913). Note that the taxed flow in 1911 does not cover inheritances to the surviving spouse and children at all, since these were exempted from taxation at the time. Therefore, the

argument that  $v_{1911}$  is a lower bound of the true value applies even stronger here.

The data constraint lies mainly on the calculation of  $\mu_{1911}$ . We are not aware of any data that permits to compute age-wealth profiles at the time. Therefore, for the computations in Table 10 we assume  $\mu_{1911}$  to take on the same value for Germany as it was observed for France at the time, calculated by Piketty. This can be motivated by the fact that the most recent estimates, when the German data sources are most reliable, are almost identical in both countries. After all, age-wealth profiles should not have been too different between France and Germany in 1911. Of course, this proceeding is not completely satisfactory. But given the lack of data, it seems to be the most reasonable assumption. The point is that there are sufficient differences in  $v_{1911}$ ,  $m_{1911}$  and  $\beta_{1911}$  compared to nowadays, based on sound evidence, so that the intent to establish a value for  $b_{y,1911}$  is justified. The exact amount of  $\mu_{1911}$  matters relatively less, then. Nevertheless, it should be emphasized that the data point for 1911 is probably the most uncertain of our estimates.

The main finding is a U-shaped evolution of  $b_{yt}$  over the last century. Even taking into account some uncertainties in the data, the results are sufficiently robust to sustain this conclusion. High mortality rates and a high wealth-income ratio at the beginning of the last century led to a level of yearly inheritance and gift flows as high as almost 15% of national income, but the level dropped substantially over the decades of war and political turmoils. The most important contribution to the increase in the postwar period since 1961 derives from the ratio of private wealth over national income, which more than triples over this time. These are probably still the long-run consequences of war destruction and expropriatory policies in the first half of the last century, as the ratio is converging back to a higher steady state. The second most important contribution stems from the ratio of average wealth of decedents over the average wealth of the living, which increases by around 40% over the period. Clearly, the life-cycle hypothesis of wealth accumulation holds less and less, as people tend to leave more assets at the moment of death. The third factor are inter vivos gifts, which as a share of bequests have more than tripled between 1961 and 2009. In contrast, the evolution of adult mortality rates alone would rather have contributed to a decrease of inheritance flows, since they have decreased by 20% over the last decades.

Note that the numbers we obtain for the recent years, i.e. around €220 billion transferred in 2009, are of the same order of magnitude as the estimates by other authors we mentioned for the years 2011 and after. We have emphasized that this is a lower bound estimate of the true value. Compared to other authors, we have now injected science to the computation of these values and may regard this level of inheritance flows in Germany as well-established.

Furthermore, the numbers can be compared to Piketty's (2011) findings for France. Indeed, both countries have experienced a similar evolution of inheritance flows over the

20<sup>th</sup> century, although the levels are systematically higher in France than in Germany, by around 40% for the latest observation, 70% before the first world war, and over 160% in the early 1960s. In recent years and in 1961, this difference is driven by higher levels of the the wealth income ratio in France, in the first place. In contrast, the gap in 1911 is mainly a result of higher adult mortality rates in France.

## 5.6 Decomposition of the gap between taxed and economic flows

Given the evidence we have provided so far, a major puzzle is the huge discrepancy between the taxed flows of inheritance and the total flows that we find at the aggregate level. From what we have seen, the taxed flow is only around 15% of the economic flow for both 2002 and 2007. Besides some uncertainty in the estimates, there are two explanations for this. First, the taxed flow only measures the top 8% of all transmissions in the economy. Second, the numbers from the tax statistics underestimate the true size of these decedents' estates because of valuation effects and tax evasion. Now, can we assess the relative importance of the two effects?

Since we know the distribution of wealth from the SOEP data, this information enables us to estimate a counterfactual of the taxed flow, by measuring the transmissions that must have occurred among the top 8% of wealth holders in Germany. The idea is to take the SOEP sample and estimate the average wealth of decedents, but only for the top 8% of the distribution. This means applying the mortality multiplier approach for this subsample, controlling for differential mortality of the rich and by sex. The resulting value for the average wealth of decedents is then multiplied by the number of top 8% decedents and the gift-bequest ratio, yielding an estimate for the economic inheritance and gift flows among top 8% decedents.<sup>35</sup>

The findings from this exercise for the years 2002 and 2007 are summarized in Table 11. The figures for the taxed flow come from Table 7, the economic flow is taken from Table 10. Repeating the estimation of the total wealth of decedents for the top 8% subsample, corrected for inter vivos gifts, yields total amounts of €41.913 billion and €72.139 billion being transmitted in 2002 and 2007, respectively, by the 60,000 richest decedents. Note that this constitutes a lower bound, since the SOEP does not fully capture financial assets at the top of the distribution, so the true value is probably even higher.

The insight that this exercise produces is striking. We notice that valuation and tax evasion effects reduce the estate values that are declared to authorities by more than one half. At the same time, we have evidence that wealth that is transmitted by the richest 8%

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<sup>35</sup>It should be noted, however, that those 60,000 individuals who figure in the tax statistics and the top 8% of wealth holders in the SOEP sample are most likely not exactly the same people, because of favorable treatment of spouses and children in the tax records. Nevertheless, the discrepancy should be limited, not undermining the validity of this exercise. It would be hard to argue that estates that are then transferred to spouse or children and those that are transferred to more distant relatives were systematically and considerably different in size. We do not analyze this further.

Table 11: Taxed and economic inheritance and gift flows (in €bn)

	2002	2007
Taxed flow	20.458	30.941
Top 8% economic flow	41.913	72.139
Economic flow	130.337	201.868
Total economic flow / taxed flow	637%	652%
Total economic flow / Top 8% economic flow	311%	280%

Source: own calculations based on SOEP v27, national accounts, inheritance and gift tax records and mortality statistics.

of decedents accounts for around one third of the total transfers, probably considerably more. Note that the shares are relatively similar for 2002 and 2007, which underlines the plausibility of this finding. Hence, we can say that valuation and tax evasion effects reduce the ratio between economic and taxed flow from around 650% to around 300% or even less, and distributional effects account for the rest.

This exercise sheds some light into the distribution of estates in Germany. It is worth noting that a combination of the data sources used in this work can yield a complete picture of the wealth distribution. Bach *et al.* (2007) have made such an approach to the income distribution by combining using SOEP data and official income tax statistics. In a similar manner, SOEP data on wealth could be merged with information from inheritance tax micro data, using mortality multipliers. To our knowledge, this approach has not been implemented yet, but it appears to be a promising path. To start with, consider that in the 2010 tax statistics, the 300 highest estates (above the €5m threshold) amount to more than €4.5 billion, i.e. the top 0.5% of taxed estates cover more than 21% of estates that are part of the statistics.

## 6 Extensions

### 6.1 Outlook

At this point, it is interesting to make projections for the evolution of inheritance flows in the future. We have already seen that studies like Braun *et al.* (2011) do this kind of analysis. The empirical approach that we implement here would allow for enriching this evidence. Making different assumptions about the future evolution of  $\mu_t^*$ ,  $\beta_t$  and  $m_t$ , one can conclude about the possible magnitude of inheritance and gift flows after many years. Unfortunately, it is beyond the scope of this thesis to do this kind of analysis and draw firm conclusions, but it is a possible realm for future research, and we will just provide a few brief comments.

Apparently, there is still considerable potential for future growth of inheritance flows, in absolute terms as well as compared to national income. This can be seen from a comparison with the French case, but also more generally. It is worth reminding Piketty’s (2011) model, which states that under reasonable assumptions for a developed country, inheritance and gift flows can reach 20 – 25% of national income in the steady-state. Piketty’s result relies on the  $r > g$  logic, i.e. that returns to private wealth are considerably higher than the growth rate of the economy. There is no reason why this argumentation should not apply to the German case. In times of aging and a decreasing population size—according to the Statistical Office, the natality in Germany in 2010 was 1.39 children per woman and may remain at such low level—potential growth will automatically fall. The IMF sees the long-term growth potential for the economy at only 1.25% (International Monetary Fund, 2011).

Low natality rates also mean that the average amount of transfers that heirs receive will tend to rise, since the estates of decedents will tend to be split up among a lower number of beneficiaries. This can lead to a further increase in wealth concentration.

In terms of mortality, official projections by the United Nations Population Division (2011) predict mortality rates to increase substantially by almost 50% over the next 50 years and to decay only after 2060 or so—a strong case for a further increase of inheritance flows over the next decades.

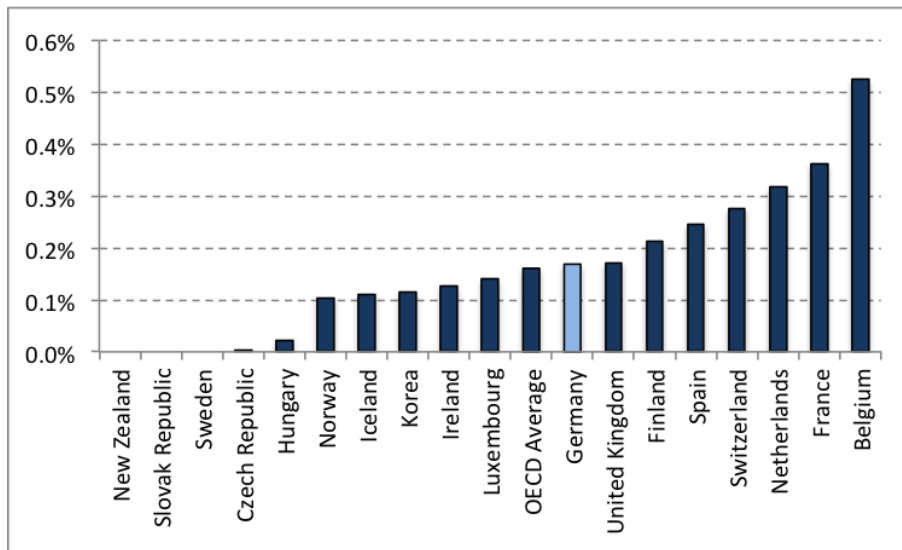
Of course there are other issues that matter, too. Individuals’ savings behavior may change, due to responses to capital and inheritance tax systems. Or more intrinsic preferences on leaving bequests may vary. For instance, people may transform more savings into annuities, as doubt is cast on the sustainability of the public pension system and the underlying intergenerational contract, which would reduce the wealth of decedents. Many scenarios are possible, but they will all affect future inheritance flows. After all, the motivation for leaving bequests—as one of the determinants of the shape of age-wealth profiles—still constitutes a field of research where more answers need to be found.

When making projections for the future, it is worth reminding that Equation 1 is not a decomposition into different causal effects on inheritance. For instance, changes in mortality rates of the population have an effect on both average adult mortality ( $m_t$ ) and the average wealth of decedents (hence,  $\mu_t$ ). Changes in wealth holding may affect both the aggregate amount of private household wealth ( $\beta_t$ ) and age-wealth profiles (hence,  $\mu_t$ ). The elements of the accounting equation are interrelated and effects need to be analyzed jointly.

## 6.2 Policy implications

The issue of taxing inheritance is an ongoing debate in current politics, therefore some comments linking the findings of this work to the debate are appropriate.

Figure 8: Revenue from estate and inheritance taxes as percentage of GDP in 2009 by country



Note: The sample consists of those OECD countries that provided data for the given year. Source: <http://stats.oecd.org/>

First, it is worth noting that the inheritance tax contributes only a small share to total tax receipts of the German State. In 2010, €4.4 billion of a total of €529.3 billion accrued to the inheritance and gift tax, i.e. a share of 0.83%.<sup>36</sup>

In an international comparison of the share of tax revenue from estate and gift taxes as a share of GDP, Germany is quite close to the average of those OECD countries that provided data in 2009 (0.17% vs. 0.16%). We can see in Table 8 that a number of countries do not levy inheritance taxes, or only at a very low level. At the same time, revenues relative to GDP are considerably higher in a number of neighbor countries, notably in Belgium, France, the Netherlands and Switzerland. An international comparison of inheritance tax systems has last been carried out by Scheffler & Spengel (2004). They show that tax systems differ strongly across countries and no common guideline can be identified. However, the German rules are not extreme as compared to other countries. They stress that the taxation of very high estates is relatively strong, as compared to relatively preferential treatment of smaller estates due to the high level of exemptions. Furthermore, they emphasize the favorable rules regarding the valuation of business assets and real estate. The 2009 reform should not have changed much the validity of these conclusions.

Arguments in favor of a reform of these particularities, towards a more even assessment of wealth and lower tax rates have been brought forward by other authors before the last major reform (Bach *et al.*, 2007a). But even afterwards, the debate continues. In a

<sup>36</sup>See publication “Steuereinnahmen nach Steuerarten 2006-2010” from March 3, 2011, available on [www.bundesfinanzministerium.de](http://www.bundesfinanzministerium.de).

recent report, the scientific advisory council to the German Ministry of Finance<sup>37</sup> calls for a reform mainly of the rules concerning the inheritance of business assets, since the preferential treatment is still prevalent and provides misguided incentives for company management. They recommend an increase of the tax base combined with reduced tax rates.

Whereas these critics aim at the structure of the tax system, there is also raising concern about the level of taxation. In times of increasing public debt, which calls for spending cuts and tax increases, taxes on wealth could contribute to a consolidation of public finances. For instance, Bach *et al.* (2011) assess the revenue and distributional effects of a wealth tax that could be introduced, based on propositions by the German Socio-Democrat Party (SPD) and the Green Party in the German parliament. They identify a substantial revenue potential.<sup>38</sup>

Putting our estimate for total inheritance and gift flows of €220 billion in 2009 into perspective with the tax revenue of around €4.4 billion yields an average tax rate of merely 2%. Clearly, the state is not benefiting much from aggregate transfers. This is striking since the tax base can be characterized as fairly inelastic: Kopczuk (2010) reviews empirical evidence and finds that the elasticity of the size of estates to the marginal tax rate is of the order of between 0.1 and 0.2, certainly lower than for other taxes. The elasticity of the main tax incident (death) should be virtually zero, so the reaction of the tax base to changes in the tax system rather relies on avoidance channels, by making inter vivos gifts, under-declaration of assets or holding assets abroad. By contrast, we would expect hardly any behavioral changes in terms of labor supply or related decisions. So, from an economic viewpoint, efficiency losses of further increases should be rather low. For sure, under the current system, we are far from the peak of the Laffer curve. In a new paper, Piketty & Saez (2012) develop a theory of optimal capital taxation, yielding a socially optimal tax rate on inheritance of about 50-60% under reasonable assumptions on parameters. We are far from that, too. Finally, a different argument for increasing bequest taxes is brought forward by Arrondel and Masson (2010): They regard the channel of avoiding high bequest taxes by making inter vivos gifts as desirable, assuming that inequalities between generations are too large and increasing inter vivos gifts can help alleviating them. Increasing inheritance taxes would induce such reactions. Indeed, the concrete system of inheritance and gift taxation can be used as a policy instrument aiming at distributional issues, beyond the simple purpose of raising revenues.

In terms of public finances, the economic advisory council of the German government has recently suggested the creation of a fund to pool public debt exceeding the Maastricht limit of 60% of GDP, and to pay off this debt over a long-term horizon (SVR, 2011). The

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<sup>37</sup>see Bundesministerium für Finanzen (2012).

<sup>38</sup>Their approach is also interesting from a methodological view, since they combine SOEP data on the wealth distribution with publicly available information on the wealth of the 300 richest Germans, provided by the periodical *manager magazin*.

author of this thesis believes that arguments in favor of partly using additional inheritance tax revenues in order to decrease the debt burden are justified, in particular taking into account that estates have been build up in times of systematic budget deficits, and hence may especially have benefited from tax policies that have not been stringent enough in the past.

Given that only relatively few people at the top of the wealth distribution are actually subject to inheritance legislation, we may wonder why voters do not call for a more sizable contribution of inheritance taxes to public finances, as standard political economy models like the median voter model would suggest. One fact that may play a role is that lobbying activities of elites can explain the outcome, especially for the taxation of business assets. Furthermore, two other issues may matter. First, people seem to be unaware of the true extent of taxation: Following survey evidence from Meyer (2011), twice the number of heirs who actually have to pay taxes believe that they will be taxed if they inherit. Second, the number of voters hoping for future inheritances is probably higher than that of actual heirs. It is because of the uncertainty of receiving a bequest that the number of people who oppose a possible reform can be sizable. Finally, another reason could be the intrinsic perception of German voters who regard family property as “untouchable” for the state, independent of being themselves potential beneficiaries or not. These perceptions persist over time, as Beckert (2007b) emphasizes.

## 7 Conclusion

In this thesis, three main findings have been established. First, we have found that an approach to the aggregate amount of inheritance via survey questions directly aiming at inheritance systematically underestimates the true flows. It is necessary to apply other methods in order to account for non-response, underreporting, and the high concentration of inheritance flows in general. Similarly, tax records do not reveal the true amount of inherited wealth directly.

Second, we have seen that inheritance and gift flows in Germany in the last century have followed a U-shaped evolution, similar to what has been established for France. The aggregate amount of inheritance relative to national income seems to be evolving back to levels it had attained before the first world war.

Third, we have found a remarkable gap between the economic flow of inheritance and gifts and what is covered in tax records. For recent years, we find that economic flows are more than six times higher than taxed flows. When valuation and tax evasion effects are controlled for, this factor reduces to around three, at most. The rest is due to high tax exemptions that prevent bequests in 92% of cases from being taxed.

Several realms remain to be investigated in future research. Although the broad picture in this work appears to be robust, a more comprehensive analysis aiming at closing the



time gaps would be desirable, as well as projections into the future. Furthermore, the political economy of inheritance taxation seems to be an interesting field, as much as an analysis of the motivation for individuals to leave bequests or make inter vivos gifts, where a consensus in the literature is still to be found.<sup>39</sup> Finally, the combination of micro data from the inheritance tax with survey data, using mortality multipliers, could yield fruitful insight into the wealth distribution in Germany, particularly at the top percentiles.

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<sup>39</sup>Cf. Kopczuk & Lupton (2007, p. 231): “(...) better indicators of the desire to die with positive net worth would greatly improve our understanding of household wealth determination.”

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# Appendix

## Tables

Table A.1: Differential mortality parameters by specification and age group (mortality of poor relative to average mortality rate)

Age group	Brown et al., 2002		Piketty (2011)
	male	female	
17-19	1.305	1.158	1.33
20-24	1.305	1.158	1.33
25-29	1.305	1.158	1.33
30-34	1.363	1.216	1.33
35-39	1.408	1.267	1.33
40-44	1.434	1.304	1.33
45-49	1.439	1.323	1.33
50-54	1.424	1.320	1.29
55-59	1.390	1.300	1.29
60-64	1.342	1.267	1.2
65-69	1.282	1.224	1.2
70-74	1.215	1.177	1.13
75-79	1.143	1.128	1.13
80-84	1.070	1.079	1.05
> 85	0.924	0.979	1.05

Note: poor are defined as people with less than median wealth.



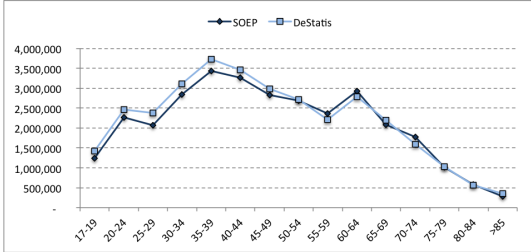
Table A.2: Private household wealth and national income 1961 – 2009 (in €billion)

year	fixed assets	net financial assets	private household wealth	net national income	wealth-income ratio
1961	130.6	67.3	197.8	133.3	1.48
1962	151.1	77.3	228.4	144.2	1.58
1963	170.7	87.2	257.9	152.3	1.69
1964	188.5	99.1	287.7	167.3	1.72
1965	209.7	114.0	323.6	183.3	1.77
1966	230.8	131.9	362.7	194.2	1.87
1967	248.5	149.7	398.2	194.6	2.05
1968	259.0	166.5	425.5	213.8	1.99
1969	281.7	186.5	468.2	236.7	1.98
1970	333.7	209.6	543.3	271.2	2.00
1971	394.5	237.8	632.3	299.7	2.11
1972	451.5	268.7	720.2	329.0	2.19
1973	502.8	305.6	808.4	368.3	2.19
1974	561.0	341.6	902.6	393.5	2.29
1975	616.3	383.6	999.9	409.3	2.44
1976	644.3	434.1	1078.4	449.0	2.40
1977	701.0	478.5	1179.5	477.4	2.47
1978	757.7	522.5	1280.2	515.0	2.49
1979	825.4	567.4	1392.9	554.2	2.51
1980	940.6	619.2	1559.8	582.7	2.68
1981	1043.3	676.5	1719.8	603.2	2.85
1982	1121.7	739.2	1860.8	620.8	3.00
1983	1167.2	800.0	1967.2	653.5	3.01
1984	1238.2	857.4	2095.7	688.8	3.04
1985	1290.1	920.4	2210.5	719.3	3.07
1986	1325.8	977.4	2303.2	765.7	3.01
1987	1371.4	1039.9	2411.3	792.5	3.04
1988	1419.6	1101.7	2521.3	836.2	3.02
1989	1481.9	1185.9	2667.8	888.7	3.00
1990	1572.4	1266.3	2838.6	967.3	2.93
1991	1705.5	1359.3	3064.7	1037.7	2.95
1992	3648.4	1097.3	4745.7	1424.0	3.33
1993	3885.4	1163.2	5048.6	1454.6	3.47
1994	4073.3	1303.4	5376.7	1517.5	3.54
1995	4260.3	1311.0	5571.3	1569.4	3.55
1996	4406.3	1408.9	5815.2	1593.8	3.65
1997	4542.6	1512.5	6055.1	1621.1	3.74
1998	4668.4	1665.8	6334.2	1655.4	3.83
1999	4814.7	1797.6	6612.3	1687.1	3.92
2000	4953.6	1976.7	6930.3	1724.5	4.02
2001	5092.5	2001.5	7094.0	1767.5	4.01
2002	5228.6	2070.4	7299.0	1787.4	4.08
2003	5371.8	2020.5	7392.3	1811.5	4.08
2004	5509.2	2236.5	7745.7	1891.6	4.09
2005	5656.2	2399.9	8056.1	1921.6	4.19
2006	5872.4	2637.1	8509.5	2025.2	4.20
2007	6154.7	2832.1	8986.8	2118.0	4.24
2008	6402.1	3014.0	9416.1	2139.4	4.40
2009	6595.6	2902.4	9498.0	2051.4	4.63

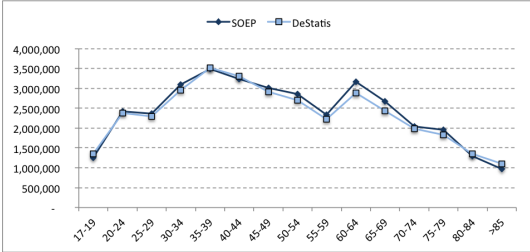
Note: Wealth is measured at the beginning of each year. The structural break in 1991 is due to the German reunification in 1990 and to the non-inclusion of land and consumer durables before 1991. Sources: German Federal Statistical Office and Deutsche Bundesbank (for details, see Section 4.3.2).

# Figures

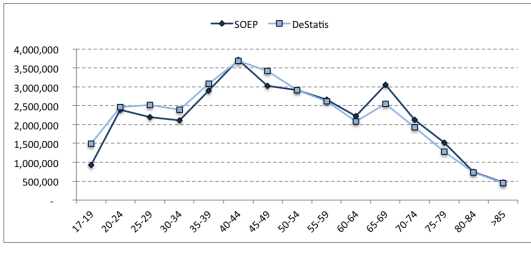
Figure A.1: Population by age group and sources



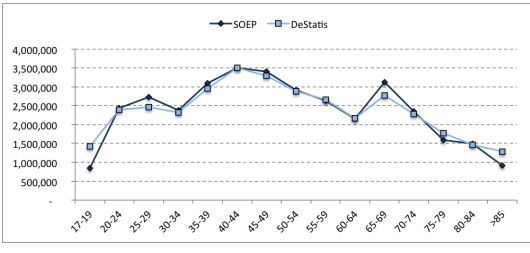
(a) Males, 2002



(b) Females, 2002



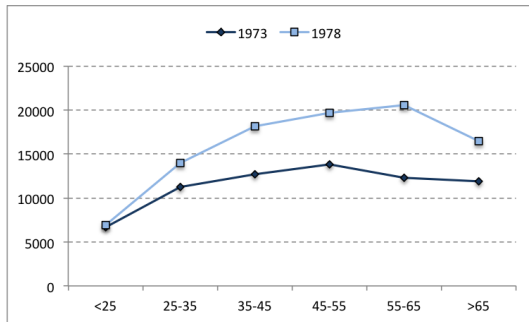
(c) Males, 2007



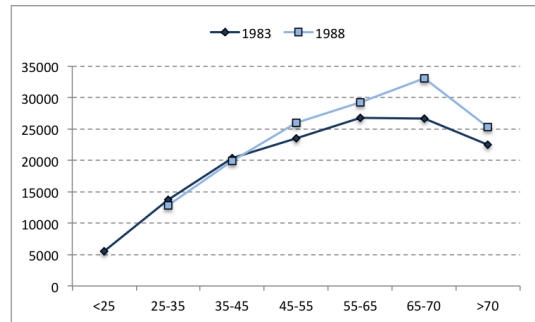
(d) Females, 2007

Source: German Federal Statistical Office and SOEP v27.

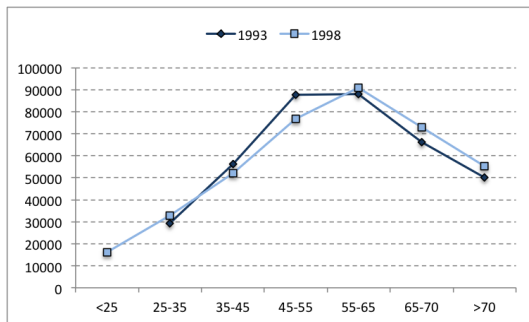
Figure A.2: Age-wealth profiles based on EVS, 1973 – 2008



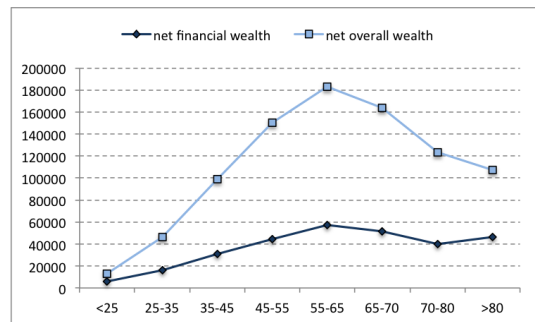
(a) 1973 and 1978



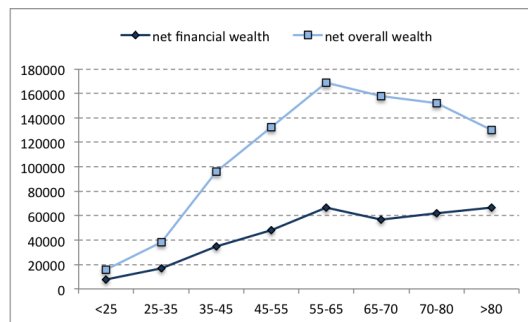
(b) 1983 and 1988



(c) 1993 and 1998



(d) 2003



(e) 2008

Note: Wealth is measured in current Euros since 2003 and current DM before 1998. Source: EVS and mortality statistics.

## Acronyms

- DIW:** Deutsches Institut für Wirtschaftsforschung - German Institute for Economic Research
- ESA:** European System of Accounts
- EVS:** Einkommens- und Verbrauchsstichprobe – Sample Survey of Income and Expenditure
- NPISH:** Non-Profit Institutions Serving Households
- SHARE:** Survey of Health, Ageing and Retirement in Europe
- SOEP:** Socio-Economic Panel