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Wealth and its Distribution in Germany, 1895-2018*

Thilo N. H. Albers† Charlotte Bartels‡ Moritz Schularick§

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Abstract

German history over the past 125 years has been turbulent. Marked by two world wars, revolutions and major regime changes, as well as a hyperinflation and three currency reforms, expropriations and territorial divisions, it provides unique insights into the role of country-specific shocks in shaping long-run wealth dynamics. This paper presents the first comprehensive study of wealth and its distribution in Germany since the 19th century. We combine tax and archival data, household surveys, historical national accounts, and rich lists to analyze the evolution of the German wealth distribution over the long run. We show that the top 1% wealth share has fallen by half, from close to 50% in 1895 to 27% today. Nearly all of this decline was the result of changes that occurred between 1914 and 1952. The interwar period and the wealth taxation in the aftermath of World War II stand out as the great equalizers in 20th century German history. After unification in 1990, two trends have left their mark on the German wealth distribution. Households at the top made substantial capital gains from rising business wealth while the middle-class had large capital gains in the housing market. The wealth share of the bottom 50% halved since 1990. Our findings speak to the importance of historical shocks to the distribution and valuations of existing wealth in explaining the evolution of the wealth distribution over the long run.

JEL Classification: D31, E01, E21, H2, N3

Keywords: Wealth inequality; portfolio heterogeneity; saving; wealth taxation.

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1 Introduction

Understanding the dynamics of the wealth distribution has once again become an active research field in macroeconomics and public finance. The question of what factors account for the observed skewness in the wealth distribution goes back to Pareto himself (Benhabib & Bisin 2018). Researchers typically assumed that skewed labor earnings translate into a skewed distribution of wealth. Yet empirical evidence shows that wealth tends to be much more unequally distributed than earnings. This observation has recently refocused attention on the role of other factors such as returns on wealth and portfolio heterogeneity as well as taxation as drivers of long-run wealth dynamics (Fagereng et al. 2020, Gabaix et al. 2016, Greenwald et al. 2021, Jakobsen et al. 2019, Jones 2015, Kuhn et al. 2020). Economic history has an important role to play in these debates–not only by bringing new data and facts to the table, but also by studying observable shifts in the wealth distribution in their economic and historical context. Identifying such shifts and linking them to historical forces and events allows for a fuller understanding of the dynamics of wealth and its driving forces. It can also help distinguish different theoretical channels and their empirical relevance.

In this paper, we aim to write the economic history of the distribution of wealth for a country whose modern economic and political history has been extraordinarily turbulent: Germany. German history in the 20th century was marked by five different forms of government – the Kaiserreich, the Weimar Republic, the Nazi Regime, the Federal Republic, and the German Democratic Republic. On top of this come three currency conversions, the effects of two world wars, substantial changes in its borders, and in the composition of its population. The latter is marked by the expulsion and murder of the German Jewry as well as the influx of German refugees from Eastern Europe after World War II. More recently, German reunification in 1990 provided another quasi-natural experiment, allowing us to study the effects of the integration of an egalitarian socialist economy into one of the most advanced capitalist economies. Presenting the first comprehensive study of long-run wealth inequality in Germany spanning the entire period from the late 19th century until today, the paper makes three main contributions.

First, we construct new long-run series for German marketable wealth and its distribution since 1895 from historical sources. While we can build on some older work, our paper is the first to bring German data up to standard with the rapidly growing body of long-run data on wealth and its distribution. Germany's volatile history brings particular challenges with respect to the construction of wealth series that we discuss in detail.[1] Our new series for aggregate wealth and its distribution in Germany add to an international research effort to construct long-term data for the distribution of wealth. Long-run series for France cover 1914-2014

[1] Even for countries with less volatile political paths through 20th century history, researchers find it difficult to agree on wealth inequality levels and trends. For instance, even in well-studied cases like the US, researchers arrive at wealth shares of the top percentile ranging from about 20% (Kopczuk & Saez 2004) to 40% (Saez & Zucman 2016). Existing estimates for current day top wealth shares in Germany also diverge substantially and range from 20% to more than 30% (Vermeulen 2018, Bach et al. 2019).

(Piketty et al. 2006, Garbinti et al. 2021), for Sweden 1873-2012 (Roine & Waldenström 2009, Lundberg & Waldenström 2018), for the United Kingdom 1895-2013 (Alvaredo et al. 2018), and for the United States 1913-2020 (Saez & Zucman 2016, 2020).[2] Our new series for aggregate wealth and its distribution improve on existing work and provide significant revisions to the official balance sheets. In contrast to earlier work by Baron (1988, covering 1935-1980) and Dell (2008, covering 1894-1995), our top 1% series is consistently estimated in market prices and shows substantially different levels of wealth concentration. We also draw on a wider range of sources and improve upon the work of Piketty & Zucman (2014). Our estimates for unified Germany address well-known shortcomings of the official balance sheet data. We correct the valuation of Germany's large number of private limited companies and quasi-corporations, as well as the valuation of housing assets to reflect the rapid growth in real estate prices since 2010. Our corrected wealth-income ratio is about 120% of GDP higher than the official balance sheets imply. Germany is considerably richer than official statistics show.

The second main contribution is a quantitative decomposition of major historical shifts in the German wealth distribution through which we aim to identify the key forces behind the largest observed changes in the wealth distribution. In the absence of fully-fledged general equilibrium models for wealth dynamics, we return to an older approach to develop historically plausible counterfactuals (Fogel 1964). For instance, to account for the effect of border changes after World War I on the German wealth distribution, we calculate counterfactual wealth shares applying postwar borders to prewar data. Comparing the top 1% wealth share calculated for 1913 in the borders of 1920 to the actual top 1% wealth share in 1913 allows us to approximate the influence that border changes had on changes in the wealth distribution. We construct historically plausible counterfactuals for all the observed time periods in which major shifts in the wealth distribution occurred. More precisely, we look at World War I, the 1923 hyperinflation episode, the Nazi regime, the destruction during World War II, and the wealth taxation after the war aimed at sharing the burden of post-war reconstruction ("Lastenausgleich").

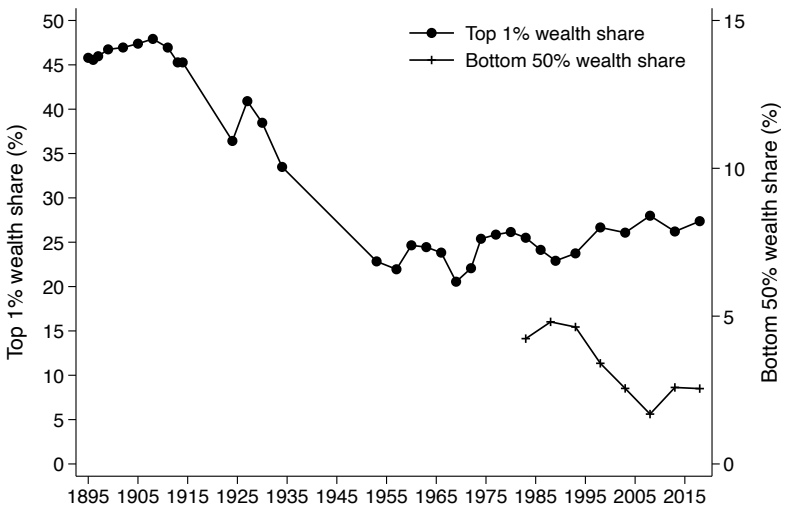
In a third contribution, we study the wealth dynamics following German unification in 1990, combining various survey data with adjusted business and real estate wealth aggregates. Unification brought together a poorer and relatively egalitarian society with one of the most advanced OECD economies. We focus on the drivers of the increase in wealth inequality, in particular the growing importance of capital gains in shifting wealth shares, and the evolution of savings rates across the distribution.

We find that over the long-run, the concentration of wealth in the hands of the German top 1% has fallen by almost half, from close to 50% in 1895 to 27% today. Almost all of the decline in the top 1% wealth

[2] Series with shorter time horizons exist for China 1978-2015 (Piketty et al. 2019), Italy 1995-2016 (Acciari et al. 2021), Russia 1995-2015 (Novokmet et al. 2018), South Africa 1993-2017 (Chatterjee et al. 2021), and Spain 1985-2014 (Martínez-Toledano 2020).

share occurred in less than 40 years, between World War I and the early years of the Federal Republic after World War II. Since the early 1950s, the top 1% share has remained within a narrow range. However, this stability at the surface masks substantial movement in the overall distribution of wealth, especially in recent decades. Since reunification in 1990, the upper half of the wealth distribution effectively doubled its wealth. Asset valuations have played an important role. Households at the top of the distribution made substantial capital gains from rising business equity. At the same time, the middle-class witnessed large capital gains in housing so that the gap between top and middle-class wealth holders increased only moderately. However, real wealth of the average household in the bottom 50% stagnated, and the bottom 50% share in total wealth nearly halved from 5% in 1978 to 2.8% in 2018. This is because the portfolio of households in the lower half of the distribution consists mainly of deposits and life insurance assets that did not appreciate in value. In the process, the gap between the "haves" and the "have-nots" has widened considerably: in 1993, the average wealth of households in the top 10% of the wealth distribution was 50 times higher than in the bottom half. By 2018, the gap has grown to 100 times. This polarization of wealth between the upper and lower half of the distribution in the past 30 years is missed by standard inequality measures such as the Gini coefficient that mainly track wealth shifts within the upper half of the distribution. Figure 1 demonstrates the decline and relative stability of the top 1% wealth share at the same time as the bottom 50% wealth share collapsed.

Figure 1: Wealth share of the top 1% and bottom 50%, Germany, 1895-2018



Note: Own estimates based on wealth tax until 1989, EVS-TU 1993-2018.

The most pronounced contractions in German wealth inequality occurred in the interwar period as well as during and after World War II. The top 1% wealth share fell by more than 11pp. between 1914 and 1934, and by another 10pp. during World War II and its aftermath. What factors were responsible for the equalization? Collapsing asset valuations played a central role during World War I, the hyperinflation, and the Great Depression. These events compressed the market value of business wealth holdings at the top while

the capital stock remained largely intact. By contrast, the destruction and taxation of capital explain most of the decline in inequality in and after World War II. The "Lastenausgleich" taxed German households whose wealth had survived the war and those that had profited from the eradication of debts in the currency reform of 1948. Apart from a small allowance, the wealth levy constituted a quasi-flat 50% tax on the net wealth of households in 1948. Our estimates suggest that the wealth tax alone reduced the top 1% wealth share by about 3pp., while war destruction and the dismantling of plants accounted for another 3pp. of the drop in the top 1% wealth share during and after World War II. These findings mesh nicely with recent studies that underscore the importance of asset returns and portfolio structure for wealth inequality dynamics (Garbinti et al. 2018, Fagereng et al. 2019, 2020, Bach et al. 2020, Kuhn et al. 2020). This being said, we also show that saving rates remained comparatively high for Germany's middle class (in comparison to France or the United States) and that they increase in wealth and income levels – a finding that speaks to ongoing debates about the relationship between savings rates across the wealth and income distributions (Saez & Zucman 2016, Fagereng et al. 2019, Garbinti et al. 2021, Mian et al. 2021).

More generally, the findings in our paper also point to a deeper puzzle. Our analysis of the observed big shifts in the German wealth distribution over the past 125 years highlights the importance of country-specific shocks – wars and destruction, wealth taxation, inflation – in triggering the most significant shifts in wealth shares. However, when we compare long-run trends in German wealth inequality to other advanced economies, the overall path looks strikingly similar. Other advanced economies also saw sharp reductions in top-wealth shares around the mid of the 20th century and a substantial reduction of top wealth shares relative to the levels around the year 1900. Put differently, despite its uniquely turbulent history, Germany's trajectory does not look all that different to other countries in Europe and the U.S. with regard to long-run trends in the wealth distribution. We argue that this finding underscores the importance of common political and technological shocks and trends shaping the wealth distribution in advanced economies over the long-run. Germany is a case in point, but other countries made similar experiences. For instance, the Great Depression was a global event that depressed business asset valuations in all economies for decades to come. The two world wars stand out as periods when taxation triggered large shifts in the wealth distribution *across* countries. This is because different economies responded to war in similar ways by raising taxes and increasing redistribution. In that sense, our study of the extreme case of Germany points to a greater theme of correlated shocks and policy responses across the major economies that have aligned cross-country wealth histories to a surprising degree over the past century.

The paper is structured as follows. We first describe our data and estimation methods for both aggregate wealth and its distribution in Section 2. In Section 3, we present the long-run trends, compare our results to previous results in the literature, and look at Germany in international comparison. Section 4 zooms in

on the major historical episodes that have shifted the German wealth distribution, as well as their underlying forces. In Section 5, we study wealth inequality dynamics in unified Germany where the greater data availability allows us to study wealth growth, capital gains, and savings across the entire wealth distribution. Section 6 concludes.

2 Data

Our definition of wealth and its valuation closely adhere to the international standards described in Piketty & Zucman (2014). Wealth is defined as the value of assets owned by households net of debt. Assets include financial assets, such as savings deposits or life insurances, real assets, such as houses and farmland, and business assets. In line with the international literature, we exclude consumer durables, hard-to-assess items like works of art, as well as non-tradable future claims on public and employer-based pension systems. While the inclusion of employer-based systems would hardly affect wealth inequality estimates in the German context (Frick et al. 2010), including public pension claims reduces the Gini by as much as a quarter (Bönke et al. 2019, 2020). Yet our focus is on marketable wealth, which we evaluate at market prices throughout. This constitutes a major improvement over previous attempts to create historical wealth inequality series for Germany (Baron 1988, Dell 2008), which lack a consistent valuation at market prices. Our new series thus makes it possible to compare German long-run wealth inequality intertemporally and internationally.

Table 1: Main data sources

Period	Aggregate	Distribution	Data Appendix
1895-1914	Wealth tax and wealth levy, contemporary estimates, statistical yearbooks	Wealth tax (Prussia), Wealth levy 1913 (German Empire)	Section DA 1
1924-1934	Wealth censuses, statistical yearbooks	Wealth tax (German Reich)	Section DA 2
1953-1989	Financial Accounts, National Accounts	Wealth tax (FRG)	Section DA 3
1993-2018	Financial Accounts, Household Balance Sheets, Corporate and personal income tax	EVS+, SOEP, HFCS, Manager Magazin rich-list	Section DA 4

Table 1 shows our main data sources for aggregate private wealth and its distribution. For 1895 to 1989, we collected and digitized historical data to construct a series of aggregate household wealth as well as federal and regional wealth tax data and a one-off wealth levy capturing wealth at the top of the distribution. For the post-1990 period, the data sources become broader so that we can study wealth dynamics across the entire distribution. Household surveys like EVS, SOEP, and HFCS record micro data on German household wealth every few years. At the same time, substantial data shortcomings exist with respect to the coverage of top wealth and aggregate household wealth as recorded in official household balance sheets (HBS). Therefore, we present revised estimates for aggregate household wealth and top-correct survey data using household

wealth aggregates and rich lists. Focusing on the most recent period, the following sections discuss the particular challenges of the data construction in more depth. The Data Appendix discusses similar challenges for the historic data and documents the consistency of aggregates and distributional data over time.

2.1 Revising aggregate household wealth

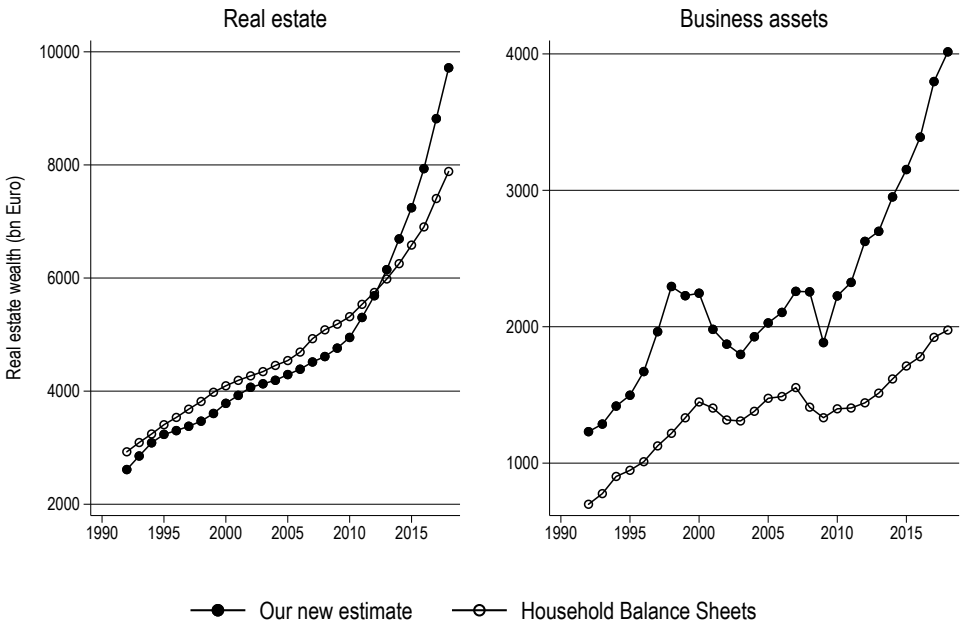
Although Household Balance Sheets (HBS) for both fixed and financial assets owned by private households are published annually by the Federal Statistical Office (Destatis) since 1992,[3] substantial challenges remain with respect to aggregate wealth data. First, housing wealth appears to be mismeasured as current estimates do not reflect market price changes over time. Second, business wealth in enterprises other than public limited companies is likely underestimated. We will see that, in both cases, the mismeasurement reflects path-dependent peculiarities of German statistics and accounting rules that do not distinguish clearly between reporting of book and market values. One should note that business wealth and real estate wealth together constitute more than 60% of household wealth. Our approach in both cases is to update the German concepts to international standards and value both at market prices. In the following, we present improved estimates of aggregate real estate and business wealth.

Real estate wealth Real estate wealth is the most important form of wealth for most households. In 2018, about 53% of total gross wealth is residential real estate (according to HBS). The valuation of housing wealth is challenging, particularly because of the changing value of land. Many European countries, like France and the United Kingdom, compute a total value of housing wealth based on market prices. In German data, housing structures and the underlying land are estimated separately. The series for housing wealth is perpetuated using housing investments while accounting for depreciation. The price of construction land is evaluated annually by a board of experts based on a single value of land for each federal state. The value for land is likely heavily downward biased, because the land price estimates are for available plots of construction land that are geographically remote from prime locations.

The left-hand graph of Figure 2 shows that the official housing wealth estimate increases rather smoothly over time, failing to capture the housing boom since 2010 that is visible in surveys and in house price data (see Data Appendix Figures DA 4.1 - DA 4.3). We use the housing aggregate recorded in the HFCS survey 2011 and extend the series applying the method by Davis & Heathcote (2007). This method decomposes the aggregate value of the housing stock into buildings and land. The price of land is inferred from data on house prices and buildings costs. Our new estimate puts the total value of residential real estate in Germany at close to 10 trillion Euros, or about 275% of GDP, at the lower end of international comparisons. This being said, our estimate is close to 2 trillion Euros higher than what the official HBS data suggest.

[3] While households' financial assets estimated by the German central bank (*Bundesbank*) are published annually since 1960, estimations of fixed assets are only available from 1992 onwards.

Figure 2: Aggregate real estate and business wealth: HBS vs. revised estimates, 1991-2018



Sources: See Data Appendix DA 4.
Note: The figures compare the official HBS numbers for real estate and business equity with our estimates for the respective asset types.

Business wealth Business wealth is the sum of equity in (1) public limited companies, (2) private limited companies and quasi-corporations,[4] and (3) unincorporated businesses. In 2018, the official HBS denotes (1) ca. 1,000 billion Euros for public limited companies,[5] (2) 220 billion Euros for private limited companies and quasi-corporations, and (3) 770 billion Euros for unincorporated businesses. Hence, business wealth sums to a total of ca. 2,000 billion Euros according to the official HBS. We stick to the HBS numbers for (1) public limited companies and (3) unincorporated businesses, which we consider to be accurate.

However, the estimation of wealth in private limited companies and quasi-corporations (2) is more difficult, but particularly important in the case of Germany since a substantial part of the business sector – especially the successful "Mittelstand" comprising more than 90% of the firms – is privately held. The estimate of 220 billion Euros for (2) seems implausibly low given that the richest 1,000 families (ca. 0.01% of German households) hold a total wealth of 910 billion Euros according to the *Manager Magazin* rich list of 2018, mostly invested in privately-held corporations and quasi-corporations.

Our revision of German business wealth in private limited companies and quasi-corporations applies international valuation methods for non-listed corporate business wealth. In essence, we follow the procedures of the U.S. Federal Reserve to compute the market value of closely held corporate equity in the Financial Accounts of the United States (Ogden et al. 2016). We multiply the earnings of such businesses with the ratio of market value to revenue from publicly traded companies, applying discounts of 25% and 50% for

[4] This includes private limited companies (*GmbHs*), cooperative societies, and quasi-corporations such as general partnerships (*Offene Handelsgesellschaft - OHG*) and limited partnerships (*Kommanditgesellschaft - KG*).

[5] This includes listed and non-listed shares in public limited companies and investment funds.

private limited companies and quasi-corporations, respectively, to reflect the lack of liquidity of closely held shares.[6] The European System of Accounts advises a similar strategy (Eurostat 2013, p. 178). Our estimation procedures by legal form are outlined in detail in Data Appendix DA 4.

Adding up these different components (public limited companies, private limited companies, quasi-corporations and unincorporated businesses) yields an estimate for total business wealth owned by German households of approximately 4,000 billion Euros in 2018. The right-hand graph of Figure 2 contrasts our new estimate with business wealth according to HBS. Our estimated business wealth is about twice as high as the HBS' figure.[7]

2.2 Data for the distribution of wealth

Wealth tax data Wealth tax data constitute our main source for the distribution of wealth. These data are available for Germany for 100 years (1895-1995). In 1995, the German Federal Constitutional Court ruled that unequal tax treatment of different forms of wealth was unconstitutional.[8] Upon this decision, the German government chose to suspend the wealth tax rather than to reform the legislation. Before, depending on the period, between 2% (post-war period) and 14% (pre-World War I) of all tax units had had to declare their wealth to the authorities.

For the period 1895-1914, we use wealth tax data from Prussia. For 1913, we can estimate wealth concentration in the German Reich as a whole drawing on the *Wehrbeitrag* – a one-time wealth tax levied to fund Germany's military build-up at the eve of World War I. This levy also allows us to benchmark the German Empire's wealth distribution against that of Prussia, which encompassed about 60% of Germany's population (Data Appendix DA 1.3). Concluding that the structure and distribution of wealth in Prussia are likely representative for Germany as a whole, we extrapolate the German benchmark estimate for 1913 backwards until 1895 employing the Prussian data. For the years 1924 to 1934, we can draw on a new federal wealth tax that equally applied to all German states. For post-war West-Germany, wealth tax data are available from 1953 until 1995.[9]

[6] The choice of our discount is based on private company discounts estimated in the corporate finance literature. For example, Koeplin et al. (2000) estimate a discount of 18% to 31% for domestic firms.

[7] We benchmark our revised estimate against other data sources. First, according to the official balance sheets for institutional sectors, the German non-financial corporate sector's net worth was 3,600 billion Euros in 2018 (this number excludes unincorporated businesses). Given that (a) 90% of German firms are family-owned, (b) that foreign or public holdings are of overall limited quantitative importance, and (c) that the financial corporate sector is not even included here, our estimate of about 3,400 billion corporate and quasi-corporate business wealth held by German households is still conservative. Second, US business wealth (both corporate and non-corporate) is about 30% of total private wealth (Saez & Zucman 2016). Revising upwards the German business share from 16% (official HBS) to 32% (our revised estimate) brings Germany in line with international magnitudes.

[8] Real estate wealth had been fully assessed for the last time in 1964 at cadastral values (*Einheitswerte*). These were systematically lower than the market valuation of other asset types.

[9] After 1989 large exemptions for business wealth were introduced, which makes the two last wealth tax statistics from 1993 and 1995 of limited use for the study of top wealth shares. We use wealth tax statistics up to 1989.

Survey data We use all three German household surveys that document information on household wealth. The Income and Expenditure Survey (*Einkommens- und Verbrauchsstichprobe (EVS)*) was initiated in West Germany in 1962/3 and includes questions on household wealth since 1978.[10] We use the harmonized EVS+, which is constructed by Bönke et al. (2013) and Bartels et al. (2020). It provides consistently defined income, expenditure, and wealth variables (see Data Appendix DA 4 for more details on the data harmonization procedures). The Socio-Economic Panel (SOEP) includes a wealth questionnaire in 2002, 2007, 2012, and 2017. The European Central Bank's Household Finance and Consumption Survey (HFCS) was first released in 2011 and continued in 2014 and 2017.

Survey data are known to have some shortcomings for inequality measurement. First, aggregate household wealth recorded in surveys is far below the macroeconomic aggregates from other data sources, which particularly applies to financial assets and business assets. To close this gap, we uprate all survey data to macroeconomic aggregates (see Section 2.3). Second, the EVS data do not record business assets, but business assets represent a substantial share of the portfolio of the wealthy. This creates a downward bias for inequality measures as the German business sector mostly consists of closely held family firms, i.e., not publicly traded firms at the stock exchange. We impute business wealth in EVS using distributional information from SOEP, making its coverage consistent with SOEP and HFCS data. Finally, surveys are known to miss the very wealthy at the top of the distribution, thus creating a downward bias for income and wealth inequality measures (Bartels & Metzing 2019, Schröder et al. 2020).[11] Assuming wealth at the top to follow a Pareto distribution, Vermeulen (2018) and Bach et al. (2019) impute the 'missing rich' in HFCS data using information from rich lists. We connect our paper to these papers using rich lists to complement the missing rich at the top.

Lists of large wealth holders Since 2000, the German business magazine *Manager Magazin* (MM) has annually published a list of rich individuals and families. Journalistic wealth rankings, like the MM-list, come with a number of uncertainties. First, net wealth is estimated based on a variety of data sources and the methods employed to bring these data sources together are not documented for the public. Hence, it is impossible to reconstruct and check these lists against alternative data sources, methods, and assumptions. Second, net wealth might be overestimated because liabilities are often underestimated. However, many privately held firms in Germany are family-owned, often for generations, and equity-to-asset ratios tend to

[10] According to the statistical office, the microdata of the EVS 1962/3, 1969, and 1973 have been destroyed and, thus, are no longer available for research. See Statistisches Bundesamt (2013) for further details on the survey's methods and implementation.

[11] German household survey data provide substantially lower top wealth thresholds than suggested by the list of the *Manager Magazin*, although with varying gaps. Appendix Table A.1 shows that net wealth of the top 0.01% is at least 5 million Euros according to EVS, but above 12 or 13 million according to SOEP and HFCS, respectively, and more than 100 million according to the MM-list in 2018. EVS does not record business wealth, which is a central reason for the overall lower wealth values in EVS.

be high.[12] Lastly, many entries of the MM-list refer to a large family and it is unclear how many households a single family represents. Based on the work by Bach et al. (2015, p. 8), we assume that, on average, each entry represents about four households. From this assumption it follows that ca. 0.01% of German households are listed in the MM-list in 2018.

2.3 Estimating the distribution of wealth

Our principal measure of inequality is a quantile's share in overall wealth, e.g., the wealth share of the top 1%, top 10%, 50-90%, or the bottom 50%. We estimate wealth shares using the generalized Pareto interpolation method popularized by Piketty (2001, 2003) and further developed by Blanchet et al. (2022).[13] The distributional data have to be adjusted in different ways before we can apply the Pareto interpolation method. For the 1924-1989 period, we have to uprate the fiscal values documented in wealth tax data to market values. We obtain the asset-specific uprate factors from the ratio of total market wealth to total fiscal wealth. For the 1993-2018 period, we correct the survey data for missing observations at the top using information from wealth rankings.

Top-correction and uprating involves several steps. First, we start with unadjusted survey data and compute each percentile's share $s_{p,a}$ in total wealth of asset a as

$$s_{p,a} = w_{p,a} / \sum_{p=0}^{p=99} w_{p,a} \tag{1}$$

where $w_{p,a}$ is total wealth of percentile p in asset category a. Note that, at this stage, total wealth is the total recorded in survey data. For EVS, we impute business wealth drawing on the business wealth distribution recorded in SOEP. We compute each percentile's share of business wealth in SOEP, $s_{p,business}$ of the nearest survey year (e.g., SOEP 2017 for EVS 2018) and then transfer every percentile's share to its respective counterpart in the EVS net wealth distribution (Data Appendix DA 4.4 for discussion and additional Figures). Second, we top-correct the distribution. We increase the asset-specific shares $s_{p,a}$ of the top percentile by adding the asset-specific share held by the top 0.01%, which is recorded in the MM-list, and reduce asset-specific shares of the bottom 99 percentiles proportionately.[14] We also top-correct the top percentile's

[12] Comparing tax data of deceased persons with their fortunes documented in the *Forbes* list, Raub et al. (2010) find that net worth was overestimated by approximately 50 percent, primarily due to assessment difficulties, fiscal distinctions, and poor assessment of liabilities. However, one should note that few German firms are listed at the stock exchange and most German firms have a low level of indebtedness. On average, the equity ratio of the German *Mittelstand* was 30% in 2016 (Gerstenberger 2018). Thus, the critique of Raub et al. (2010) may not apply to Germany.

[13] Pareto interpolation is traditionally applied in the literature on long-run series of top income and wealth shares. See Bartels (2019) for an exposition of this method for the estimation of top income shares on the basis of German income tax data.

[14] We choose to replace wealth above the 99th percentile for three reasons. (1) Looking at the wealth thresholds presented in Table A.1, we can be reasonably confident that survey data are representative up to the 99th percentile. (2) The *income* share of the top 1% is typically underestimated by survey data when comparing survey and income tax data, while the income share of the P90-99 matches quite closely (Bartels & Metzing 2019). (3) The top percentile of the income and wealth distribution consists of

share $s_{p,a}$ held in total real estate and in total financial assets, because HFCS data (oversampling wealthy households) and wealth tax data show substantially higher shares of the total held by the top percentile.[15]

In a third step, we uprate the distribution. We multiply the top-corrected percentile shares $s^{tc}_{p,a}$ obtained from the survey data with the macroeconomic aggregate of the respective asset type. We do the same for debt. By using the asset-specific percentile shares, as implied by the survey data plus the MM-list top-correction, we implicitly assume that the uprating factor is constant across the distribution.[16]

Lastly, we compute total net wealth tnw_p and average wealth of each percentile. Each percentile's total net wealth is then given as

$$tnw_p = \sum^{a} s^{tc}_{p,a} \cdot T_a \tag{2}$$

where T_a denotes the macroeconomic aggregate of asset category a. We refer to uprated and top-corrected survey data as EVS-TU, HFCS-TU, and SOEP-TU, respectively. Data Appendix DA 4.4 provides a detailed comparison of the adjusted and unadjusted data and discusses the differences. Appendix Figure A.3 contrasts our top 1% series with the estimates from Bach et al. (2019) and Vermeulen (2018). Their upper bound estimates are 7 percentage points higher than ours, likely owing to their assumption of a constant Pareto coefficient among the rich in contrast to our varying coefficient (following Blanchet et al. 2022).[17]

3 The long-run evolution and distribution of wealth in Germany

In this section, we present our main results on the evolution of wealth and its distribution in Germany from 1895 to 2018 and discuss them in the international context. We start with the aggregate wealth-income ratio before studying wealth shares and their evolution over time.

business owners while the middle class up to the 99th percentile largely draws on labor income and is mostly invested in owner-occupied housing (Bartels 2019). Housing is well-captured by survey data, while only a small share of aggregate business wealth is captured in surveys (see Data Appendix Figure DA 4.2). One could argue that we should choose a lower cutoff than the 99th percentile given that EVS probably under-represents top wealth even more than SOEP and HFCS (see Appendix Table A.1). By choosing a comparably high cut-off above which we replace top wealth, our estimates represent a lower bound of wealth inequality.

[15] More precisely, we use the estimate from HFCS 2011 and 2014 and adjust the top percentile's share in total real estate upwards by 5% in EVS, SOEP and HFCS 2017. We draw on wealth tax data for the top percentile's share in total financial assets and adjust survey data upwards by 5%. We reduce the share of the bottom 99% proportionately.

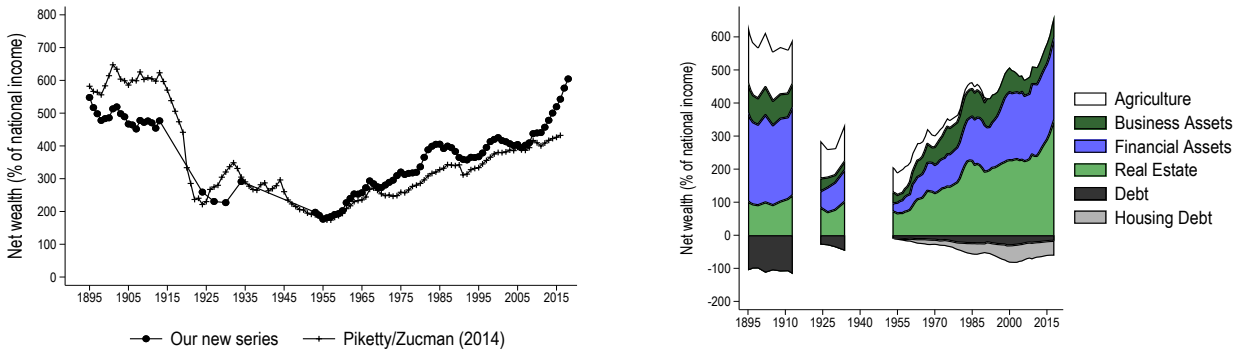
[16] One could argue that our uprating factor should increase moving to the top of the distribution, because under-reporting of wealth and under-representation of the wealthy is likely more prevalent at the top. Then, we would have to modify the asset-specific percentile shares, i.e., increase those of higher wealth classes and reduce those of lower wealth classes. However, our proportional strategy aims to apply the most conservative assumption so that our estimates will represent a lower bound of wealth inequality.

[17] Empirical top income and wealth distributions documented in administrative tax data show that the Pareto coefficient is not stable. Rather, the Pareto coefficient seems to follow an inverse u-shape when moving toward the very top of the distribution. Consequently, Bach et al. (2019) and Vermeulen (2018), who estimate a single Pareto coefficient on the basis of rich lists in order to simulate the top of the wealth distribution, probably attribute too much mass to the wealthy, who are not rich enough to be included in the rich lists. They also do not uprate the survey data to macroeconomic aggregates which has a concentration-reducing impact through survey undercoverage of deposits and current accounts (see Data Appendix Figure DA 4.2).

3.1 The wealth-income ratio in Germany, 1895-2018

Figure 3a tracks the development of the (private) wealth-income ratio for the 1895 to 2018 period. German household net wealth to national income declined from 500% at the turn-of-the-century to 200% after the shocks of the world wars and the Great Depression and then quite steadily increased throughout the post-war period. The temporary decline of the wealth-income ratio after 1990 reflects that the increase in private wealth due to the unification of East and West Germany was much lower than the increase in income. In 2018, the wealth-income ratio reached 600%.

Figure 3: Wealth-income ratio and its composition in Germany, 1895-2018



(a) Wealth-income ratio (b) Wealth composition

Source: See Data Appendix and Piketty & Zucman (2014). National income is from `WID.world`.
Notes: In Figure (b), financial assets include corporate business assets because we cannot distinguish between financial asset types in the pre- and interwar periods (e.g., savings, bonds, stocks). After 1990, business assets include agricultural assets.

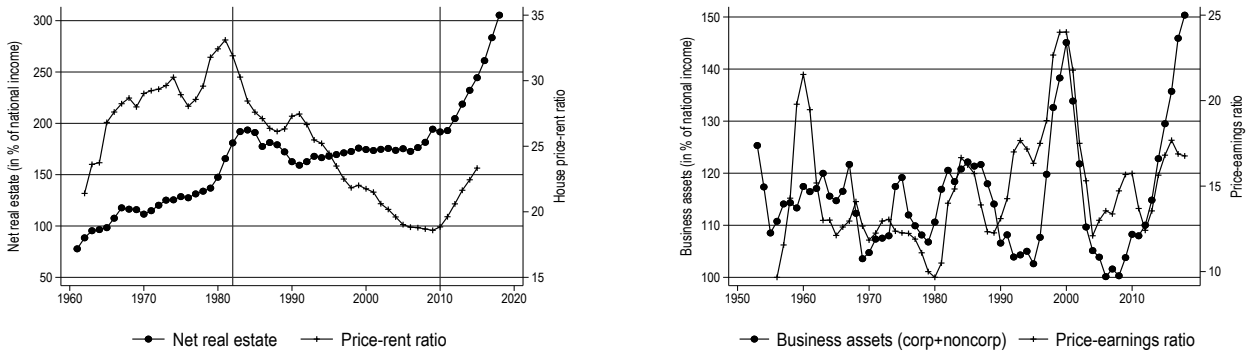
Figure 3a also shows that our results align with the earlier estimate of Piketty & Zucman (2014) even though we diverge significantly from their methodology before 1950 and use additional data sources since 1950. Other than the very significant revisions for the most recent years discussed in Section 2.1, the most notable difference is that our series puts the ratio to around 500% at the eve of World War I rather than 600% as in Piketty & Zucman (2014). This is mainly due to a downward-correction of the value of land.

The structure of wealth drastically changed over the 20th century, as shown in Figure 3b. Before World War I, agricultural and financial assets were the predominant type of wealth in the portfolios of German households. Real estate amounted to less than one-fifth of total household wealth. Between 1913 and 1927, the wealth-income ratio halved. As there had been no physical war destruction during WWI in Germany, the decrease in the wealth-income ratio reflects the capital stock's revaluation and inflation-induced losses on nominal assets. Savings lost 85% of their value and equity lost 57% which chimes with the decline of financial assets' share in national income from around 270% in 1913 to 75% in 1927 (ca. -72%).[18] Since the 1950s, real

[18] The proportional decline of real estate and business assets in national income is ca. -35% and ca. -60%, which is also in line with valuation changes induced by hyperinflation and war (see Section 4.2 and DA 6.2.4, Table 28).

estate continuously gained importance and now represents half of total household wealth.

Figure 4: The role of the asset valuations



(a) Real estate

(b) Corporate and non-corporate business wealth

Source: Estimates for real estate and corporate and non-corporate wealth are our own. National income is from `WID.world`. For the construction of the price-earnings ratio and of the house price-rent ratio (inverse rental yield), see Data Appendices DA 7.1 and DA 7.2, respectively.

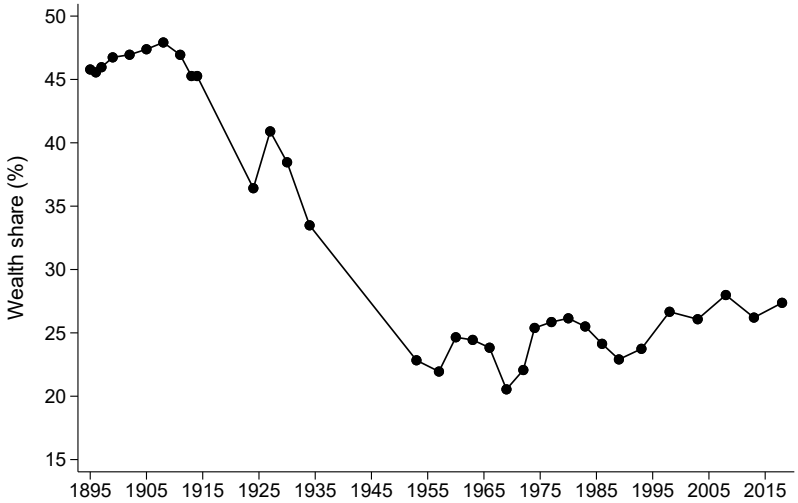
Valuation swings are key to understanding the fluctuations of the wealth-income ratio (Piketty & Zucman 2014, Artola Blanco et al. 2020). Figure 4a plots the real estate wealth-income ratio against the house price-rent ratio. During the 1960s and 1970s, demand for owner-occupied housing and, thus, prices were high despite substantial building activity and increasing home-ownership rates (Kohl 2017). At the same time, the government subsidized social housing and regulated rents (Tomann 1990). The period beginning in the 1980s coincided with a policy-shift, indeed a deregulation of the rental market. Prices stagnated and rents increased moderately (Knoll et al. 2017, Jordà et al. 2019). The resulting fall in the price-rent ratio coincides with stagnant housing wealth. This trend has reversed with increasingly higher real estate valuations and growing housing wealth in the aftermath of the Great Recession, also driven by the sharp decline in interest rates. Figure 4b plots the corporate and non-corporate business wealth-income ratio against the price-earnings ratio. It shows that years with a high valuation of business wealth are also characterized by high price-earnings ratios. Compared to real estate, the evolution of business assets and their valuation is more volatile.

3.2 Wealth concentration in Germany, 1895-2018

Figure 5 shows the long-run trajectory of the top 1% wealth share in Germany. It highlights the important role that shifts during the wars and in their aftermath have played for the evolution of the wealth distribution. Effectively, the top 1% wealth share dropped by half during the 30-year-period from the beginning of World War I until the end of World War II. Until unification, it hovered around 24%, with some ups and downs throughout the post-war period. Since unification, the top 1% share has increased moderately from 24% in 1993 to 27% in 2018 and yet remained fairly stable in light of the historical magnitude of changes. While

the wealth-income ratio has returned to its pre-World War I levels, the top 1% wealth share is currently only slightly higher than its post-war average.

Figure 5: Top 1% wealth share in Germany, 1895-2018



Notes: Own estimates based on wealth tax until 1989, EVS-TU 1993-2018. Top 0.1% and 0.01% wealth shares are displayed in Appendix Figures A.1 and A.2.

The drastic decline between 1913 and the early years of the Federal Republic is consistent with previous top 1% series for Germany based on fiscal rather than market values (Baron 1988, Dell 2008).[19] The Great Depression and World War I depressed the top 1% share mainly through the revaluation of existing capital, whereas the destruction and taxation of wealth played a more important role for the break after World War II (see Section 4).

In the post-war boom period, the wealth distribution remained, by and large, stable with housing wealth accumulation playing an important role outside the very top.[20] Three wealth formation laws between 1961 and 1970 introduced new policies to support wealth formation of lower wealth groups.[21] The home-owning share of the population increased from 27% in 1950, to 34% in 1968, and to almost 40% in the 1980s (Kohl 2017). Housing wealth increased from less than 100% to ca. 200% of national income (Figure 3b).

Three processes shaped the evolution of wealth inequality in Germany from the 1990s onwards. First, the income share of the bottom 50% dropped from more than 30% in the 1960s to less than 25% in the 1980s. This limited the bottom group's ability to keep up with the savings accumulation of the middle 40% (P50-

[19] Appendix Figure A.3 illustrates the differences to our series in market prices. The level differences between the series emerge from different valuation strategies. We discuss and illustrate the differences from using market values (our series) and fiscal values (Baron 1988) in Data Appendix DA 3.7. Dell (2008) applies fiscal values to the distributional data, but market values for total wealth (which are systematically higher) such that he obtains a much smaller estimate of the top 1% share.

[20] The middle class's post-war housing wealth accumulation is also documented for Sweden and the United States (Roine & Waldenström 2009, Saez & Zucman 2016).

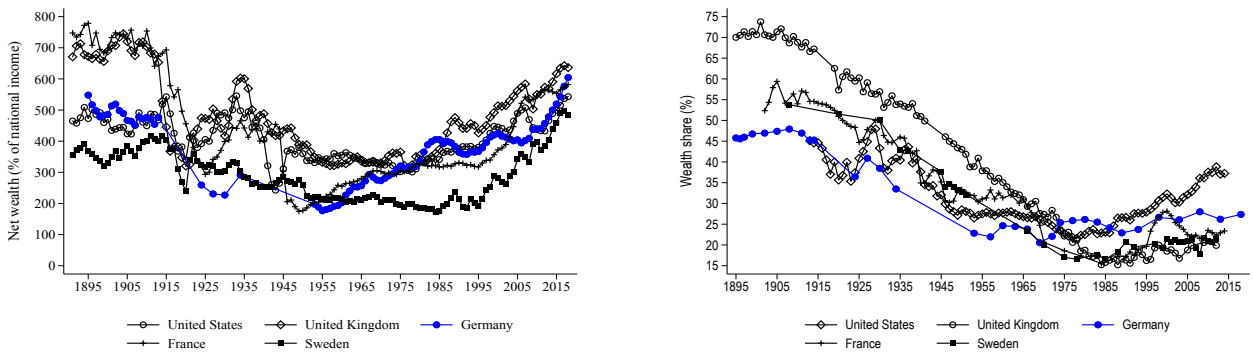
[21] Other measures included subsidies for owner-occupied housing since 1952, loans for business and education, as well as capital-forming benefits since 1961 (*vermögenswirksame Leistungen*). See Tomann (1990) and Bönke & Brinkmann (2017) for more details on wealth formation policies in Germany.

90). The income share of the middle class remained stable, while that of the top decile continued to grow (Bartels 2019). Second, the home ownership rate barely grew and remained at ca. 40%. Third, the gap between capital returns and GDP per capita income growth, which had remained relatively small over the post-war decades, started to widen (Jordà et al. 2019). Taken together, these developments meant that the bottom 50% increasingly lost out in relative terms while the middle and the top benefited from increasing capital returns and rising asset prices. As a result, we observe an increase in wealth inequality in Germany since the 1990s, which we analyze in more detail in Section 5.

3.3 Germany in international perspective

How does the evolution of wealth and its concentration in Germany compare to other countries? In this part, we compare our estimates of the evolution of the German wealth-income ratio and the top percentile's share to the corresponding measures in France, Sweden, the United Kingdom, and the United States. Despite Germany's particular history, similarities with other countries do exist.

Figure 6: Germany in international comparison



(a) Wealth-income ratio (b) Top 1% wealth share

Source: Private wealth-income ratios except for Germany are from `WID.world`. Top 1% wealth shares for France are from Piketty et al. (2006) and Garbinti et al. (2021), for Sweden from Roine & Waldenström (2009) and Lundberg & Waldenström (2018), for the United Kingdom from Alvaredo et al. (2018) and for the United States from Saez & Zucman (2016).

Figure 6a demonstrates that all countries in the sample experienced a sharp drop in the private wealth-income ratio between the eve of World War I and 1950. Together with the subsequent recovery, this created a U-shape pattern in various countries (Piketty & Zucman 2014, Waldenström 2017). In 2018, wealth-income ratios stood at 600% in Germany versus 500% in Sweden, 540% in the United States, 580% in France, and 640% in the United Kingdom.

Moving from the wealth-income ratio to wealth concentration, Figure 6b illustrates that the evolution of the top percentile's share in private wealth follows the comparison group closely. All countries start at high levels of wealth concentration, which drop after World War I. The Great Depression affected the top 1% share more in the United States and Germany than in France and the United Kingdom, which is consistent with

our knowledge of the relative depth of the Depression. After the sharp decline following World War II, wealth concentration exhibited a moderate downward or roughly stable trend during the Golden Age in all countries. Subsequently, there is a small to modest increase of wealth concentration since the 1980s observable in the European countries, and a more pronounced one in the United States. While country-specific *levels* of wealth concentration remain debated (see, e.g., Kopczuk 2016, Saez & Zucman 2016, and Smith et al. 2021 for the US), these long-run *trends* seem to be broadly comparable across countries, independent of data and method.[22]

Three factors affect the strong international co-movement. First, fundamental economic mechanisms govern the accumulation and distribution of wealth (see e.g. Piketty 2014). Key parameters such as savings (s), economic growth (g), and return on capital (r) are similar across countries and generate similar inequality patterns for countries at comparable levels of economic development. Second, policy trends and secular developments affect the wealth distribution. These include the expansion of home ownership in Western economies after World War II (Zucman 2019, p. 126) and the gradual reversal of the high-taxation regime and the liberalization of capital markets since the 1980s (Jordà et al. 2019). The third factor are globally correlated economic and policy shocks (see e.g. Roine & Waldenström 2015). Figure 6b points to their relevance in suddenly shifting top 1% shares. The revaluation in equity markets through globally-transmitted crises such as the Great Depression (Temin 1993), heavy capital taxation in the wake of wars (Scheve & Stasavage 2010, 2012), and the ensuing post-war inflations appear to have reduced wealth concentration across countries.

In the next section, we introduce a framework to study factors generating sudden shifts in the wealth distribution and apply it to the German case. Given the similarity of trends and shocks—despite substantial heterogeneity in the individual countries' experiences and policies—we believe that our exercise does not just shed light on the factors behind Germany's wealth inequality ruptures, but that the insights likely apply to other countries as well.

[22] The capitalization method tends to produce higher *levels* of top wealth shares than results from wealth tax data (Lundberg & Waldenström 2018) or from estate tax data (Garbinti et al. 2021, Saez & Zucman 2016). The approach chosen to measure wealth concentration in a given country and at a given point in time is typically presaged by the available data sources, each carrying their own advantages and disadvantages. Wealth tax data, estate tax data, and income tax data are the three main administrative data sources used in the above-cited studies. Studies using wealth tax data are scarce due to the small number of countries taxing wealth on a broadly defined scale. Examples are Roine & Waldenström (2009) for Sweden and this study for Germany. Examples for the estate multiplier method applied to estate tax data are Kopczuk & Saez (2004) for the United States, Piketty et al. (2006) for France, Acciari et al. (2021) for Italy, and Alvaredo et al. (2018) for the United Kingdom. Capitalizing incomes from income tax data is the most recent approach for the long-run study of wealth inequality, revived by Saez & Zucman (2016). Country studies include Garbinti et al. (2021) for France, Martínez-Toledano (2020) for Spain, Lundberg & Waldenström (2018) for Sweden and Saez & Zucman (2016) for the United States.

4 Accounting for large shifts in the wealth distribution

In most developed countries, substantial shifts in the wealth distribution occurred at three moments in time: around World War I, during the Great Depression, and around World War II. These shifts provide historical experiments, that allow us to study the mechanisms behind changes of the wealth distribution. All three events had profound effects on asset prices. Additionally, the wars, World War II in particular, were associated with tax increases and direct effects of war, including a large influx of displaced people and, in many countries, substantial destruction of the capital stock. To gauge the relative importance of these factors, asset prices and taxation in particular, we introduce a general accounting framework adapting Fogel's (1964) seminal work to the study of inequality. We then apply this framework to the German case, in which said three events reduced the top 1% share by more than 20 percentage points.

4.1 Framework

Central to the older approach of Fogel (1964) is the idea to build historically plausible counterfactuals. Fogel himself was interested in the effect of railways on U.S. growth, the counterfactual being a larger canal network and no railways (see Donaldson & Hornbeck 2016, for a description of his methods and a comparison to a modern general equilibrium framework). In a nutshell, Fogel's idea was that the difference between the historically realized national income and a plausible counterfactual development path would allow him to approximate the effects of railways on economic growth. More generally stated, consider the function $f(x)$ that maps a state vector x onto the measure of interest. Let x describe the observed state and x' describe the counterfactual state. Then, γ reflects the difference between the realized state $f(x)$ and the counterfactual state $f(x')$ in such framework.

We adapt this framework to the analysis of top wealth shares. Total wealth W is held by N households, each possessing wealth $w_i, i = 1, ..., N$. $Q(p) = F(w)^{-1}$ is the quantile function, representing the inverse of the empirical cumulative distribution function $F(w)$ and returning the wealth thresholds w_p of percentile p. $S(p) = S\left(\frac{\sum_{i=1}^{N} \mathbf{1}_{w_i<Q(p)}}{N}\right) = 1 - \frac{\sum_{i=1}^{N} w_i \mathbf{1}_{w_i \geq Q(p)}}{W}$ defines percentile p's cumulative wealth share on the Lorenz curve. In practice, historical inequality research faces data limitations in that we only have information about the wealth of N^{TP} taxpaying households, $\{w_j^{TP}\}_{j=1,...,N^{TP}}$, at the top of the distribution. By definition, the households paying a wealth tax are the richest such that applying the indicator function to N^{TP} instead of all N households is a warranted simplification when computing top 1% wealth shares. Equation 3 defines the top share T(.99) accordingly:

$$T(.99) = 1 - S\left(\frac{\sum_{i=1}^{N} \mathbf{1}_{w_i<Q(.99)}}{N}\right) = \frac{\sum_{j=1}^{N^{TP}} w_j^{TP} \cdot \mathbf{1}_{w_j^{TP} \geq Q(.99)}}{W} \tag{3}$$

Equation 3 is a useful representation of the top 1% wealth share when operating in data-scarce historical

settings. It highlights that to calculate a top 1% share it suffices (i) to know the total number of households N, (ii) to know the total net wealth W, and (iii) to have wealth tax data on at least $\frac{N^{TP}}{N} \geq 1\%$ of households. Thus, $T(.99) = f(N, W, \{w_j^{TP}\})$ summarizes the information necessary to estimate the top 1% share.

To estimate the effect γ of an event of interest on the top 1% share, we construct the corresponding counterfactual values N', W', $\{w_j^{TP}\}'$ and estimate the counterfactual top 1% share via $f(N', W', \{w_j^{TP}\}')$. Contrary to Fogel's case, we do not always rely on *ex-post* comparisons. It is often more plausible to shock an existing distribution in t_0 with the event that will occur in t_1. For example, we construct a counterfactual top 1% wealth share in Weimar borders based on 1913 data and compare it to the Empire's top wealth share in 1913 to gauge the importance of the border change caused by World War I. In such *ex-ante* cases, the effect of interest is given as:

$$\gamma^{\text{ex ante}} = f(N', W', \{w_j^{TP}\}') - f(N, W, \{w_j^{TP}\}) \tag{4}$$

In cases in which we construct the counterfactual after the event occurred—for example, when making the wealth taxation after World War II 'undone'—we calculate the event's effect on the top 1 share as:

$$\gamma^{\text{ex post}} = f(N, W, \{w_j^{TP}\}) - f(N', W', \{w_j^{TP}\}') \tag{5}$$

Independent of whether we construct an *ex-ante* or *ex-post* counterfactual, the challenge is to find plausible values for N', W', and $\{w_j^{TP}\}'$. Constructing them for the number of households (N') and aggregate net wealth (W') is typically straightforward. For events such as the influx of expellees at the bottom of the distribution, in which the wealth and ranking of the taxpayers remains unchanged ($\{w_j^{TP}\}' = \{w_j^{TP}\}$), these parameters suffice to construct a counterfactual wealth distribution. Other events, like the Great Depression, lead to diverging asset prices and change the wealth ranking among those paying wealth taxes depending on their portfolio composition ($\{w_j^{TP}\}' \neq \{w_j^{TP}\}$). To model such changes, we expand the tabulated wealth tax data into a household-level dataset by combining two insights and a modest set of assumptions.

First, households at the top of the wealth distribution diversify their portfolios very little in terms of asset classes. For example, rural landowners held almost exclusively agricultural assets and entrepreneurs held business or financial assets (depending on the company's legal status). Second, these types of wealth holders correspond to the asset classification in the tabulated tax data. By assuming that households within a given wealth bracket hold the same net wealth—a simplifying but, given the granularity of the historical German wealth data, uncritical assumption—we can back out the number of each type of wealth holder for each wealth class. After distributing the debt among the rural and urban landowners and the savings equally among all rich households within a given wealth bracket, we arrive at a household dataset. We then shock

the households' portfolios with the respective changes in asset prices to arrive at $\{w_j^{TP}\}'$ (see Data Appendix DA 6.1 for details/validations).

A caveat of our framework is its ignorance of general equilibrium effects. The severity of this omission depends on the specific case in question. For example, there are few reasons to believe that interest rates and investment would have been substantially different in a Germany in the borders of the Federal Republic in 1934 from its actual realization in Weimar borders. However, when analyzing the effect of capital levies after World War II, ignoring general equilibrium effects may be potentially less innocuous. Given the scarcity of capital in the post-war period, the levy surely affected investment levels and, thus, indirectly wealth accumulation and concentration in the later part of the 1950s. The effect we measure, however, only captures the immediate redistributive effects.

4.2 World War I and its aftermath: Revaluing the capital stock

Our first historical experiment is the revaluation of the capital stock during World War I. The war depressed asset prices around the world and led to inflation in most European countries (Kuvshinov & Zimmermann forthcoming, Lopez & Mitchener 2020). These two factors changed the relative prices of assets and, hence, the distribution of wealth. This was no different for Germany, in which the fall of asset prices and the inflation were particularly extreme. On the one hand, the German case allows us to draw out the mechanisms very clearly. On the other, it requires us to first account for the direct consequences of WW I—battlefield deaths, new borders, the in-migration of displaced people—to gauge the relative importance of the wealth stock's revaluation.

Battlefield deaths, borders, and displacement According to official sources, around 1.9 million German soldiers died in World War I. Their death severely impacted household formation during and after the war, leading to a shortfall of about 860,000 single households such that $N' = N - 860,000$. We assume that wealth of fallen soldiers was inherited by family members (young soldiers) or by their widows (richer and older soldiers) such that total wealth and the distribution at the top stayed unaffected ($W' = W$;$\{w_j^{TP}\}' = \{w_j^{TP}\}$). The comparison of the 1913 wealth distribution with and without fallen soldiers suggests that this effect of the war decreased the top 1% share by half of a percentage point (Table 2).

The border changes following the war affected the level and structure of wealth. The lost Eastern provinces had housed a large and rather poor peasantry. Subtracting them and the other lost territories from the respective estimates for the total Empire in 1913, implies a loss of 8.7% of the tax units, but only 5% of aggregate wealth.[23] Analogously, the rich source material allows to create the group of wealth taxpayers

[23] Following the treaty of Versailles, Germany returned the territory of Alsace-Lorraine to France and transferred most of the Prussian provinces of Poznan and East-Prussia to the Second Polish Republic. In the following, we abstract from other smaller border changes (see Data Appendix DA 6.2.1).

Table 2: World War I and the wealth distribution

Event	Sources, details & sensitivity	Shocked variables	Reference year	Most affected part of distribution	Δ Wealth in terms of national income	Δ Wealth in terms of private wealth	Δ Tax units	Δ Top 1% share
Battlefield deaths, borders, and displacement								
Territorial change	DA 6.2.1	N,W,w_j^{TP}	1913	whole	$-24\ pp$	$-5\ pp$	-8.7%	$-0.3\ pp$
Expellees	DA 6.2.2	N, W	1913	bottom	$+1\ pp$	$+0.2\ pp$	$+1.7\%$	$+0.1\ pp$
Fallen soldiers	DA 6.2.3	N	1913	bottom & middle	-	-	-3.5%	$-0.5\ pp$
Revaluation of capital stock								
Asset prices & hyperinflation	DA 6.2.4	W,w_j^{TP}	1913	whole	$-142\ pp$	$-30\ pp$	-	$-2.4\ pp$
Sum of counterfactual partial effects ($\sum \Delta$ Top 1%)								$-3.0\ pp$
Total observed change in top 1% share (1913-1927)								$-4.4\ pp$

($\{w_j^{TP}\}'$) in 1913 in Weimar borders by removing those based in the lost territories. Relative to the baseline scenario—the top 1% share in actual 1913 borders— territorial reorganization reduced the top 1 share by 0.3 percentage points (Table 2). However, the migration of 1.06 million individuals from the former German territories to the Weimar Republic (Oltmer 2013, p. 41), an estimated 380,000 households, partially neutralized the effect of the territorial changes. Adding these households, equipped with wealth amounting to the annual salary of an unskilled laborer, to the bottom of the 1913 wealth distribution in Weimar borders increases the top 1% share by a tenth of a percentage point (Table 2). Taken together, border changes and battlefield death can only explain a small fraction of the observed 4.4 percentage points drop in the top 1% share associated with World War I.

Revaluation of the capital stock The German experience after World War I provides a historical case for studying the potentially large role of sudden revaluations of the capital stock on wealth concentration. The most obvious way in which the war affected relative asset prices was through the hyperinflation that followed it (Holtfrerich 1980). Debt was often paid back with worthless paper mark during the hyperinflation and only reinstated at 20% (Lewinsohn 1926). Savings and non-equity financial assets lost around 85% of their value. Historically less well-appreciated is the diverging price evolution of other assets, which we compare between 1913 and 1927. Real estate prices dropped by 20% due to a mix of regulation and later heavy taxation (Führer 1995). Business and financial equity assets dropped by 57% due to the economic insecurity, lack of investment during the war, and economic turmoil. In contrast, agricultural land prices rose by approximately 15% owing to increasing relative prices of agricultural products (Lewinsohn 1926, p. 165). These asset price developments affected the wealth distribution along an urban-rural divide rather than a class divide. Among the relatively poor, small farmers benefited from higher farm prices, whereas their counterparts in the city, typically tenants, lost their modest savings. While the rural and urban middle class both benefited from the

reduction of their debt, rising farm prices only favored the former. The rising farm prices also benefited the rural rich (farmers) while falling business and financial equity prices shrank urban fortunes. What was the effect of this bifurcation in asset prices on the top 1% share?

The historical evidence shows that there were five types of wealthy households: rural landowners, urban landowners, business owners of listed companies, business owners of non-listed companies, and rentiers (Martin 1913, Bresciani-Turroni 1968). We assume that these groups held all their wealth in the respective assets typical for the type (e.g. rural landowners held agricultural assets), except for some savings, which we assume to be equi-distributed within a wealth class.[24] Expanding the tabulated wealth data to a household-level dataset (as detailed in Section 4.1) allows us to shock households at the top of the distribution that may or may not fall into the top 1% with the price changes discussed above, generating counterfactual wealth holdings for each individual taxpaying household ($\{w_j^{TP}\}'$). Analogously, we apply the price changes to the respective asset types of the wealth total to generate counterfactual total private net wealth W'. Relative to the baseline, our quantification suggests that the diverging asset prices and hyperinflation shrank the top 1% share by 2.4 percentage points. Thus, the inequality-decreasing effects of declining equity and bond prices alongside the eradication of debt dominated the inequality-increasing effects of the eradication of savings. More important than all other effects of the war combined, the revaluation of the asset stock explains about half of the shift in the German wealth concentration associated with World War I (Table 2).

4.3 The Great Depression: Equity price shocks and bankruptcies

Our second historical experiment, the Great Depression, focuses on yet another revaluation of the capital stock. This shock was profoundly different from the one associated with WW I since it was directed towards the richest households' main assets: listed and unlisted business wealth. Indeed, falling equity prices and valuations serve as the main explanation for the sudden decline in wealth concentration around the world associated with the Great Depression (e.g. Kopczuk & Saez 2004, for the U.S.). A second channel through which this economic downturn affected wealth concentration pertains to the survival of firms rather than their market value. Bankruptcies may have been particularly relevant in countries where most firms were closely-held and of personal liability instead of being traded at the stock exchange. Germany's stock market capitalization was relatively low (Kuvshinov & Zimmermann forthcoming).

Bankruptcies The number of joint stock companies decreased by about 21%, the total subscribed nominal capital in such companies by around 7%, and the number of businesses with more than 5 employees by about 22%. Since the bankruptcy shock only pertained to holders of certain asset classes, we impute the household-level dataset from the tabulated data (as detailed in Section 4.1). We let 22% of the owners of

[24] Data Appendix DA 6.2.4 provides further details on the household-level dataset imputation and an out-of-sample validation.

personal-liability firms in each wealth class lose their entire business assets. In addition to this shock to particularly closely-held shares in companies, we also incorporate the effects of bankruptcies of joint stock companies. Instead of dropping from the rich, we assume that the loss of the stock owners corresponded to the volume change in joint stock companies of 16% of their wealth - a compromise estimate between the change in their nominal capital and number. Implementing the shocks to the household portfolio and adjusting total wealth accordingly, we compare the corresponding counterfactual top 1% share to the baseline distribution in 1927. Table 3 shows that business failures were indeed a relevant factor, decreasing the top 1% share by about 2.2 percentage points.

Table 3: The Great Depression and the wealth distribution

Event	Sources, details & sensitivity	Shocked variables	Reference year	Most affected part of distribution	Δ Wealth in terms of national income	Δ Wealth in terms of private wealth	Δ Tax units	Δ Top 1% share
Bankruptcies	DA 6.3.1	W, w_j^{TP}	1927	Upper class	$-14\,pp$	$-6\,pp$	-	$-2.2\,pp$
Asset prices	DA 6.3.2	W, w_j^{TP}	1927	Upper class	$-58\,pp$	$-25\,pp$	-	$-4.9\,pp$
Sum of counterfactual partial effects ($\sum$ Δ Top 1%)								$-7.1\,pp$
Total observed change in top 1% share (1927-1934)								$-7.4\,pp$

Asset prices The fall of the prices in business assets and financial equities was stark relative to that of other assets during the Great Depression. Between 1927 and 1934, stock prices dropped by 51% on average, whereas real estate and farm values fell by 20% and 9%, respectively. German bond prices decreased by a mere 4% and the value of cash and savings remained unchanged. Since business and financial assets were concentrated at the top, the heterogeneity of these asset price changes decreased the top percentile's wealth share. We proceed analogously to the hyperinflation exercise to gauge the extent of this decrease. We impute a household-level dataset containing 5 types of wealth holders for 1927, shock these with the price changes, adjust total wealth accordingly, and calculate the counterfactual top 1% share.

Relative to the baseline distribution in 1927, the top 1% share dropped by almost 5 percentage points, corresponding to about two-thirds of the observed fall between 1927 and 1934 (Table 3). While similarly violent as the hyperinflation, the asset price shock associated with the Great Depression had a much larger impact on the top 1% share. How could this be the case? While the hyperinflation hit the wealth distribution along the rural-urban divide, the Great Depression's asset price shock—with equities dropping most—was firmly biased against the rich. Relative to the effect of equity prices, the role of bankruptcies in moving the top 1% was limited. Since the German case biases towards finding a large role for them—more companies were held in illiquid legal forms than elsewhere—this insight likely carries over to the experience of other countries.

4.4 World War II: Capital destruction, revaluation, and taxation

So far, the quantification exercises ascribe much of the top 1% share's sudden shifts to asset prices. World War II allows us to examine two further factors of varying international importance: the physical destruction of the capital stock and the increase of capital taxation. We also show why revaluation of capital through World War II did not lead to a major shift in the top 1% share, an insight likely carrying over to other countries. Before contrasting the destruction of capital, its revaluation, and taxation, we quantify the role of Germany-specific factors. In particular, we assess the effects of the persecution of the German Jewry, border changes, displacements, and battlefield death.

Persecution of Jews While the economic status of the German Jewry was by no means as elevated as Nazi propaganda wanted people to believe, it would be equally wrong to say that it corresponded to the average of the population (Barkai 1988). Jews were strongly represented in professions of high economic and social status, such as lawyers, doctors, university professors, and managers (Huber et al. forthcoming). Traditionally, they also lived mostly in richer urban areas, in particular in Berlin (Barkai 1988, Chapter 4). Encompassing many forms of expropriation, from extractive taxation in the form of wealth levies to plain private robbery (Ritschl 2020), their persecution likely shifted wealth shares.

Since the means of expropriation were so manifold and in part undocumented, we estimate the stock of wealth of the Germany Jewry in 1934 to assess the distributional impact of the murder and persecution that would follow. Based on rich earlier work (Junz 2002, Fremdling 2016, Ritschl 2020), we reconstruct the number of Jewish German tax units living on territory of the later Federal Republic (0.8% of all households), their wealth (3.1% of net wealth), the share of those not paying taxes and the distribution among taxpayers.[25] We subtract the Jewish German tax units from the overall tax unit population to generate N' and remove Jewish wealth taxpayers to create $\{w_j^{TP}\}'$. To account for the fact that substantial amounts of Jewish wealth ended up in the hands of private households, we subtract only half of our estimate of total Jewish wealth from the observed total net wealth W to approximate W'. Estimating the top 1% share as if all the persecution and murder happened in 1934, our results suggest a reduction of the top 1% wealth share by one percentage point relative to the baseline (Table 4).

Battlefield deaths, borders, and displacement after World War II To assess the impact of these direct effects of the war, we proceed analogously to the corresponding quantifications for World War I (see Table 4 for the corresponding appendices providing the details). First, even though more than twice as many soldiers died on the battlefield as compared to World War I (4.8m according to Overmans 2009, p. 288), the compressing effect on the top 1% share, 0.8 percentage points, was also modest for World War II. Second,

[25] The resulting ratio of wealth and population shares chimes with results based on pre-World War I tax records (Barkai 1988) and reflects historic discrimination and sorting into cities.

Table 4: World War II and the wealth distribution

Event	Sources, details & sensitivity	Shocked variables	Reference year	Most affected part of distribution	Δ Wealth in terms of national income	Δ Wealth in terms of private wealth	Δ Tax units	Δ Top 1% share
Persecution under the Nazi regime								
Persecution of German Jews	DA 6.4.1	N, W, w_j^{TP}	1934	Whole	$-9\ pp$	$-3\ pp$	-0.8%	$-1.0\ pp$
Battlefield deaths, borders, and displacement								
Territorial change	DA 6.4.2	N, W, w_j^{TP}	1934	Whole	$-94\ pp$	$-32\ pp$	-35%	$+0.0\ pp$
Expellees	DA 6.4.3	N, W	1952	Bottom	$+5\ pp$	$+2\ pp$	$+12\%$	$+0.8\ pp$
Fallen soldiers	DA 6.4.4	N	1934	Lower & middle	-	-	-7%	$-0.8\ pp$
Destruction of capital								
Bombing	DA 6.4.5	W, w_j^{TP}	1934	Middle & top	$-47\ pp$	$-17\ pp$	-	$-2.2\ pp$
Asset seizures	DA 6.4.6	W, w_j^{TP}	1934	Top	$-3\ pp$	$-2\ pp$	-	$-0.8\ pp$
Revaluation of capital								
Asset prices & currency reform	DA 6.4.7	W, w_j^{TP}	1934	Bottom & top	†	†	-	$+0.2\ pp$
War and post-war taxation of capital								
War taxation (business)	DA 6.4.8	W, w_j^{TP}	1934	Top	$-2\ pp$	$-1\ pp$	-	$-0.6\ pp$
War levy on real estate	DA 6.4.8	W, w_j^{TP}	1934	Upper middle & top	$-5\ pp$	$-2\ pp$	-	$-0.4\ pp$
Post-war wealth levies	DA 6.4.9	W, w_j^{TP}	1952	Upper middle & top	$-21\ pp$	$-10\ pp$	-	$-3.0\ pp$
Sum of counterfactual partial effects ($\sum$ Δ Top 1%)								$-7.8\ pp$
Total observed change in top 1% share (1934-1952)								$-10.7\ pp$

Notes: †: not reported because of a lack of comparability due to currency reform.

while the lost territories comprised around a third of German private wealth and more than a third of the population, the effect of the territorial reorganization on the top 1% was negligible (0.02 percentage points). This is plausible as the lost territories were a mix of rather rich industrial and rather poor agrarian regions. Third, the new borders led to an influx of displaced people into West Germany and created a large class of propertyless in the new Federal Republic by 1952 (around 12% of all households). Allowing the expellees to have some wealth, we estimate that their arrival increased the top 1% share by 0.8 percentage points. Since the effect of the refugees and that of the fallen soldiers canceled each other out, these direct war effects fail to explain the shift in the wealth distribution during World War II.

Destruction of capital The destruction of capital associated with World War II took two forms in Germany: the physical destruction, in particular through air raids, and the dismantling of war-related industries after the war. What was their effect on the wealth distribution?

Physical war destruction reduced total net private wealth by 17% (Table 4). The first wave of air raids mainly targeted industrial plants and transportation systems, whereas city centers became the main target in the second phase (Brakman et al. 2004, p.204). Hence, most of the destruction pertained to real estate (64%),

followed by business and financial equity (34%), and virtually none to agricultural (2%) assets. To account for the destruction's heterogeneity across asset classes, we impute a household-level dataset of the taxpayers from the wealth tax tabulations. To account for the fact that the bombings did not affect all buildings, we distribute the magnitude of the shock among taxpayers such that the majority of them suffered the destruction while the remainder escaped it altogether.[26] Table 4 shows that, relative to the 1934 wealth distribution in the borders of the Federal Republic, the top 1% share decreased by around 2.2 percentage points. In spite of its large magnitude in terms of total net private wealth, the upper middle class bias of destroyed real estate limited the physical destruction's effect on the top 1% share.

The seizure and dismantling of plants and businesses in war-related industries shortly after the end of the war affected predominantly rich entrepreneurs. Taking the variety of estimates into account (Cornelsen et al. 1974, Abelshauser 1975), we settle on a compromise estimate of around 3.4% of personal liability assets and 8% of corporate assets (amounting to 2% of total net private wealth). The counterfactual is based on the same imputed household dataset used in the previous exercise, in which now those owning business and corporate assets are shocked. W' is observed wealth in 1934 in the borders of the Federal Republic less the total amount of seized assets. Our results suggest that the dismantling of the West German industry reduced the top 1% wealth share by around 0.8 percentage points (Table 4).

Revaluation of capital World War II led to yet another revaluation of the capital stock and, due to the strong inflationary pressures, to a currency reform in 1948. The conversion rates for debt and small savings were 10:1. Like any such reform, it favored those with equity and mortgages and hit those with savings the most (Wiegand 1992). Prices increased heavily for agricultural assets and considerably for real estate. However, contrary to the price developments during World War I and its aftermath, financial and business equity prices dropped much less (-20% vs. -56%). This can be partly explained by the relatively low level of equity prices in 1934, in which the losses from the Great Depression had not yet been recovered. Hence, the direction of the effect on the top 1% share is not *a priori* clear. It depends on whether or not the positive wealth effects for the house-owning upper middle class relative to the entrepreneurs at the top of the distribution outweighed the eradication of wealth in the lower middle and lower classes.

We proceed analogously to the hyperinflation counterfactual and find that revaluation of wealth associated with World War II actually increased the top 1% share by 0.2 percentage points. Unlike in the cases of the hyperinflation and World War I, the inequality-increasing effect of the loss of savings dominates the positive effects for the middle class. Since low pre-war equity prices were not a distinctly German phenomenon (for long-run real US stock prices, see Shiller 2000), one might expect that the role of capital revaluation for

[26] Data Appendix DA 6.4.5 reports all historical sources, other minor assumptions that we employ to construct the counterfactual parameters W' and $\{w_j^{TP}\}'$, as well as sensitivity checks for the results.

shifting top 1% shares in the wake of World War II was similarly limited in other countries.

War and post-war taxation of capital Across and within countries, the means of capital taxation during and after the war were manifold. Germany was no different. During the war, the Nazi regime taxed profits excessively and also instituted a levy on homeowners. After the war, the German government implemented a substantial general wealth levy. Clearly these instruments of capital taxation hit different parts of the distribution. What were their respective effects on the top 1% share?

Through higher corporate tax rates, special war excess taxation, and by changing accounting rules, the Nazi regime substantially increased the tax burden for businesses, extracting up to 80% of the profits (see Banken 2018). At the same time, companies continued to pay the wealth tax. We estimate the corresponding wealth reduction to amount to 0.6% of net private wealth. The second type of extractive taxation was a one-time levy on owners of real estate. House owners had paid the *Hauszinssteuer* ever since the hyperinflation, a tax aiming at undoing some of their windfall gains due to the eradication of the debts (Führer 1995). The Nazis forced a one-time 'redemption' at January 1, 1943 by asking for 10 times the annual amount. In 1934 terms, this transfer amounted to 2.2% of net private wealth. To gauge the effect of these taxes on the top 1% share, we impute a household-level data set as for the previous exercises. We shock total wealth and the portfolios of holders of the respective type of wealth with the taxes. Combined, the two types of extractive Nazi taxation reduced the top 1% share by about one percentage point (Table 4). Even though the change in net private wealth associated with the real estate levy was four times as large, the war taxation on businesses did more to reduce the top 1% shares since it hit the top rather than the middle of the distribution.

The most substantial capital taxation was instituted after the war. It encapsulated a series of smaller emergency levies and a substantial levy in 1952, all of which are typically subsumed under the label *Lastenausgleich* (see Wiegand 1992, for a detailed overview). The name of this legislation – the "equalization of burdens act" – captures the spirit of this policy quite well. On the expenditure side, refugees and West-Germans whose assets were destroyed in the war received partial compensation for their lost assets and other benefits. On the income side, the *Lastenausgleich* taxed those whose fortunes either survived or increased during the war, for instance, through the eradication of debts due to the currency reform in 1948. A small allowance aside,[27] the main wealth levy constituted a quasi-flat 50% tax on the net wealth of households and companies as assessed in 1948. Despite its historical and economic significance, the effects of this substantial wealth taxation on wealth concentration have never been systematically analyzed (Frick et al. 2010, p.22).

What made such substantial taxation both economically and politically feasible was its particular de-

[27] The allowance of 5,000 Marks, roughly corresponding to the average annual gross income of industrial workers in 1955 (Statistisches Bundesamt 1956), was made for those households owning less than 25,000 Marks. See §29 Gesetz über den Lastenausgleich, 14. August 1952. The allowance for companies was 3,000 Marks. It is estimated that a total of 1.5 million taxable subjects (households and companies) paid the levy (Wiegand 1992, p. 167).

sign. Instead of paying the full amount in 1952, households and companies made quarterly amortization payments including interest through 1979.[28] This *modus operandi* made the levy bearable for those paying it and allows us, virtually without assumptions, to assess the impact of the levy on the most wealthy. From the accounting perspective of the households paying the *Lastenausgleich*, future payments became a debt in 1952. These were deductible from the general wealth tax in 1953 and reported in the tax tabulations. By undoing the deduction and distributing the amounts of the smaller levies and the levy on businesses, we generate the counterfactual net wealth among wealth tax payers $\{w_j^{TP}\}'$ and estimate counterfactual net private household wealth W' accordingly. Our estimate suggests that the postwar wealth levies reduced the top 1% wealth share by about 3 percentage points.

Summing up, World War II caused the largest break in the German wealth distribution. We show that the taxation of capital during and after the war as well as war destruction reduced the share of wealth held at the very top.

4.5 Unification in 1990

The final historical experiment remains of considerable importance for contemporary German society. In 1990, the unification of East and West Germany amalgamated a socialist and a capitalist economy, thus combining two distinct wealth distributions. The long-run top 1% trend for Germany does not reveal a significant break—the top 1% share increases by 0.8 percentage points between 1989 and 1993 (see Figure 5). In the following, we evaluate the unification effect contrasting the East and West German wealth distribution recorded in EVS in 1993, which is the first available data on the East German wealth distribution.

Table 5: Unification and the wealth distribution

Event	Sources, details & sensitivity	Shocked variables	Reference year	Most affected part of distribution	Δ Wealth in terms of national income	Δ Wealth in terms of private wealth	Δ Tax units	Δ Top 1% share
Unifying East and West Germany		W, N, w_j^{TP}	1993	Whole	+30 *pp*	+8 *pp*	+27%	+2.0 *pp*
Total observed change in top 1% share (1989-1993)								+0.8 *pp*

Unification increased total wealth of German households by 8% (see Table 5). East German households had accumulated several forms of private wealth during the years of the GDR: savings deposits, single-family houses, and small craft workshops.[29] As consumption opportunities were restricted, the savings rate of East

[28] The combined annual payment amounted to 4-6% of the initial amount of 1948, depending on the asset type (Albers 1989, p. 288). It gave the levy the character of a wealth tax on the initially assessed net wealth in 1948 and implied that it could be paid from the returns to private wealth rather than its substance.

[29] Firms with more than ten employees were socialized in 1972, limiting private business ownership to small craft workshops (Solga 1995).

German households was actually comparatively high.[30] The return on savings deposits was fixed at 3.25% in 1971 and remained unchanged thereafter (Deutscher Bundestag 1995). The socialist regime pursued the aim to completely socialize housing and inhibited ownership of apartments in apartment buildings. Land was socialized in 1961. Yet, many buildings remained in private ownership, particularly single-family houses. In 1990, the government owned 58% of housing, private households owned 42%, and the home-ownership rate stood at ca. 25% (Deutscher Bundestag 1995).

As the overall German population increased, ca. 75,000 West German households moved up in the joint wealth distribution into the enlarged top 1% group. These West German households were much richer than their Eastern counterparts entering the bottom 99%, leading to a 20% increase of total wealth held by the top percentile (see Figure A.4 for an illustration). Meanwhile, unification increased total wealth of all German households only by 8%. In consequence, the top 1% share increased by 10% or two percentage points in unified relative to West Germany (23% vs. 21%, see Table 5).

5 Wealth dynamics since unification: 1990-2018

In 1990, East and West Germany was unified merging a socialist and a capitalist economy. From this point onwards, household survey data allow us to study the wealth distribution across the population in unified Germany in more detail.[31] We will start the next section with the evolution of wealth inequality and wealth growth across the entire German population from the 1990s to 2018. We then look at wealth growth in East and West Germany separately. Finally, we quantify the role of asset prices and savings for wealth growth for the bottom, middle, and top of the wealth distribution.

5.1 Wealth and wealth growth across the distribution

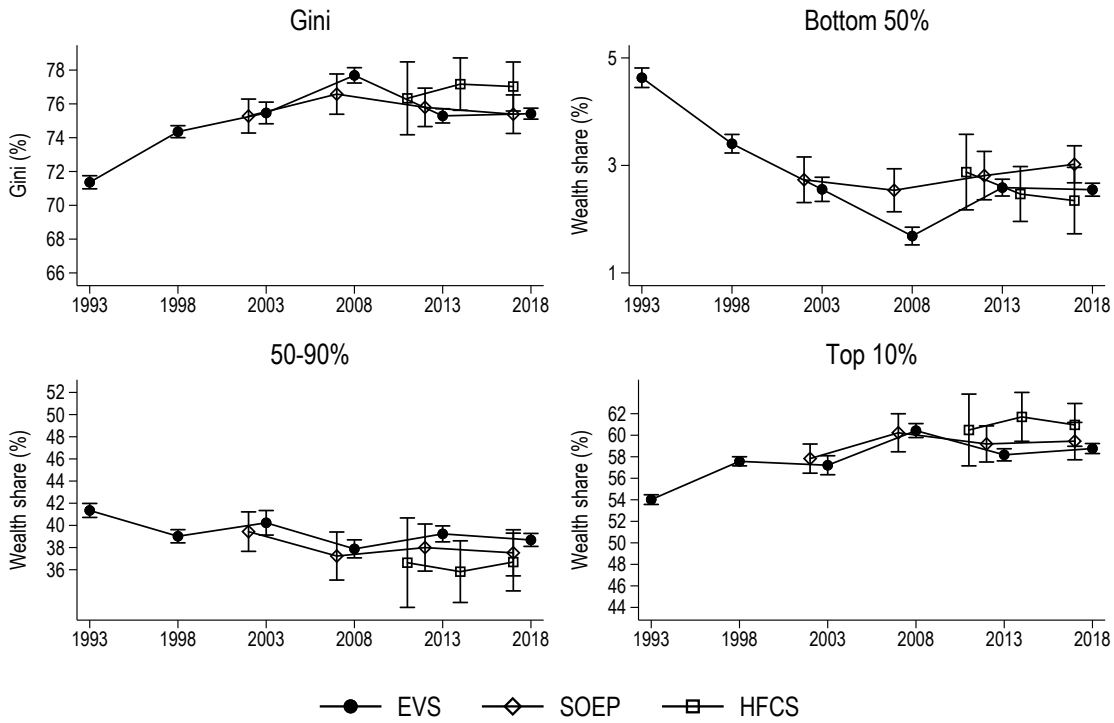
Figure 7 contrasts wealth inequality measures from EVS, SOEP, and HFCS survey data, which we top-corrected and uprated to macroeconomic aggregates according to our procedures outlined in Section 2.3. It shows the Gini coefficient as well as the wealth share of the bottom 50%, the middle 40%, and the top 10%. Wealth inequality increased between 1993 and 2008 and then slightly decreased. The increase in the 1990s corroborates the results in Fuchs-Schündeln et al. (2010), who also use EVS data. The decline after 2010, coinciding with rising house prices, is also documented by SOEP and HFCS data (Grabka & Halbmeier 2019;

[30] The East/West German average wealth-ratio was higher for savings than for total average wealth: In 1993, the overall average wealth in East Germany was roughly one-third of West German average wealth. Average savings deposits in East Germany in 1993 amounted to two-thirds of the West German average.

[31] Note that the German wealth tax was abolished in 1995 and never expanded to East Germany after unification. Like Bach et al. (2019), we use the documentation of the wealth of the 1,000 richest Germans prepared by *Manager Magazin* to account for wealth at the very top of the German distribution. At the same time, substantial data challenges remain with respect to aggregate wealth data. In particular, business wealth and real estate wealth that together constitute more than 60% of household wealth are underestimated in the official Household Balance Sheets (see Section 2.1). Thus, we show our improved estimates.

also see Figure 7).[32] Between 1993 and 2018, the Gini coefficient increased from 71% to 75% and the wealth share of the top decile increased from 54% to 59%. On the other hand, the bottom 50% of the distribution increasingly fell behind with respect to wealth. Their share in total German wealth fell by nearly half from more than 5% in 1993 to below 3% in 2018. In other words, the bottom 50% own an even smaller share of total wealth than they did 25 years ago.

Figure 7: Measures of wealth inequality by survey, 1993-2018



Source: EVS-TU, HFCS-TU and SOEP-TU.
Notes: Revised Household Balance Sheets according to our preferred estimates, i.e., capitalized business incomes from corporate and income tax data and price-adjusted real estate.

Overall, we find that the level of wealth inequality measured with EVS and SOEP is similar, but slightly lower than in the HFCS (see Figure 7). Recall that we add business wealth to EVS data assuming the distribution recorded in SOEP data. Hence, our study is the first to produce inequality estimates based on EVS that are indeed comparable to SOEP and HFCS data. Our inequality results are somewhat lower than those from two other studies that correct top wealth (Vermeulen 2018, Bach et al. 2019). These replace surveyed wealth with Pareto-imputed wealth, but do not uprate their top-corrected survey data to macroeconomic aggregates. Both obtain a top percentile's wealth share of more than 30% for 2011, while our estimate based on EVS is about 28% for 2008 and 26% for 2013 and our estimate based on HFCS for 2011 is 28%.

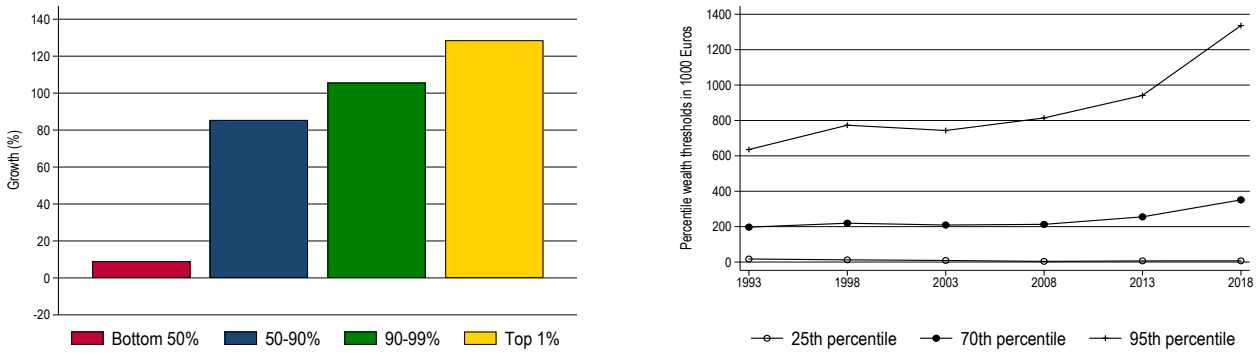
German wealth has grown by 8.8 trillion Euros since 1993. How were these gains distributed across dif-

[32] The decline in HFCS top wealth shares between 2014 and 2017 in HFCS data seems to be a measurement problem of the HFCS data rather than an economic result. According to (Deutsche Bundesbank 2019, p. 23): "In the wave 2017 it appears, in particular, that business assets in the top tail of the distribution were under-recorded. In addition, fewer very wealthy households participated in the survey compared with the survey waves in 2010 and 2014."

ferent parts of the population? Looking at the distribution of growth offers a different perspective on wealth inequality because relative inequality measures like the Gini depend strongly on changes within the richer half of German households owning sizable wealth. A case in point are recent studies on global inequality, which highlight differential growth rates across the global income distribution.[33] While relative inequality has been the more prominent concept in applied work by economists, it is absolute inequality that many people see in their daily lives and that motivates their concerns about distributive justice (Ravallion et al. 2004, p.23).

Indeed, standard measures of relative wealth inequality do not show much of a change between 1993 and 2018. This is because the wealth gains of the top 10% from rising business equity and the wealth gains of the middle class from rising housing markets were of equal size. While the first effect increased wealth inequality until 2008, the second effect decreased wealth inequality through 2018 (see Figure 7). However, top wealth shares and Gini are silent about the fact that half of the population did not benefit from the overall wealth growth, while the upper half nearly doubled their wealth.

Figure 8: Wealth growth by group, 1993-2018



(a) Average wealth growth, 1993-2018

(b) Percentile thresholds

Source: EVS-TU.

Since unification, average wealth nearly doubled for the 50-90% and more than doubled for the top 10%, while average wealth remained nearly stable for the bottom 50% (see Figure 8a).[34] These trends are mirrored in the trajectory of median wealth for the different groups displayed in Figure 8b. The median wealth of the 50-90% (70th percentile) increased from about 200,000 Euros in 1993 to almost 400,000 Euros in 2018. Median wealth of the top 10% (95th percentile) increased from about 600,000 Euros in 1993 to almost 1.4 Mio. Euros in 2018. The overall pattern of small wealth growth for the bottom half and substantial

[33] Among the most prominent of them is the work by Lakner & Milanovic (2016): Their *elephant curve* points at the enormous income gains at the top of the global income distribution.

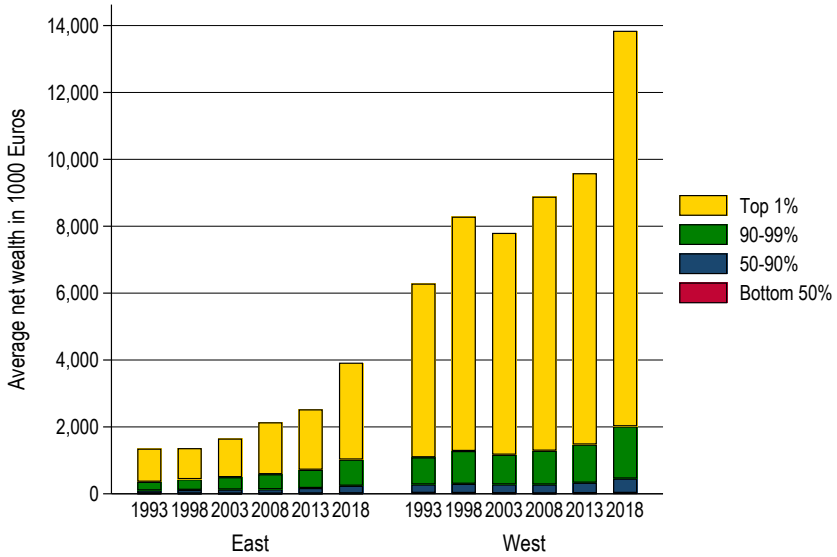
[34] It is often argued that the bottom 50% mostly consists of young people who eventually move up the wealth distribution accumulating wealth over the lifecycle. Appendix Figure A.8 shows that this is not the case for Germany: In the bottom half of the wealth distribution, roughly one half is older than 50 years, almost one third is older than 60 years. Only one in five household heads in the bottom half is less than 30 years old.

wealth growth for the upper half is robust to the general trend of decreasing household size and aging in Germany.[35]

5.2 Wealth growth in East and West Germany

Almost three decades after unification, large discrepancies between East and West Germany persist. In 2018, average household wealth in West Germany amounts to almost 450,000 Euros, and in East Germany to 200,000 Euros. This means that the average household in West Germany is more than twice as rich as the average East German household. Grabka & Halbmeier (2019) come to similar conclusions analyzing individual wealth.

Figure 9: Wealth growth of the bottom, middle and top by region, 1993-2018



Source: EVS-TU.
Notes: Average net wealth in 2015 Euros by wealth group. Wealth groups conditional on region of the household.

Large wealth discrepancies between East and West Germany persist despite higher growth rates in East Germany over a period of 25 years. Figure 9 shows average wealth growth of the bottom 50%, 50-90%, 90-99% and top 1% in East and West Germany. The richest percentile of East German households increased their average wealth from one to three million Euros or 200%, while the West German top percentile increased their average wealth from five million to twelve million Euros, approximately 130%. The upper class (90-99%) in East Germany increased their average wealth from 260,000 to 780,000 Euros or 200%, while the West German upper class increased their average wealth from 810,000 to 1.6 million Euros, approximately

[35] In order to isolate the effects of smaller households and aging, we employ the reweighting method suggested by DiNardo et al. (1996) and create a counterfactual distribution in 2018 with the household size and age distribution of 1993. The resulting difference in growth rates is displayed in Figure A.10. If the distribution of household size and age had remained stable since 1993, we would have observed slightly higher wealth growth for the middle class and, even more so, for the bottom 50%. Yet, the overall picture of highly unequal wealth growth remains unchanged. See Data Appendix Section DA 4.7 for details on the implementation of the method.

by 90%. Middle class (50-90%) average wealth in East Germany grew from 90,000 to 230,000, or 160%, while middle class wealth in West Germany grew from 250,000 to 430,000 Euros, about 70%.

The bottom 50% experienced near zero growth rates, both in East and West Germany. The small positive growth in all of Germany shown in Figure 8 was driven by East German households that are over-represented at the bottom of the German wealth distribution. When we analyze the East and West German wealth distribution separately, we see that the bottom half of the West German wealth distribution even experienced a small wealth loss in real terms, i.e., a negative growth rate. The bottom half's average wealth in East Germany stagnated at about 12,000 Euros, while it declined from 25,000 to 24,000 Euros in West Germany. Overall, however, differential growth across wealth groups implies a much stronger wealth polarization in the East since unification than in the West.

Differences in portfolios and investment behavior between East and West German households explain much of the persistent wealth differences between East and West Germany. Savings deposits and other financial assets like life insurances remain the dominant asset type for East German households and account for a substantial part of wealth growth in East Germany between 1993 and 2018 (see Appendix Figure A.5). This applies to the middle class, upper class, and the top percentile in East Germany alike. Housing wealth is still scarcer in East Germany than in West Germany even though relative growth of housing wealth was much higher in the East (see Appendix Figure A.5). This means that East Germans are less likely to benefit from increased house prices. The business asset portfolio share of the East German top decile is smaller and the growth rate is smaller (see Appendix Figure A.5). As a result, the East German top decile gains less from rising equity prices than its West German counterpart.

5.3 Capital gains vs. savings

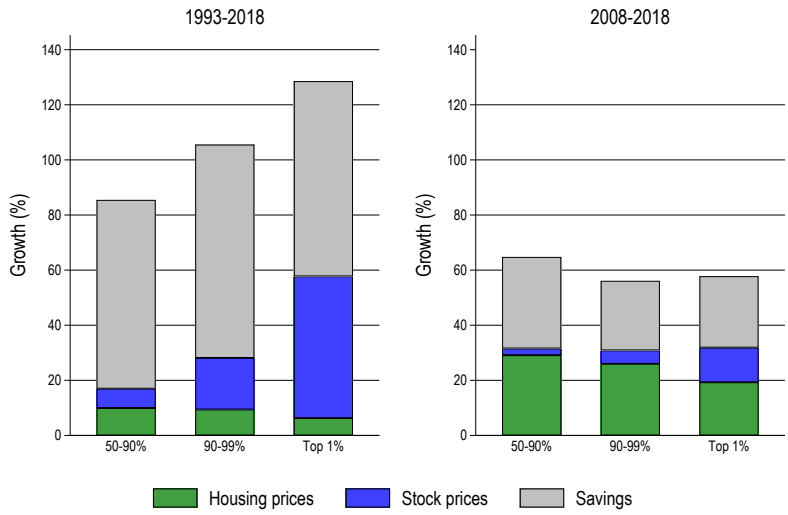
We now look at the role of asset prices and savings for wealth growth over the past 25 years and at the distribution of these gains. Capital gains create differential wealth growth, because portfolios systematically and persistently differ across the wealth distribution. The bottom 50% is mostly invested in savings deposits and other financial assets such as life insurances. Housing represents the most important asset for the German middle class (50-90%) and upper middle class with a portfolio share of almost 60% or 55%, respectively. Business assets become the dominating asset class when moving to the top percentile of the German wealth distribution and represent 50% of its wealth. Note that only 7% are held as shares in public liability companies, while the remainder is held as private liability companies, quasi-corporate, and non-corporate businesses (see Appendix Figure A.7).

What share of the wealth accumulation of the above groups is explained by rising asset prices over the past 25 years? For this exercise, we decompose wealth accumulation over time using the law of motion adapted from Saez & Zucman (2016) and Kuhn et al. (2020) and then compute the contribution of capital

gains from asset price changes (see Data Appendix DA 4.6 for a detailed description of the method). Savings flows and capital gains are "synthetic" as we assume that households stay in their wealth group. Household panel data, like the SOEP, show that German households are very likely to stay in one of the three wealth groups, bottom 50%, middle class (50-90%), or top 10%.[36]

Figure 10 shows the contribution of asset price changes to wealth growth by wealth group. The left-hand graph covers the full period from 1993 and 2018 and the right-hand graph zooms into the period from 2008 and 2018, when Germany saw a rapid increase in house prices. House prices started to increase in 2010 after having declined in real terms for almost two decades. Between 2008 and 2018, house prices increased by 50%. We refrain from showing the bottom 50%, because their near zero wealth growth is largely explained by decreased savings deposits and smaller consumer debt. Three results are worth noting.

Figure 10: Wealth growth from asset price changes, 1993-2018 and 2008-2018



Source: EVS-TU.
Notes: Growth from housing prices and stock prices computed using Bulwiengesa house price index and CDAX performance index following Equation 18. Grey shaded areas are synthetic savings.

First, rising equity prices account for most of top wealth gains between 1993 and 2018 (see left-hand graph of Figure 10). Wealth of the top percentile increased by 130% over this period. Almost 60% can be explained by rising equity prices. Stock prices of firms listed in the CDAX sharply increased in the second half of the 1990s. Between 1990 and 2018, stock prices increased almost fourfold in real terms. Capital gains from equity are of minor importance for the middle class as they rather invest their savings in deposits and other financial assets like life insurances, which do not generate capital gains.[37] Second, the middle class benefited

[36] For example, from those in the bottom 50%, 80% remained in this group after five years and 68% after 15 years, according to SOEP data. See Appendix Table A.2 for a wealth mobility matrix.

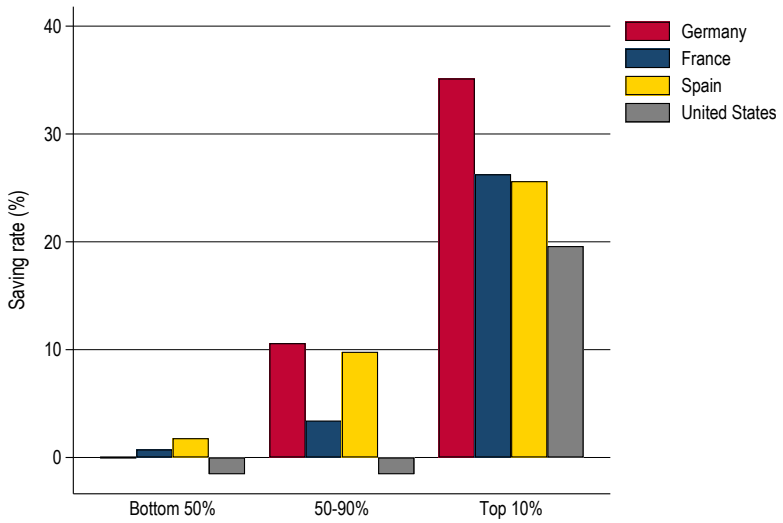
[37] As the German Bundesbank (Deutsche Bundesbank 2019, p.14) notes, German households show a strong preference for liquid and low-risk assets, which is reflected by significant inflows into savings deposits and cash as well as into claims against insurers and pension funds. For example, in 2018, 213 bn Euros held in cash by private households compared to 311 bn Euros held

more from rising house prices between 2008 and 2018 than top wealth holders, contributing almost half of middle class wealth growth between 2008 and 2018 (right-hand graph of Figure 10).

Third, high saving rates of the middle class moderated wealth inequality in Germany. As shown by the grey-shaded areas in Figure 10, more than two-thirds of middle class wealth growth between 1993 and 2018 is from savings. Thus, the middle class compensated smaller capital gains from the lack of business investments with higher savings. Between 2008 and 2018, wealth growth rates are similar across wealth groups and the level of wealth inequality remains stable. However, middle class savings could not match the large equity gains of the top during the 1990s, meaning that wealth inequality increased during the 1990s. Given that West German households are more invested in housing and equity, they gained more from rising asset prices than their East German counterparts (see Appendix Figure A.6). Fuchs-Schündeln (2008) also documents exceptionally high financial saving rates in East Germany in the 1990s, which converged with the West German average toward the end of the 1990s.

The degree of saving rates heterogeneity across wealth levels is identified as a key factor for wealth inequality dynamics (Saez & Zucman 2016, Benhabib et al. 2019): the higher the relative saving rate at the top, the more skewed is the wealth distribution. Figure 11 contrasts saving rates by wealth group for France, Germany, Spain, and the United States, demonstrating that the saving rate of the German middle class is high in international comparison. While the German and Spanish middle class (50-90%) save 10% of disposable income, the French middle class (50-90%) saves about 3%, and the US middle class saves virtually nothing.

Figure 11: Saving rates by wealth group in international comparison



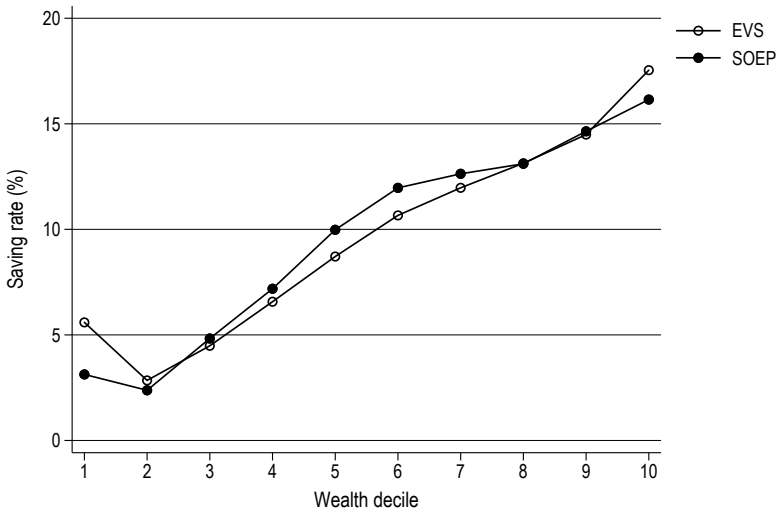
Source: Garbinti et al. (2021) for France, Martínez-Toledano (2020) for Spain and Saez & Zucman (2016) for the United States.
Note: Average saving rates since 1990.

To further illustrate the importance of middle class savings for the stabilization of the German wealth

in listed shares. Even against the background of low interest rates since 2014, shares and investment shares have only gradually gained importance.

distribution, we compute counterfactual changes in the wealth share assuming German wealth groups would have saved like their US counterparts. More precisely, our US counterfactual simulates that the middle class (50-90%) would have saved nothing, the 90-99% only half of what they did, and the top 1% more than 30% (what they did in both Germany and the US). Appendix Figure A.9 shows that the wealth share of the 50-90% would have declined by almost 8pp., the 90-99% would have gained about 2pp., and the top 1% would have gained 6 percentage points. Strong savings by the middle class turns out as an important factor for keeping wealth concentration in Germany in check.

Figure 12: Saving rates by wealth decile based on surveyed savings



Source: EVS and SOEP.
Notes: Saving rates are defined as annual savings relative to annual disposable income as recorded in EVS 2013 and SOEP 2012 scaled to the national net saving rate. Using EVS, savings are computed as the difference between a household's disposable income and its consumption. Using SOEP, savings are taken from the question asking for the amount of monthly savings plus mortgage repayment.

Do saving rates in Germany increase with wealth? The results from the studies displayed in Figure 11 clearly confirm such a pattern.[38] By contrast, Fagereng et al. (2019) show that saving rates in Norway are flat across the wealth distribution and that capital gains drive wealth inequality dynamics. Note that saving rates shown in Figure 11 are based on the law of motion adapted from Saez & Zucman (2016), where savings are computed as a residual. To shed light on this controversy, we assess the saving rate in Germany in two complementary ways: First, we use active savings regularly recorded by the SOEP questionnaire. Second, we use EVS information on consumption and disposable income to calculate savings. Figure 12, presenting saving rates by wealth decile based on SOEP and EVS, shows that the heterogeneity of saving rates in Figure 11 is well in line with saving rates recorded by survey data: The bottom three deciles save between 5% and 10% of their disposable income. The saving rate then quite steadily increases and reaches 15-20% for the top decile. It is an

[38] Mian et al. (2021) show increasing saving rates with income using SCF-data and demonstrate that heterogeneity in saving rates together with increasing top income shares exerted downward pressure on the natural rate of interest. Bach et al. (2018, Table 1) show that the saving rate in Sweden, defined as saving from labor income divided by net worth, is a decreasing function of net worth on average. As the above cited studies, including this paper, divide savings by disposable income, their results are not comparable.

open question for future research to what extent cross-country differences in saving rate heterogeneity are related to country-specific features of the income distribution, investment behavior, and industry structure.

The recent increase of wealth inequality in unified Germany is moderate in historical comparison, but driven by the same factor as the major shifts in the first half of the 20th century: asset prices. Capital gains from rising equity valuations for top wealth holders were counterbalanced by large middle-class capital gains from housing. Taken together with their strong savings, the middle class could keep up with the rich such that the gap between these two groups increased only moderately. Yet, the gap between the top and the bottom half widened substantially. On the one hand, the bottom half's portfolios consisting of deposits and life insurances were largely by-passed by rising asset prices. On the other hand, the large differences in savings across the wealth distribution (both relatively to income and in absolute terms) compress bottom wealth and lift up middle-class wealth in Germany. Given the heterogeneity of portfolios and saving rates, we might expect wealth inequality to further expand in Germany.

6 Conclusion

By drawing on a wide range of data, this study provides the first comprehensive analysis of the evolution of wealth and its distribution in Germany from 1895 to 2018. Taking a long-run perspective is important for two reasons. First, the historical perspective allows us to gauge the significance and size of much-debated changes in the distribution of wealth in recent decades. Second, studying the movements in wealth inequality in the past leads to a better understanding of the factors driving the wealth distribution today.

A central insight is that in Germany, as in other countries, changes in the valuation of existing assets played a major role for changes in the wealth distribution over extended periods. Household portfolios differ across the distribution such that relative price changes in equity and real estate markets revalue the entire stock of assets, thereby affecting the overall wealth distribution in quantitatively important ways. The equalizing collapse of business valuations during the Great Depression is a case in point, as is the recent real estate boom that lifted the fortunes of house owners.

German history also offers important insights on how policies can affect the wealth distribution. In particular, the substantial wealth tax associated with the "Lastenausgleich" after World War II played a large role in equalizing the wealth distribution. With the "Lastenausgleich," Germany became one of the most equal countries before her post-war economic miracle took off. For the past 70 years, the top 1% wealth share has fluctuated around its postwar level. Since unification, the concentration of wealth at the very top has risen only moderately. The main reason for the stability is that the middle-class made substantial gains in real estate wealth, thus mitigating concentration at the very top. However, a substantial part of the population does not own assets, and, hence, did not profit from rising stock or house prices altogether.

Between 1993 and 2018, the gap between the "haves" and the "have-nots" has widened significantly. In the lower half of the distribution, wealth has barely grown at all while both the top 10% and the 50-90% of households roughly doubled their wealth. As a consequence, a household in the top 10% of the wealth distribution is now 100 times richer, on average, than a household in the bottom half. 25 years ago, the gap was 50 times.

Finally, our study highlights the importance of high quality data to study trends in the distribution of wealth (and income). Germany lags behind in the quality of micro data and with respect to plausible estimates of aggregate household wealth. The improved estimates of business and housing wealth that we present in this paper result in a wealth-income ratio that is 120 percentage points higher than when estimated with the official data. Germany is considerably richer than official statistics show.

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A Appendix Tables & Figures

A.1 Tables

Table A.1: Wealth thresholds in surveys and the MM-list 2017/2018

Quantile	SOEP	HFCS	EVS	MM-list
		Unadjusted		
P 50	60,000	62,300	46,126	
P 90	455,000	550,500	444,589	
P 95	681,300	862,700	647,081	
P 99	1.6 Mio.	2.4 Mio.	1.3 Mio.	
P 99.9	5 Mio	7 Mio.	2.9 Mio.	
P 99.99	13 Mio.	12 Mio.	5.5 Mio.	100 Mio.
		Uprated and top-corrected		
P 50	132,174	113,289	129,697	
P 90	788,260	865,419	946,431	
P 95	1.2 Mio.	1.3 Mio.	1.5 Mio	
P 99	3 Mio.	3.7 Mio.	4 Mio.	
P 99.9	13 Mio.	10 Mio.	8 Mio.	
P 99.99	88 Mio.	90 Mio.	90 Mio.	100 Mio.

Note: SOEP data from 2017, EVS data from 2018, HFCS data from 2017. Current Euros.

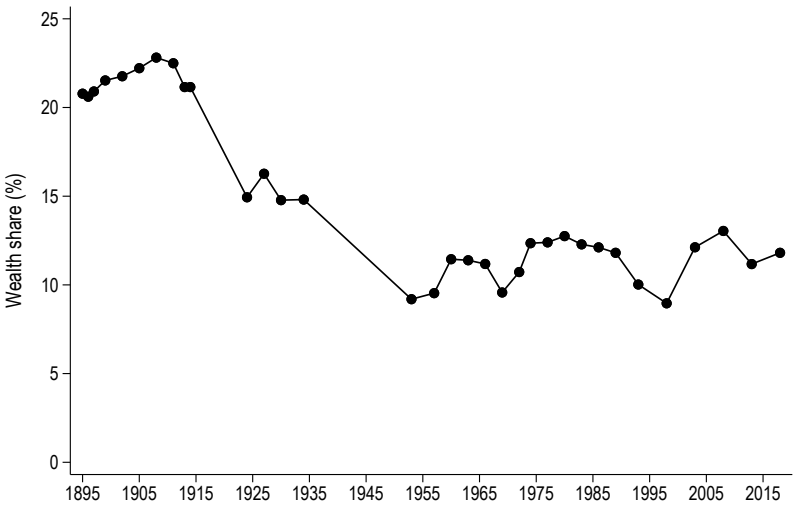
Table A.2: Wealth transition matrix

	after 5 years			after 10 years			after 15 years		
	B 50%	50-90%	T 10%	B 50%	50-90%	T 10%	B 50%	50-90%	T 10%
Bottom 50%	79	21	1	75	24	1	68	30	2
50-90%	18	74	8	22	69	9	26	66	9
Top 10%	3	32	65	4	35	61	6	38	56

Source: SOEP-TU.
Note: Wealth group changes in % with respect to wealth group in 2002.

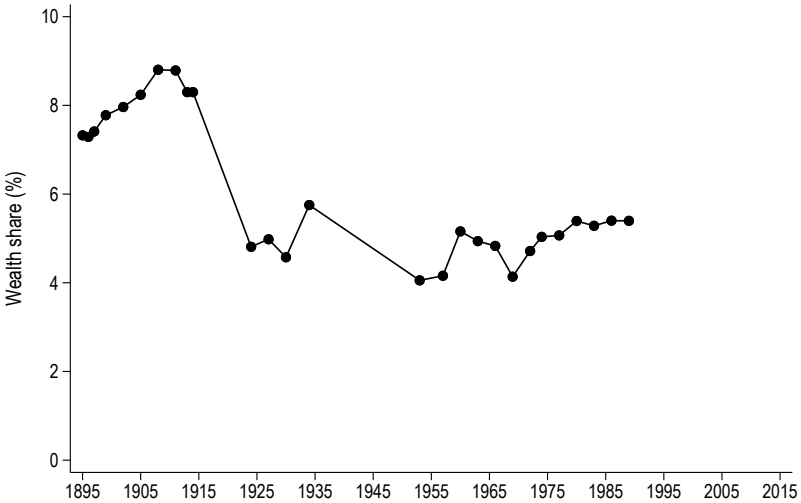
A.2 Figures

Figure A.1: Top 0.1% wealth share in Germany, 1895-2018



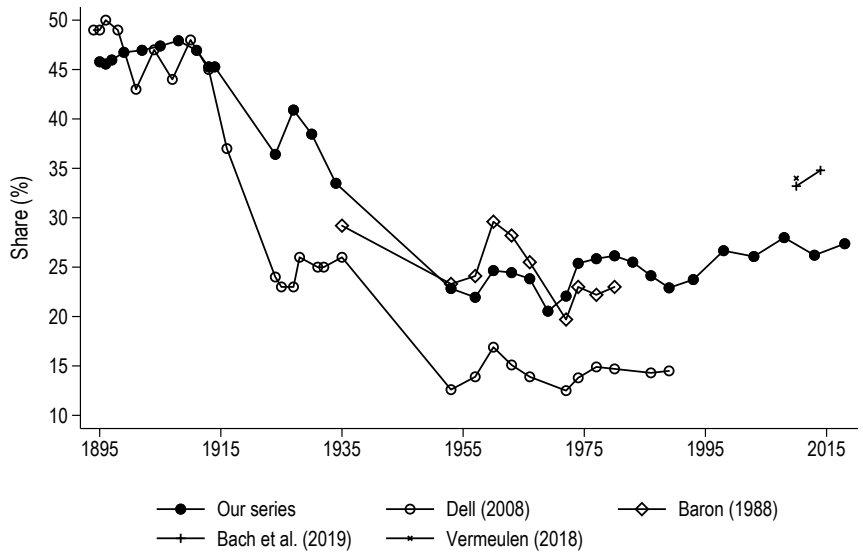
Notes: Own estimates based on wealth tax until 1989, EVS-TU 1993-2018.

Figure A.2: Top 0.01% wealth share in Germany, 1895-1989



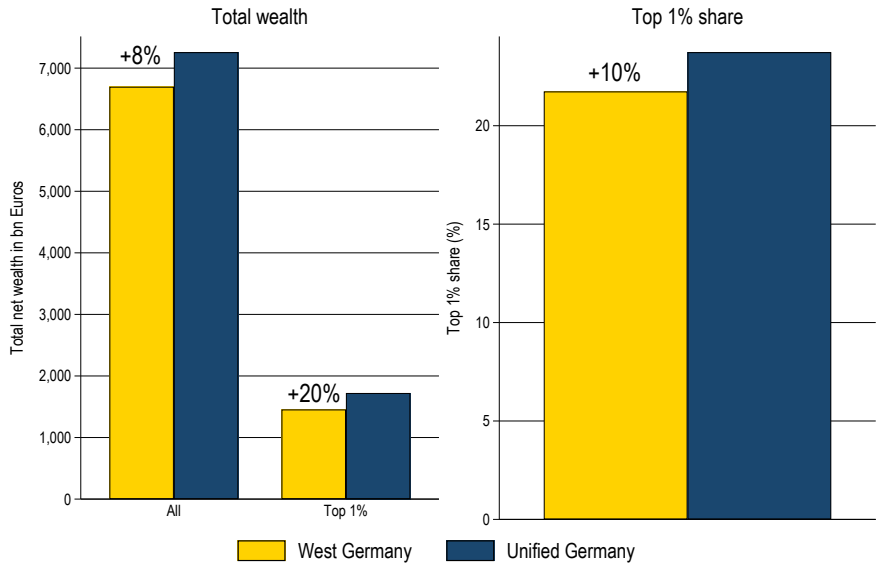
Notes: Own estimates based on wealth tax until 1989. Given the data insecurity surrounding top 0.01% wealth since the abolition of the wealth tax, we do not display the top 0.01% wealth share based on EVS-TU 1993-2018.

Figure A.3: Comparison with previous top 1% wealth share series



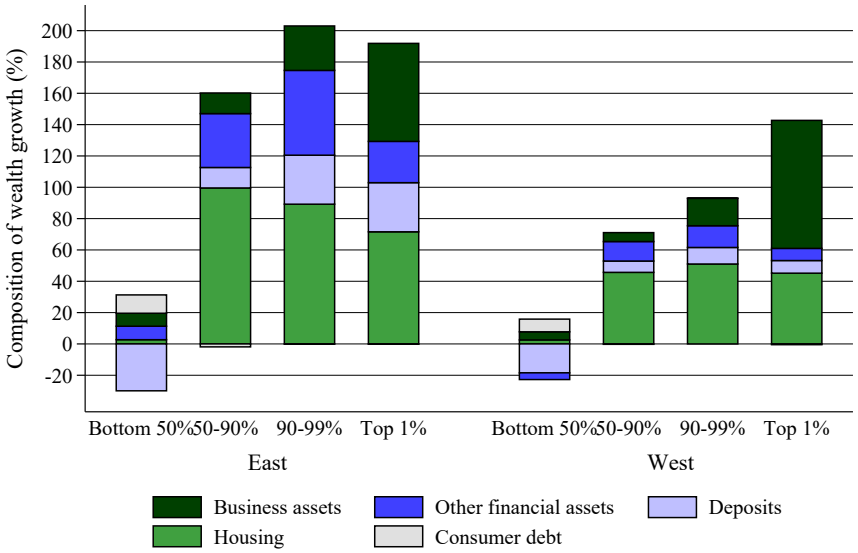
Sources: Baron (1988, Tables 40-49) and Dell (2008, Figure II-29, Figure III-34 and Table IV-21).

Figure A.4: Total wealth and top 1% shares in West and Unified Germany, 1993



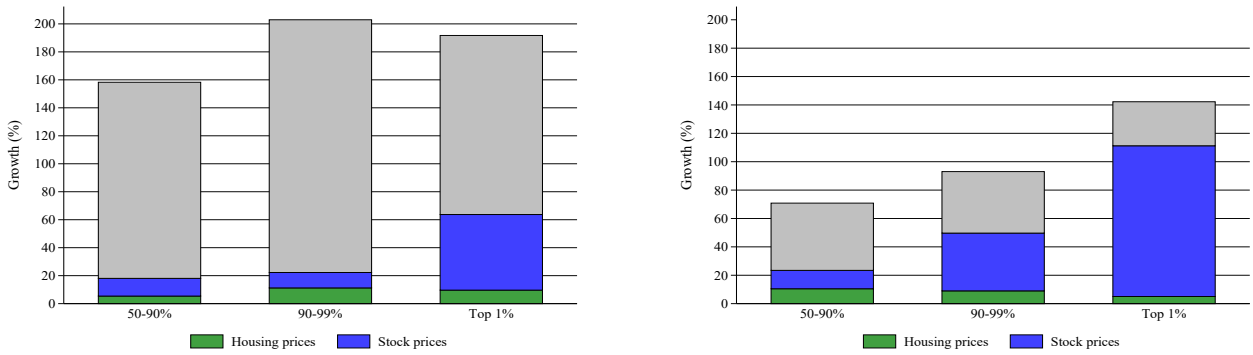
Source: EVS-TU for the survey year 1993.

Figure A.5: Composition of wealth growth, 1993-2018



Source: EVS-TU.
Note: Average net wealth in 2015 Euros. Business assets include shareholdings in both corporate and non-corporate firms. Other financial assets include securities, and insurances.

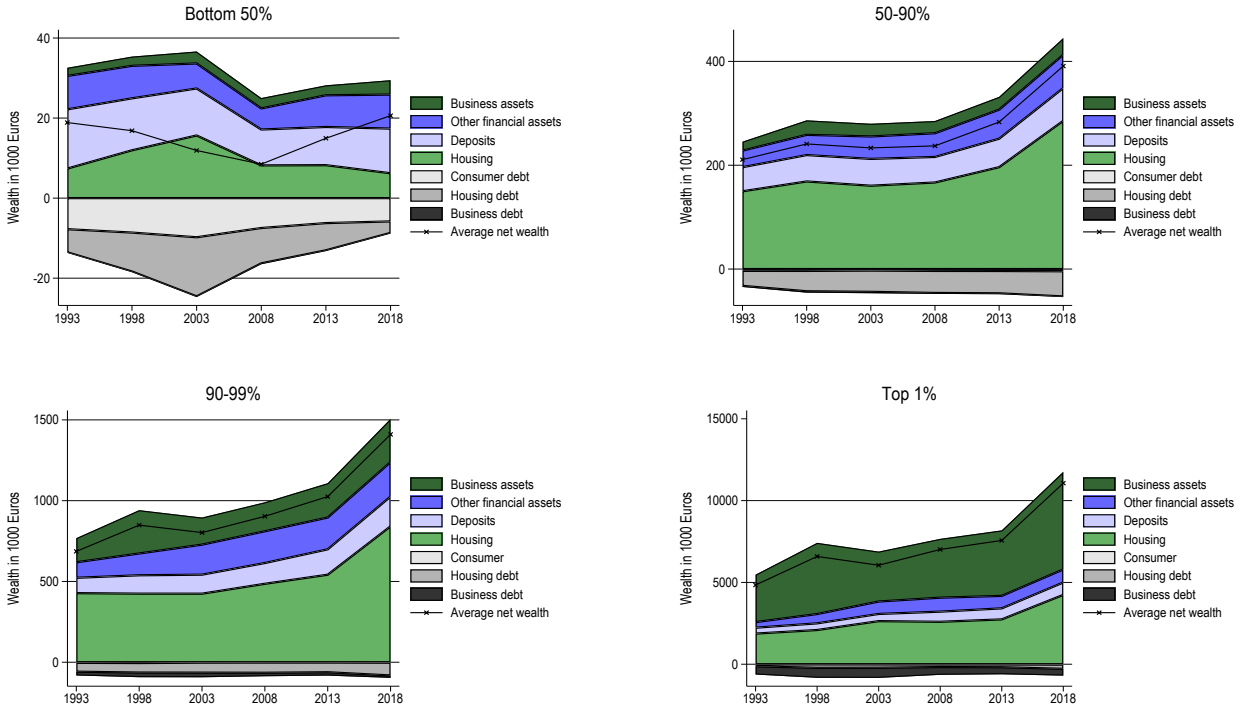
Figure A.6: Wealth growth from asset price changes, 1993-2018



(a) East (b) West

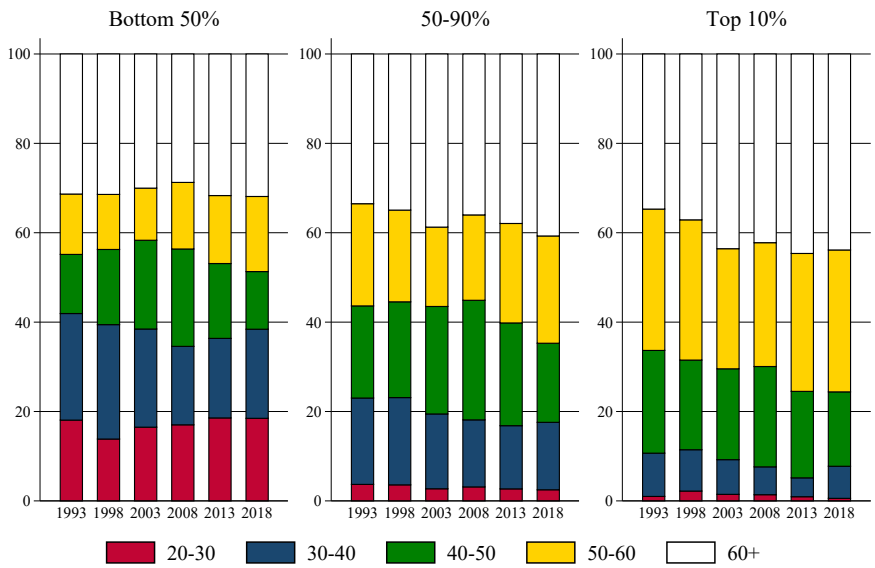
Source: EVS-TU.
Note: Growth from housing prices and stock prices computed using Bulwiengesa house price index and CDAX performance index following Equation 18. Grey shaded areas are synthetic savings.

Figure A.7: Heterogeneity of portfolios for the bottom, middle and top, 1993-2018



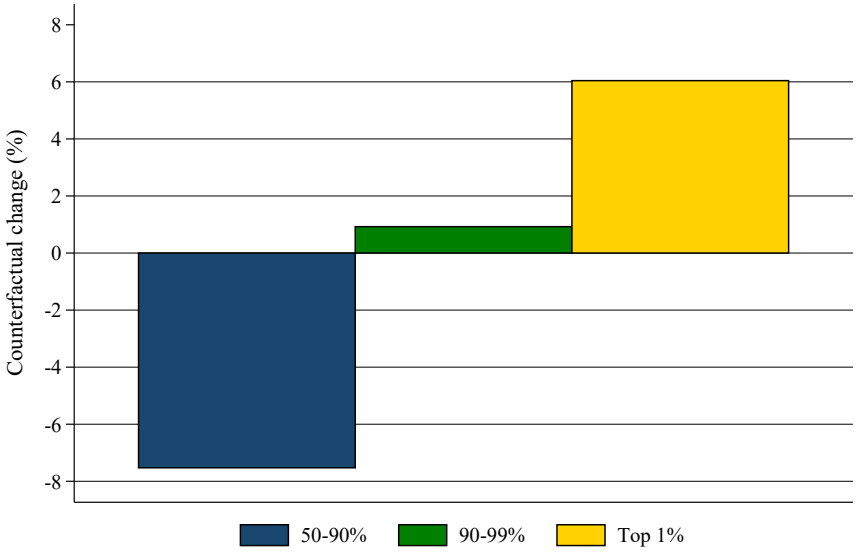
Source: EVS-TU.
Note: Average net wealth in 2015 Euros. Business assets include shareholdings in both corporate and non-corporate firms. Other financial assets include securities and insurances.

Figure A.8: The wealth distribution by age, 1993-2018



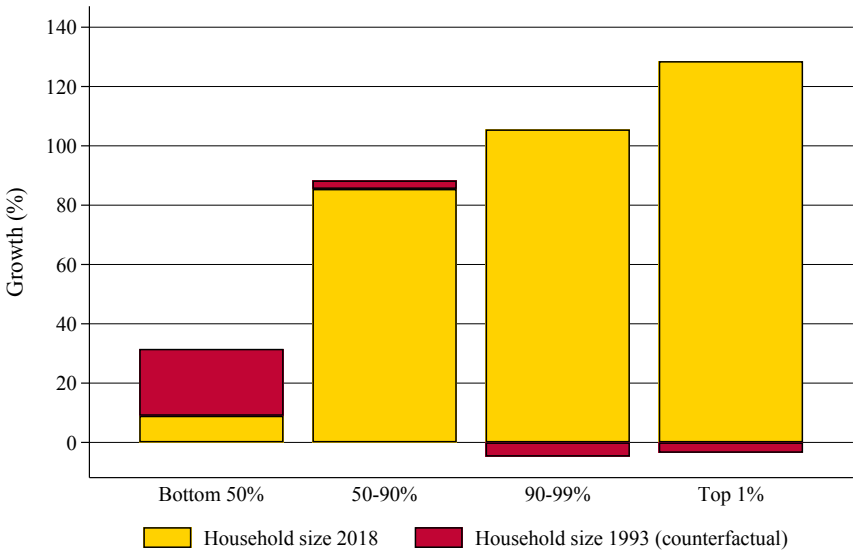
Source: EVS-TU.

Figure A.9: Changes in wealth shares assuming US saving rates, 1993-2018



Source: EVS-TU.
Note: Counterfactual wealth growth assuming US saving rates: the middle class (50-90%) 0%, 90-99% 15%, and top 1% 30%.

Figure A.10: Wealth growth: accounting for decreasing household size and aging, 1993-2018



Source: EVS-TU.
Note: Growth of average net wealth in 2015 Euros. Red bar shows the additional increase/decrease that would have occurred if the distribution of household size and age had remained constant between 1993 and 2018.