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Income, consumption and wealth inequality in Germany: Three concepts, three stories?

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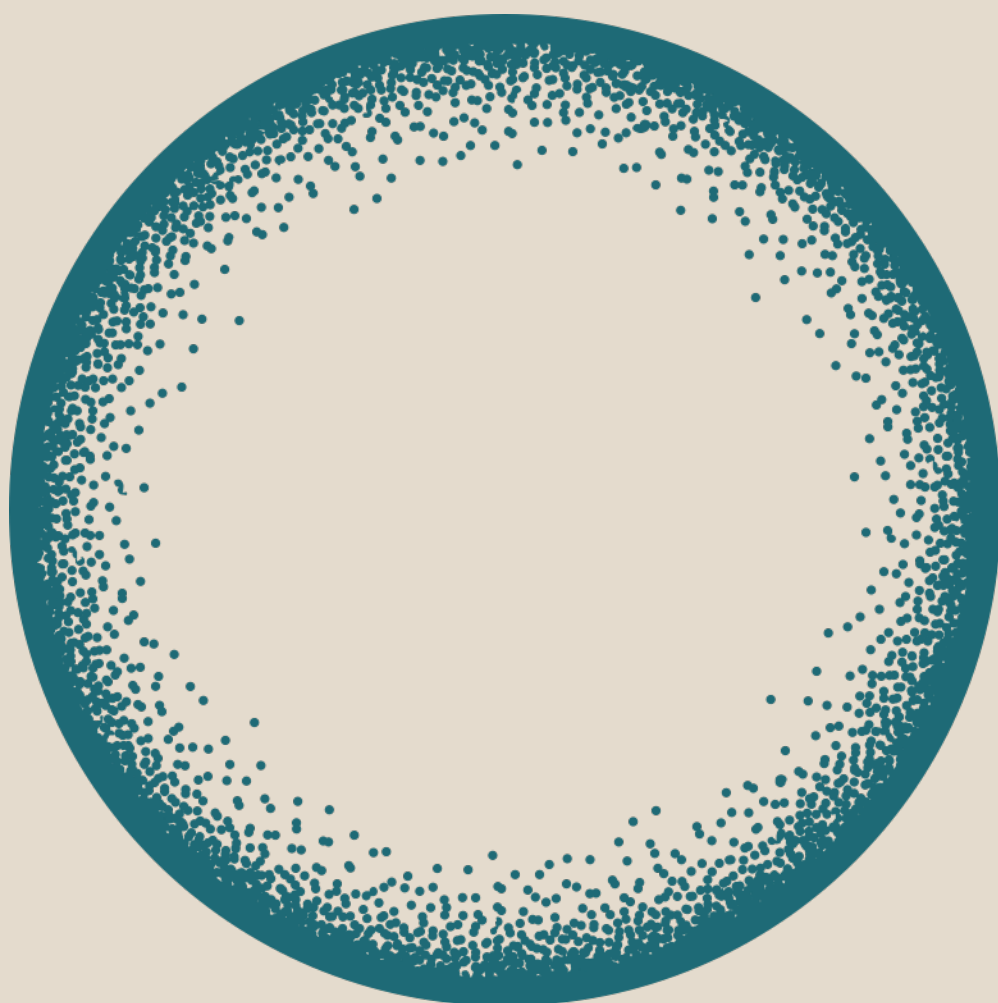
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INCOME, CONSUMPTION AND WEALTH INEQUALITY IN GERMANY: THREE CONCEPTS, THREE STORIES?

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Abstract

Given how controversially inequality is still being discussed by both academics and policy makers in Germany, we discuss methodological issues related to the measurement of inequalities and review the literature. One important issue is the choice of the measure of well-being: the central measures discussed are household equivalent disposable income, household consumption, and household wealth. Subsequently we use the Income and Expenditure Survey (Einkommens- und Verbrauchsstichprobe (EVS)) for Germany since 1993 to compare inequality across income, consumption, and wealth. Generally, we find that these three concepts tell different stories about the level of inequality and its intertemporal pattern. In line with theoretical arguments and previous empirical evidence, wealth is more unequally distributed than income and income more unequally than consumption.

JEL codes: D C21, D12, D31

Keywords: inequality, income, consumption, wealth

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1 INTRODUCTION

Increasing inequality is considered by scholars (e.g., Stiglitz, 2012) and policy makers alike to be one of the most serious problems facing society. Rooted in economic, social, political, and fairness arguments, many reasons underlie this concern about high inequalities:

1. One important economic concern about high inequalities is that credit rationing prevents low-income households from undertaking investments in education, which again weakens the innovative power and, thus, the growth potential of an economy (Deininger and Olinto, 2000).
2. One important social concern is that high inequalities weaken social cohesion because people are less likely to trust each other, thus creating a “psychic distance between the have-nots and the haves” (Shapiro, 2002, p. 120), such that community involvement weakens.
3. One important political concern is that high inequalities foster the power of economic elites, who use this power to (re)design the political system in their favor to accumulate even higher fortunes - creating a vicious circle (e.g., Domhoff, 1967, and Corneo, 2006).
4. From a fairness or moral perspective, attitudes to inequality are contained in an individual’s ethical values about what is morally tolerable or not. A set of formal principal concepts and theories that link inequalities to social welfare, including utilitarianism, libertarianism and the Rawlsianism, or the capability approach are proposed (see Sen, 2000).

In light of these reasons, this paper has three principle aims. First, as there are many critical choices made when measuring inequality, this paper reviews the important methodological choices, including that of the reference unit (e.g., individual vs. households) and of the data source (e.g., administrative vs. survey data). Secondly, keeping in mind the first aim, the paper reviews the literature on income, consumption, and wealth inequalities. Thirdly, the paper uses an inter-temporally harmonized dataset, based on the German Income and Expenditure Survey (see Bönke et al., 2013), to provide a consistent time series of income, consumption, and wealth inequalities in Germany. While the use of the Income and Expenditure Survey may come at the disadvantage of underestimating the level of inequality, this paper is the first to directly contrast the evolution of income, consumption and wealth inequality in Germany since the 1990s.

2 INEQUALITY OF WHAT?

When the media picks up results of a research study on inequalities, they usually condense the evidence into headlines claiming that, for example, “Inequality in Germany has increased.” In the public debate, the various working assumptions underlying the measurement of inequalities are often ignored. Each assumption, discussed below, may crucially affect the findings provided. In addition to the aforementioned obvious working assumptions regarding the choice of the time and region of analysis, the measurement of inequalities requires choices by the researcher (see Cowell, 2009):

1. Choice of the inequality index. Many studies use the Gini coefficient to measure inequality. The index measures twice the area between the Lorenz curve and the equal-distribution line. It has particular properties. The index bounds from zero to one. It is transfer sensitive, meaning that the Gini index decreases if, through a mean-preserving transfer, income is shifted from the top to the bottom of the distribution. It is a relative measure, meaning that a multiplication of all incomes by the same positive factor leaves the Gini unchanged. Many indices share the same properties. The Theil index and the Atkinson index are examples. In empirical applications, the problem arises that although the indices share the same properties, they do not necessarily lead to the same conclusions regarding e.g., intertemporal changes in inequality or inequality comparisons across different societal groups. Different patterns may emerge because inequality measures are more or less sensitive toward changes in specific parts of the distribution, like the top or the middle. Other indices have different properties. For example, the generalized Gini index is an absolute measure, meaning it varies with average income. Of course, the choice of an absolute or relative measure changes the meaning of the findings.
2. Choice of the focal variable. Many indicators of material well-being exist beyond the three most frequently used indicators of income, expenditure, and wealth. The relative advantages and disadvantages that people have, compared with each other, can be judged in terms of many different other variables, e.g. utilities, human capital, liberties, rights, quality of life, and so on. One may also argue that inequalities of opportunities (early in life) are more important than inequalities of outcomes. In sum, the plurality of variables on which we can focus (the focal variables) when evaluating inequality requires a decision regarding the perspective adopted (Sen, 1992).
3. Choice of the reference unit. The reference unit is the economic entity for which the resources are measured. This can be an individual, if we are concerned with the distribution of individual earnings from employment. This can also be the household unit, if we are concerned with the distribution of disposable income, which is generated and consumed jointly at the household level. It can also be a taxpayer as determined by a legal definition. Certainly, inequality will vary with the choice of the reference unit: It makes an enormous difference when computing the Gini index.
4. Adjustment for differences in needs. If references differ in composition, an identical level of material resources, say in terms of income, will imply different living standards: For example, if both a couple with two children and a single adult household dispose of the same monthly income of 2,000 euros, the material well-being of the single will be higher than that of the family. To obtain a meaningful measure of material well-being, resources must be adjusted for differences in needs. Equivalence scales serve for this adjustment. The most prominent

equivalence scale is the so-called OECD modified equivalence scale. It assigns a weight of 1.0 to the first adult in the household, a weight of 0.5 for each additional adult, and a weight of 0.3 for each child. Hence, the equivalence scale for a single is 1.0, the equivalence scale for a couple with two children is 2.1, and both are equally well-off if the former has an income of 1,000 euros and the latter an income of 2,100 euros. In each case, the equivalent income is $1,000 \text{ euros}/1 = 2,100 \text{ euros}/2.1 = 1,000 \text{ euros}$.

5. Weighting of reference unit. If all reference units are of equal size, the weighting of each unit should be the same as there is no reason to argue that one unit is more important than another (the so-called axiom of anonymity). For example, if we are concerned with individual workers, each worker should receive the same unit weight, a weight of 1.¹ However, if we are concerned about households and agree with the principle of normative individualism, households should not have the same weight but each should be weighted by the number of individuals within the household unit. Thus a single adult household should receive a weight of 1.0 and a couple with two children a weight of four. As an example, suppose disposable equivalent income is 1,000 euros for a single and 2,000 euros for a couple. This results in a size-weighted equivalent-income distribution of (1,000; 2,000; 2,000; 2,000; 2,000).
6. Comprehensiveness of the measure. Even after the choice of a particular focal variable, further issues remain. Assume the focal variable is disposable income. Should we consider the value of home production? Should we consider the value of non-cash transfers (e.g., free education opportunities)? If the focal variable is consumption, how should we deal with expenditures for durable goods (depreciation), or comparisons of housing-related costs between owner and tenants?
7. Data source. Since the new millennium, research is benefitting enormously from advancements in data availability. For example, in Germany, researchers can not only choose between both various survey datasets (like the Income and Expenditure Survey or the German Socio Economic Panel (see Goebel et al., 2019)), but also administrative social security and tax datasets. Each data source has its comparative advantages and limitations. For example, survey data are usually easier to access and provide a much wider spectrum of variables – not only about the household context but also about various life domains. However, survey data suffer from item and ((partial) unit) non-response as well as other measurement issues (e.g., recall bias). The key argument made in favor of administrative data is its high validity and large sample sizes. As a downside, administrative data provide only selective and limited sets

¹ The above explanation ignores the issue of frequency weights here. Scientific surveys, however, usually provide frequency weights to produce generalizable statistics for the overall population. Then the unit weight should be multiplied with the unit-specific frequency weight.

of variables (at least in Germany) and encompass only information on the relevant population (e.g., income-taxpayers).

8. Data preparation. The analysis of the data itself requires further choices by the researchers. How should we deal with top/bottom coded data or if data are censored? What is the appropriate strategy if information in variables seems implausible (negative disposable income) or is missing?

3 LITERATURE REVIEW

3.1 The distribution of income

Typically, world capital incomes grew more rapidly than labor incomes in many countries. The labor income share in national income fell as the functional income distribution shifted (Karabarbounis and Neimann, 2014). In Germany, capital income grew by a factor of 12.5 since the 1950s, while labor income grew by a factor of 7, according to the figures of the Federal Statistical Office. During the years of the *Wirtschaftswunder*, both capital and labor income grew at similar rates. Since the 1980s, capital income increased at much faster rate than labor income.

The increased importance of capital income usually leads to higher income inequality, because capital incomes are more concentrated than labor incomes. Capital, i.e. financial assets, real estate, and firms, is only held by a small share of the population, whereas the majority of the population depends on labor income to make a living. In Germany, the top decile of the income distribution received about 30 percent of national income in the 1960s. This income share quite steadily increased to about 40 percent today. At the same time, the income share of the bottom 50% decreased from more than 30 percent in the 1960s to less than 20 percent today (Bartels, 2019). However, increasing income inequality is not only linked to the shift in the functional income distribution between labor and capital, but also to increasing labor income inequality.

Since the 1980s, the distribution of labor income itself became increasingly unequal in Germany. Using IABS data, which is constructed from a 2 percent sample of social security records, Dustmann et al. (2009) show that wages have become increasingly unequal since the 1980s, when the difference between top and medium earners started to increase. In the 1990s, wage inequality at the bottom of the wage distribution also started to rise. Grabka and Schroeder (2018) assess trends in the inequality of hourly wages as well as monthly and annual earnings of dependent employees using SOEP data since the 1990s. In the following, we elaborate on their results on wage and earnings inequality measured by the 90:10 ratio, which is resistant to outliers and indicates the income of an earner at the 90th percentile (richer than 90 percent of earners) relative to one at the 10th percentile.

The 90:10 ratio of real hourly wages grew from 3.2 in 1994 to 3.9 in 2005. Real hourly wages of the ten percent poorest wage earners even decreased by more than 25 percent between 1998 and 2006.

However, overall, this ratio remained quite stable over time. According to Dustmann et al. (2009) and Biewen and Seckler (2017), de-unionization plays a major role in exacerbating wage inequality, especially at the lower end of the distribution. Other papers highlight firm-specific wage differences (Antonczyk et al. 2010, Ohlert 2016) as well as personal characteristics or demographic changes (Glitz and Wissmann, 2017). Since the introduction of a minimum wage in 2015, inequality of hourly wages declined, and the 90:10 ratio declined to 3.5 in 2018 (Fedorets et al., 2020).

In contrast to the moderate increase of wage inequality, monthly and annual earnings inequality rose more sharply, as shown by Grabka and Schroeder (2018). Monthly earnings of the poorest ten percent of earners even halved between 1992 and 2005, whilst the richest ten percent improved their monthly and annual earnings by 20%. Subsequently, the 90:10 ratio, grew from four in 1992 to ten in 2006, oscillating near eleven today. The 90:10 ratio of annual earnings increased from eight in 1998, peaking at fifteen in 2010.

How can earnings inequality increase far more than wage inequality? Earnings are the product of worked hours and hourly wage. Indeed, from 1992 to 2012, the 10th decile increased the number of hours worked by ten percent, whilst the 1st decile works 25% hours less on average. Over the same period, the number of mini-jobs, which limit monthly income at 450€, grew from three million to seven and a half million. Additionally, Biewen et al. (2019) find negative selection of low-wage households into part time jobs, leading to an increase of earnings inequality. Nevertheless, Biewen and Plötze (2019) could only explain parts of the increase in the 90:10 earnings ratio (10% for men, 55% for women) with work-hour changes and part-time jobs.

These increased earnings inequalities accumulate over a lifetime such that lifetime earnings inequality has also increased. The inequality of lifetime earnings among cohorts born in the 1960s and 1970s is almost twice as high as for cohorts born in the 1930s (Bönke et al., 2015).

Finally, government taxes and transfers did not mitigate increased market income inequalities in Germany. Even though real equivalent disposable income of persons in private households in Germany rose by 15 percent on average between 1991 and 2015, the lower end of the income distribution did not benefit from the growth in real income. The Gini index of disposable household income remained rather stable between 1991 and 1999, then rose from 0.25 in 1999 to 0.29 in 2005. Unlike inequality in market income, inequality in disposable household income regressed only slightly between 2005 and 2009. After 2009, inequality in disposable household increased moderately until 2013 and stagnated since then (Goebel and Grabka, 2018; Goebel and Grabka, 2020).

3.2 The distribution of expenditures and consumption

Empirical studies on the distribution of household consumption are scarce. Most likely this is because of high data requirements: Ideally, information should be available for all kinds of consumption—from food to durable goods. Many surveys simply do not meet this requirement. Second, expenditures

do not equate with consumption if households use certain commodities over a longer period. For such durable commodities, expenditures made at a particular point in time do not reflect the household's current consumption of the same good. Instead, like a depreciation of durables in the books of a company, expenditures must be converted into a consumption flow over several periods (Krueger and Perri, 2006).

Although many studies focus on the distribution of income, consumption-based measures may be advantageous for conceptual reasons. As explained above, according to the permanent income hypothesis, current income has a permanent and a transitory component, with people basing consumption decisions on their permanent income. Thus, transitory changes should cause current income to vary more than consumption, but the higher variation does not necessarily reflect equally large living standard variations (see Meyer and Sullivan, 2003, and references cited therein). According to the life-cycle hypothesis, current income rises throughout working ages and then declines around retirement. If people try to smooth marginal utility, then they will save less when they are young and old, but more in the middle of their lifetime. Combined, the two hypotheses imply that, relative to current income, savings rates should exhibit an inverse U-shaped pattern with respect to age. At the same time, however, households may align savings with interest rates. When different birth cohorts face different interest rate histories (at different ages) this may map into differences of income and consumption profiles.

These patterns of income and consumption have implications for the measurement of inequality. First, consumption smoothing implies that income inequality should be higher than consumption inequality, a conjecture that finds empirical support in several studies including Krueger and Perri (2006), Pendakur (1998), Attanassio et al. (2006), Johnson et al. (2005). Second, consumption smoothing in combination with cumulative effects of (bad) luck should result in rising consumption inequality over the lifecycle. Indeed, Deaton and Paxson (1994) and Storesletten et al. (2004) provide affirmative empirical evidence. Third, it is not ruled out that income and consumption distributions exhibit different intertemporal patterns, as documented, for example, in the empirical study of Meyer and Sullivan (2007).

For Germany, a few case studies estimate inequalities from consumption or consumption expenditures. All the studies we are aware of (e.g., Noll et al., 2007, Zaidi und de Vos, 2001, Fuchs-Schündeln et al., 2010, Hufe et al., 2018) rely on the Income and Expenditure Survey for Germany (Einkommens- und Verbrauchsstichprobe), provided by the German Statistical Office. All the cited studies focus on consumption expenditure and do not derive consumption flows.

For example, Hufe et al. (2018) study the 1993 to 2013 period, finding rising inequalities for all investigated concepts of material well-being: equivalent² disposable income, market income, and consumption expenditures. Over this period, the Gini coefficient rises from about 0.27 to 0.29 for disposable income, from 0.37 to 0.39 for market income, and from 0.38 to 0.41 for consumption expenditures. At first glance, high consumption inequalities are at odds with the above argumentation, i.e., that consumption smoothing should lead to lower consumption inequalities. Notice, however, that the authors explore consumption expenditures. For expenditures, higher inequalities are not surprising because purchases of many durable goods involve high expenditures.

3.3 The distribution of wealth

Estimations of the distribution of wealth based on survey data tend to underestimate wealth inequality, as the wealthiest people and households are hardly ever included in their samples. This is due to two reasons: First, it is statistically unlikely to draw a sample that includes multi-millionaires or even billionaires. Second, these people often do not respond to surveys. Further, as the wealth tax was suspended in 1995, there is no administrative data that can be used to gain insights on the wealth distribution, thus survey data is crucial. We will review the literature with respect to the Gini coefficient, top wealth shares as well as the share of persons and households without significant wealth. In accordance with most research, we do not count the net present value of future pension claims as wealth.

Grabka and Halbmeier (2019), analyzing SOEP data, find that, in 2017, the wealthiest 10% of people own 56% of the total wealth (excluding motor vehicles), whilst the less-owning half of people only owns 1.3% of total wealth. This distribution corresponds to a Gini of 0.78 and has been relatively stable since 2004. The share of people with zero or negative wealth is 29% and increasing slightly since 2002 (27.6%).

Using the Income- and Expenditure Survey (EVS), Fuchs-Schündeln et al. (2010) find that the Gini of wealth on household level was 0.63 in 1978, rising to 0.68 in 1997. Over this period, the share of households with zero or negative wealth increased from 6.5% to 10.5%.

Another survey on the household-level is the Household Finance and Consumption Survey (HFCS) conducted by the national central banks, which allows international comparisons. According to the HFCS, the Gini of wealth in Germany was around 0.76 in both 2010 and 2014, with the wealthiest 10% of households owning 59.8% of total wealth. The HFCS additionally provides three other inequality measures, the Atkinson index, the Theil index, and the Pietra index. For both survey waves

² Equivalent incomes (consumption) adjust for differences in needs. Hufe et al. (2018) make use of the OECD modified equivalence scale.

and all inequality measures, Germany exhibits the highest- or second-highest wealth inequality of all EU members.

Albers et al. (2020) combine wealth tax data, surveys, national accounts and rich lists to study the distribution of wealth in Germany from 1895 to 2018. They show that the wealth share of the top 1% has fallen by half, from close to 50% in 1895 to less than 25% today. Between 1993 and 2018, wealth of the top 10% and of the middle class (50-90%) has approximately doubled in real terms, while wealth of the bottom half has stagnated and their share in total wealth has nearly halved. Their estimated Gini coefficient based on a combination of EVS, national accounts and rich lists increases from 0.69 in 1993 to 0.74 in 2018.

4 COMPARING DIFFERENT KINDS OF INEQUALITY IN A SETTING

Using the German Income and Expenditure Survey (EVS) allows us to jointly analyze and compare inequality of income, wealth and consumption. Though this comparison based on the EVS data may come at the disadvantage of underestimating the level of inequality (see above) and is restricted to the time from 1993 to 2013 or 2018, it allows us to better evaluate the relative importance of inequality dynamics between the three categories, and between East and West Germany.

As in many other countries, empirical analyses document that in Germany, following a long period of stability, there are high and growing inequalities in income and wealth (e.g., OECD 2008, Bönke et al., 2019, Grabka and Schröder, 2018 and 2019). That inequalities are rising, however, is not uncontested in the literature. This is because inequality has many dimensions. For example, while the literature focuses on the development of inequalities within national borders, others broaden the perspective and study inequalities in transnational spatial or political entities (Milanovic, 2012 and 2019). Thus the measurement of inequalities has expanded, no longer just measuring how inequality evolves within the borders of a country, but also how differences in living standards evolve between countries. Of course, also the time horizon matters: Do we assess the development of inequality around the financial crisis (Bönke and Schröder, 2014), around German reunification (Fuchs-Schündeln et al., 2010), or since the 19th century (Bartels, 2019)?

Of course, also the choice of the focal variable matters. Much of the current literature focuses on income inequalities, as income (from labor), is essential for social and economic participation in a market economy. Another important material component is wealth. Wealth inequalities are much higher than income inequalities (Fuchs-Schündeln et al., 2010). However, due to data restrictions, wealth inequalities receive less attention in the literature. For conceptual reasons, inequalities in consumption may be more informative than inequalities in income or wealth: According to the permanent income hypothesis, current income has permanent and transitory components, with people basing

consumption decisions on their permanent income. Thus transitory changes should cause current income to vary more than consumption, but the higher variation does not necessarily reflect equally large living standard variations (see Meyer and Sullivan, 2003, and references cited therein). Therefore, we use EVS data that allow us to jointly study the extent of wealth, income and consumption inequalities in Germany.

4.1 General features of Germany’s Income and Expenditure Survey

Five waves of Germany’s Sample Survey of Income and Expenditure (*Einkommens- und Verbrauchsstichprobe (EVS)*) from 1993 to 2018 form our database. EVS is a representative cross-sectional household sample for Germany, collected in five-year intervals, that is provided by the German Federal Statistical Office. The EVS is a quota sample, and conveys information on about 0.2 percent of the population surveyed in the respective year. Prior to German reunification, EVS only surveyed West German households; since reunification, both East and West German households enter the database. Our empirical examination relies on several household socio-economic (i.e. disposable income, expenditures, and wealth) as well as demographic variables (i.e. number of adults and children living in the household).

EVS provides the unique possibility to study the distribution of the three concepts income, wealth, expenditures, and inventories across German households. In contrast, the other two German household surveys, SOEP and HFCS, focus on income and wealth and offer no information on expenditures and inventories. EVS allows us to study the evolution of wealth inequality since 1993, while SOEP provides wealth information since 2002 and HFCS since 2010.

A disadvantage of EVS is that business wealth is not recorded. Given the high concentration of business wealth at the top of the wealth distribution, EVS data produce systematically lower wealth inequality estimates.

Through 1993, households provided information on their economic activities during the entire survey year. Since 1998, the accounting period is shortened to three months of the survey year. The reduction of the surveying period has important implications for the distribution of consumption. As households usually do not purchase durables, like electric devices or cars, every quarter, many households’ expenditures are zero even though these households possess the commodity and benefit from its use value. In the so-called inventories, EVS also provides stocks of important durables.

In our empirical analysis, we draw on the Harmonized Income and Expenditure Survey constructed by Bönke et al. (2013) and Bartels et al. (2019). In the original EVS, variable definitions greatly vary from wave to wave. Therefore, Bönke et al. (2013) and Bartels et al. (2019) carefully construct consistently defined variables. When this study was conducted, EVS wealth variables were available up to 2018, while income and consumption variables were only available up to 2013.

4.2 Definition of focal variables and sample selection

Disposable income

Disposable income is the amount of money that households have available for spending and saving. This measure is taken from the EVS data without further modifications.

Household consumption

Household consumption expenditure comprises eleven commodity categories: (1) food beverages and tobacco; (2) clothes and shoes; (3) shelter including heating, water, electricity, etc.; (4) furniture; (5) health; (6) transport; (7) communication; (8) recreation, (9) accommodation services; (10) child care; and (11) others.

Some commodity categories comprise durables. For example, “transport” (category 6) includes expenditures for the purchase of a new car. For such items, flows of consumption and expenditure are typically different: while expenditures accrue in one period, the use value of the commodity comprises several periods. Therefore, consumption is not the same as expenditure.

To derive consumption flows for durables from expenditures, we follow Krueger and Perri (2006). In a first step, we run, year by year, a linear regression with expenditures for the purchase of a durable good as dependent and a set of socio-economic household characteristics as independent variables. This regression only includes households actually purchasing the commodity during the survey period. In a second step, we derive the consumption flow from the durable commodity, by first predicting expenditures for all households, multiplying the prediction with the inventory (e.g., the number of cars owned by a household), and dividing by an assumed depreciation period of the commodity. For example, suppose a household reports 10,000 euros for the purchase of a car and owns two (according to the inventory). Under the assumption of a depreciation period of eight years, the annual consumption flow for both cars is $2 \times 10,000/8 = 2,500$.

From EVS, we compute consumption flows for the following items: (1) cars; (2) television; (3) computers; (4) fridges and freezers; and (5) washing machines, dryers, and dishwashers. We assume a depreciation time of eight years for categories (1), (4), and (5), and three years for categories (2) and (3).³ In sum, our consumption measure includes expenditures for non-durable and imputed consumption flows for durable goods.

Measuring household income

Our dataset provides disposable household income. It is gross household income (all revenues from dependent employment and self-employment, revenues from wealth, public and private transfers, rent

³ Details on the right-hand regression variables together with the regression results are available from the authors upon request.

income, and imputed rent) minus social security contributions and taxes, plus revenues from purchase of goods (for details see Statistisches Bundesamt, 2017, p. 12).

Measuring household wealth

Real estate wealth is the market value of both owner- and non-owner-occupied housing. Financial assets include regular savings (*Sparguthaben*), home purchase savings (*Bausparguthaben*), fixed term deposits (*Termingeld*), savings bonds (*Sparbriefe*), stock shares (*Aktien*), investment funds, fixed-income securities (*festverzinsliche Wertpapiere*), and government bonds (*Staatsschuld-papiere*). Private pensions are included since 2003. Insurance assets are included in all years, but with an increasing degree of accuracy. From 1978 to 1993, insurance sums are recorded, which are converted to repurchase values in the Harmonized EVS (see Bartels et al., 2019). Business assets are only surveyed in 1983 and, hence, excluded from our analysis. Our measure of gross household wealth is the sum of real estate wealth, financial assets, and insurance assets. Gross wealth is positive or zero. Hence, we can compute the Theil and the Gini without further adjustments, which would be needed in the case of negative wealth values.

Adjustment for differences in needs and inflation

Following the conventions in the literature, income and consumption are converted into equivalent units using the OECD modified equivalence scale. The OECD modified equivalence scale of a household consisting of n_a adults and n_c children is $S(n_a, n_c) = 1 + 0.5 \cdot (n_a - 1) + 0.3 \cdot n_c$. It implies household size economies and differences in needs of adults and children. Dividing income (consumption) by equivalence scale gives the household's equalized income (consumption). We measure wealth on the household level. We argue that pooling of wealth is less likely to occur than for income and consumption.

Furthermore, to allow inter-temporal comparisons in levels, we convert all euro amounts to 2013 consumer prices. Finally, to avoid having outliers drive our results, we implement a top and bottom coding, replacing all numbers exceeding the 99th (falling below the lowest percentile) with the percentile-specific cutoff.

Sample selection

The empirical analysis focuses on analyses at the household level. We impose consistency requirements on disposable income and consumption expenditure. Specifically, we exclude 85 households with negative disposable incomes, and 15 households with food expenditures of zero. The resulting working sample consists of 219,474 household observations, i.e. between 40,000 and 50,000 households in each survey year.

5 EMPIRICAL ANALYSIS

The empirical examination focuses on how levels of, and inequalities in, equivalent disposable income, equivalent consumption, and household wealth evolve over time. Thereby, we distinguish between households living in East Germany (including East Berlin), and West Germany. First, we compute the arithmetic means and a set of quantile values like the median to examine changes in the level of income, consumption and wealth. In the inequality examination, we rely on two standard measures: the Theil index and the Gini index.

Our new scientific contribution is to jointly study the distribution and evolution of the three concepts income, wealth and consumption inequalities across German households. This allows for a better understanding even if the data in general tends to underestimate wealth inequality and its rise since reunification. Not only do estimations based on survey data in general tend to underestimate top income and top wealth (see section 3.3), but so does the EVS in particular due to its omission of business assets (see section 4). Moreover, the Theil and Gini index are relative inequality indices and trends uncovered by these indices may diverge from absolute inequality indices such as the absolute gap between different percentiles of the distribution. For example, while these indices for household wealth increase only slightly between 1993 and 2018, wealth inequality has increased substantially since reunification, if measured by the distance between the upper and lower half of the wealth distribution (Albers et al., 2020).

Looking at the distribution of growth across wealth groups 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. On the one hand, the Gini reacts more strongly to changes in the middle of the distribution. On the other hand, the bottom half holds less than five percent of total wealth, so that changes in their wealth has a comparably small effect. Recent studies on global inequality have highlighted differential growth rates across the global income distribution. The elephant curve in Lakner (2016) pointing at the enormous income gains at the top of the global income distribution is a famous example. 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). In the following, we present average and percentile growth of income, consumption and wealth in Section 5.1. In Section 5.2, we present results for standard relative inequality measures like the Gini coefficient.

5.1 Levels of income, consumption and wealth

Figure 1 provides time trends for mean equivalent disposable income and consumption in 2013 prices for Germany, West Germany, and East Germany. Whiskers indicate bootstrapped 95% confidence intervals.

Over the 20 years, average equivalent disposable income in East Germany increased from about 1,500 euros in 1993 to about 1,800 euros in 2003, stagnating thereafter. For West Germany, incomes are markedly higher compared to East Germany, but stagnating at about 2,300 euros over the observation period, if not declining slightly between 2003 and 2008, with unemployment and a widening of the low-wage sector as likely causes. As a result, equivalent disposable income for overall Germany increased from about 2,100 euros in 1993 to slightly more than 2,200 euros in 2003 and about 2,200 euros thereafter. This moderate income growth until 2013 is also demonstrated by Grabka and Goebel (2020). Using SOEP data, they show that average disposable income stagnated between 2007 and 2013 and rapidly increased between 2014 and 2017. Unfortunately, disposable income for the year 2018 in EVS data was not yet available when this study was concluded.

The trends for equivalent consumption are similar: For East Germany, the mean quickly rose from about 1,300 euros in 1993 to 1,500 euros in 1998. Thereafter, there was another slight increase to about 1,550 euros in 2003. A slight dip in 2008 another rise followed to about 1,600 euros in 2013. For West Germany, the profile is rather flat but the mean markedly higher: about 1,750 to 1,800 euros. For overall Germany, mean equivalent consumption rose from about 1,650 euros in 1993 to about 1,750 euros in 1998, stagnating thereafter.

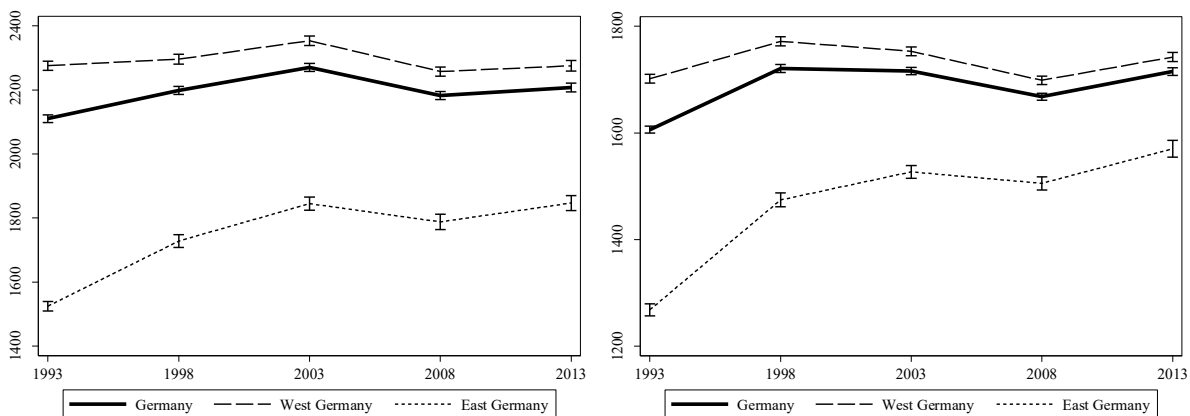
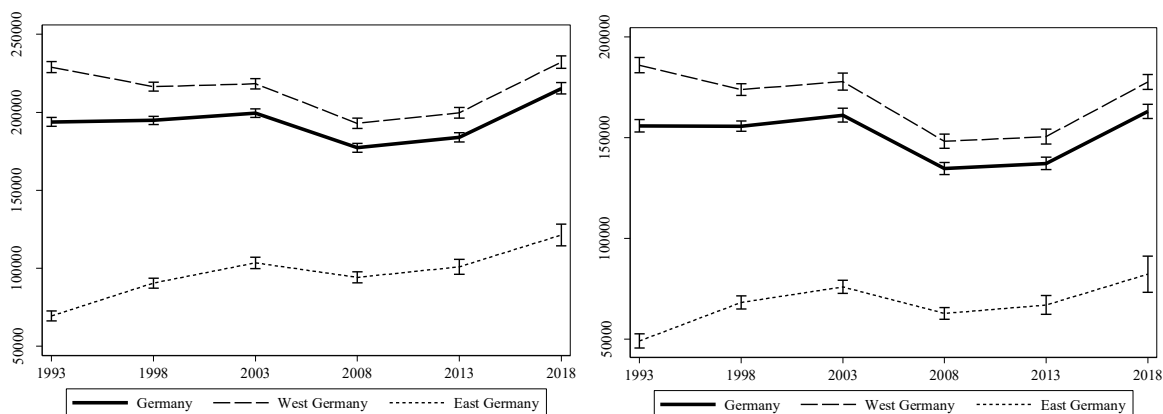


Figure 1: Average equivalent income (left panel) and consumption in 2013 euros

Average gross household wealth in Germany remained quite stable between 1993 and 2018 at about 200,000 euros, as the left-hand graph of Figure 2 shows. However, in East Germany, average household wealth increased substantially over this period, from less than 70,000 in 1993 to more than 120,000 euros in 2018. However, despite this wealth increase, the average East German household

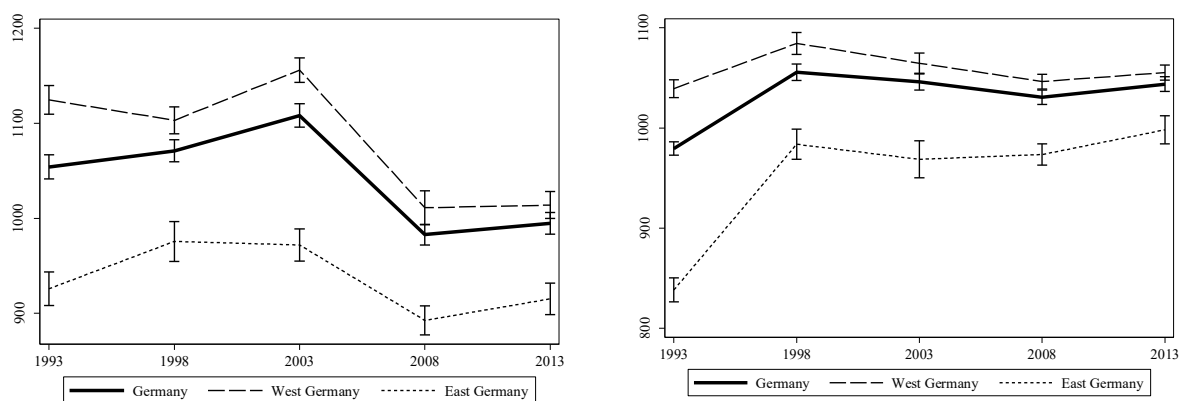
still owns about half of what a West German household owns in 2018. The trend observed for gross wealth is mostly driven by real estate wealth, as gross household wealth mostly consists of real estate wealth. Real estate wealth decreased from about 160,000 euros in 1993 to about 130,000 euros in 2008 in Germany, which is driven by the trends in West Germany (see right-hand graph of Figure 2). In East Germany, average real estate wealth increased from 50,000 to 76,000 euros between 1993 and 2003. The increase in average real estate wealth between 2008 and 2018 reflects the beginning of a new period of increasing housing prices across all of Germany.

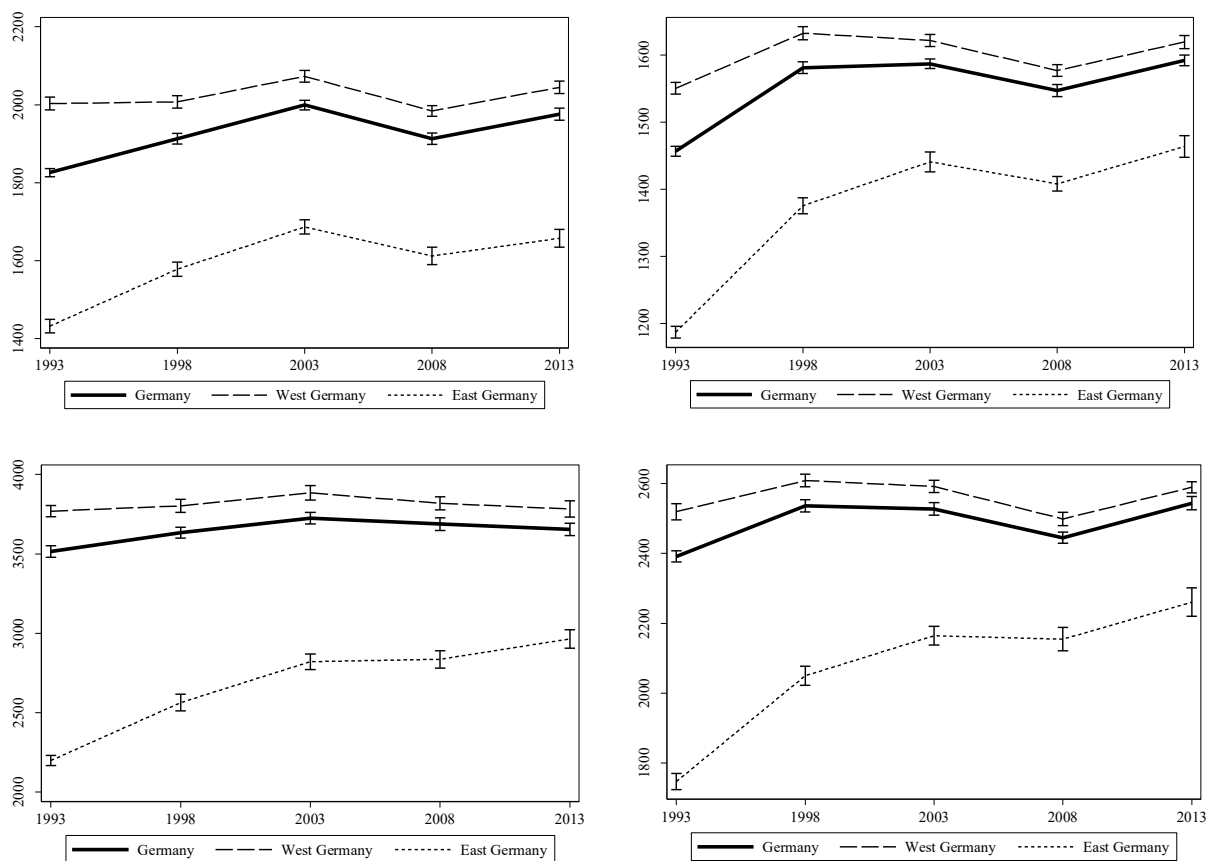


Note: Gross wealth is the sum of real estate wealth, financial assets and insurance wealth.

Figure 2: Average gross wealth and real estate wealth in 2013 euros

To understand how material wellbeing evolved along the distributions of equivalent disposable income and consumption, Figure 3 provides six graphs. The left panel provides, from top to bottom, time trends for the 10th, 50th, and 90th percentile of equivalent disposable income, while the right panel provides the same information for equivalent consumption. Again, each graph provides the results for East, West, and overall Germany.





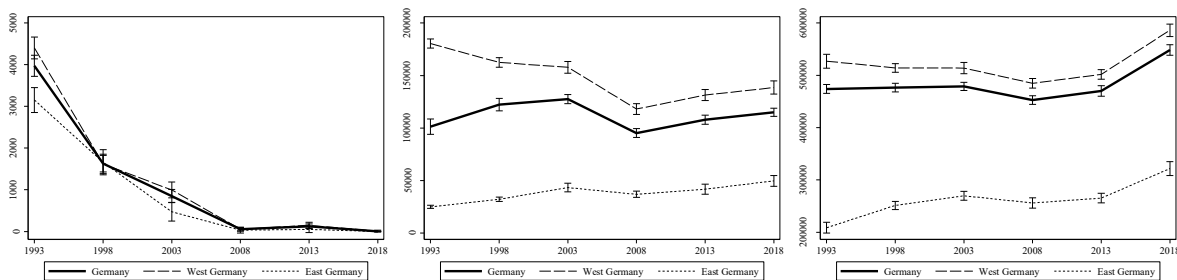
Note: Upper panel gives the 10th, middle panel the 50th, and bottom panel the 90th percentile.

Figure 3: Quantiles of equivalent income (left panel) and consumption in 2013 euros

In terms of equivalent disposable income, material wellbeing drifted further apart. For East Germany, after a rise from slightly above 900 euros in 1993 to slightly below 1,000 euros in 1998, wellbeing in the 10th centile stagnates until 2003, then returning to its initial level in 2008 and 2013. For West Germany, the trend is even more disappointing. While material wellbeing is always higher than East Germany, equivalent income in the 10th percentile is quite stable at a level of about 1,100 euros between 1993 and 2003, declining thereafter to about 1,000 euros, in both 2008 and 2013. The time trend for Germany follows approximately the West German pattern. For the median, we see a rise from slightly above 1,400 euros in 1993 to above 1,600 euros in 2003, stagnating thereafter. For West Germany, the median does not exhibit a systematic pattern, varying around 2,000 euros. For overall Germany, the median rises from about 1,800 euros in 1993 to slightly below 1,900 euros in 2003 and then stagnates. For the 90th percentile, we find a stable upward trend for East Germany. Here the quantile value increases from almost 2,200 euros in 1993 to almost 3,000 euros in 2013. In West Germany, disposable equivalent income for the 90th percentile remains roughly constant over the two decades, at about 3,800 euros. For overall Germany, it increases from about 3,500 euros in 1993 to above 3,600 euro in 2003, stagnating thereafter.

Time trends for the 50th and 90th percentile of equivalent consumption follow those for disposable income. We see a positive trend for East Germany, stagnation of material wellbeing in the West, and a slight upward trend for overall Germany. However, for the 10th percentile, however, time trends for the two concepts diverge. While equivalent disposable income at the beginning and end of the observation period remained unchanged in East Germany, we find a strong rise of equivalent consumption. From 1993 to 1998, it increases from about 850 to about 1,000 euros before stagnating thereafter. Compared to equivalent disposable income, we also find a more promising trend for consumption in West Germany. Again, it concerns the 1993 to 1998 period, with a rise from about 1,050 to 1,100 euros, and stagnation thereafter. Whether the 1993/98 rise in consumption is a real world fact or data artefact is unclear: Between the two periods, the EVS underwent important revisions. In particular, the accounting period, the period over which a household is asked to report consumption expenditures, was reduced from annual to quarterly. One implication of the shortening of the observation period is a lower probability to observe expenses for durables (see Bönke et al., 2013).

The dispersion of gross household wealth increased, as Figure 4 displays. In overall Germany, the 90th percentile remained rather stable at about 500,000 euros until 2008 and then increased; the 50th percentile fluctuated around 100,000 euros. In contrast, the 10th percentile decreased from almost 4,000 euros in 1993 to zero in 2018. While the 50th percentile declined in West Germany between 1993 and 2008, the 50th percentile increased in East Germany. This indicates that wealth became more dispersed in the top half of the distribution in West Germany and more unequal in the bottom half in East Germany.



Note: Gross wealth is the sum of real estate wealth, financial assets and insurance wealth.

Figure 4: 10th, 50th and 90th percentile of gross household wealth in 2013 euros

5.2 Inequality of income, consumption and wealth

Figure 5 shows the evolution of inequality in equivalent disposable income and consumption, using the Gini index and the Theil index as inequality measures.

We comment on income inequality first. For East Germany, income inequality shows a strong upward trend: The Gini (Theil) index increases from about 0.19 (0.06) in 1993 to about 0.25 (0.11) in 2008 and 2013. Despite this rise, income inequality remained significantly below the level of West Germany, with Gini (Theil) indices around 0.26 to 0.27 (0.12 or slightly below) between 1993 and 2003,

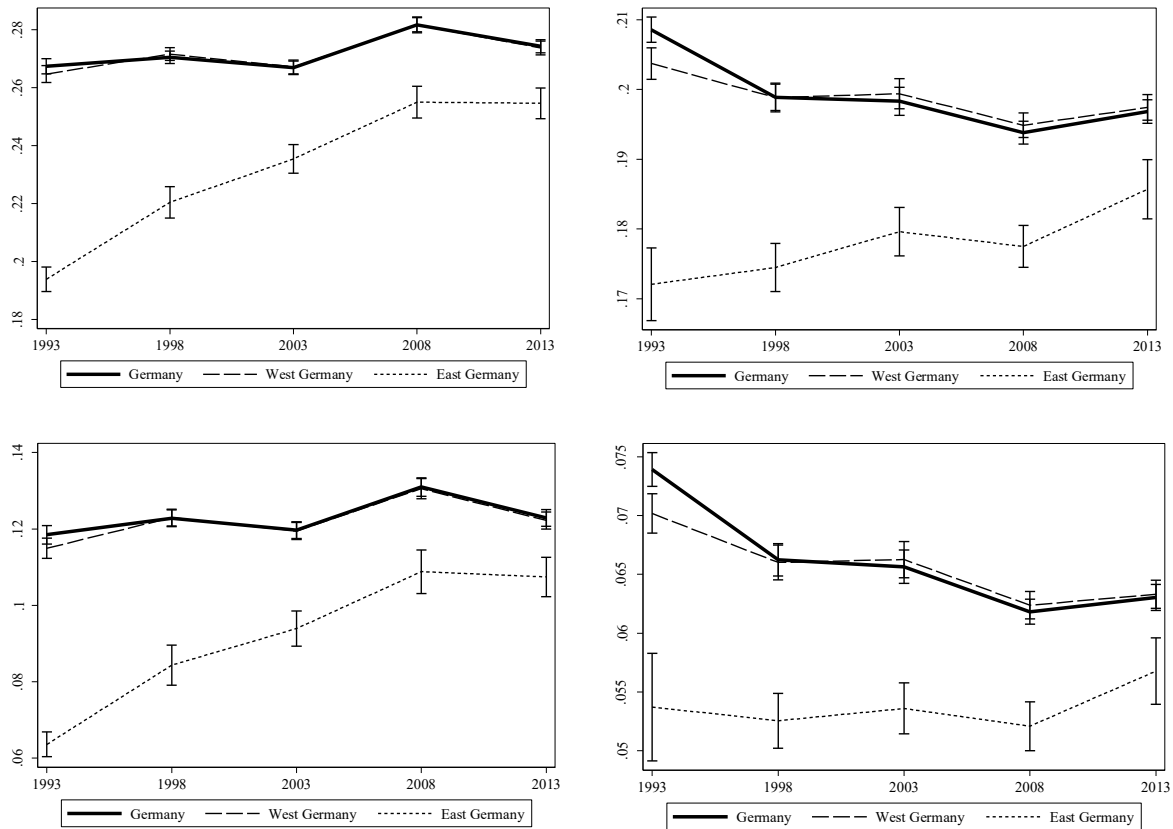
and a slight increase to about 0.27 to 0.28 (0.12 to 0.13) in the period thereafter. For overall Germany, income inequality closely tracks the trend observed for West Germany. This finding may seem surprising at first glance, as inequality within the borders of East Germany is significantly lower than in the borders West Germany, which should mitigate inequality in Germany as a whole. This inequality-decreasing mechanism, however, is offset by an inequality-increasing mechanism resulting from the significant income divide between East and West Germany.

Rising disposable income inequality between 2000 and 2005 is also documented by Grabka and Goebel (2020) using SOEP data. They estimate that the Gini coefficient of disposable income inequality fluctuated between 0.28 and 0.29 from 2005 to 2017.

For consumption inequality, some findings are similar to income, while others diverge. Consistent with income inequality is the finding of an inter-temporal increase in inequality for East Germany, although this increase was less pronounced. Another consistent finding is the higher level of inequality in West compared to East Germany as well as the close alignment of the trends in West Germany and Germany as a whole.

However, there are also findings that differ. First, in all years and regions, inequality in consumption was significantly lower than that in income. This finding is consistent with the theoretical argument of consumption smoothing, according to which households try to stabilize consumption for transitory income changes by saving or dissaving. Further, this finding underlines the importance to derive consumption flows for durable goods so that expenditures for these goods occurring in one period while its use comprises several periods does not exacerbate the estimated level of inequality. Hufe et al. (2018) use consumption expenditures without correcting for the multi-period use of durable goods and find that consumption inequality is higher than disposable income inequality.

Second, according to this data and in contrast to the results for income, consumption inequality declined over time – both in West Germany and Germany as a whole. The measured decline between 1993 and 1998 is particularly strong. However, as explained above, it is unclear whether this reduction is a true empirical finding or a data artifact: There was a methodical change between 1993 and 1998 within the EVS: While expenditures were recorded at year level through 1993, a conversion to quarterly measurement took place thereafter (see Bönke et al., 2013). Again, our results differ from Hufe et al. (2018) who find rising consumption inequality between 1993 and 2013.

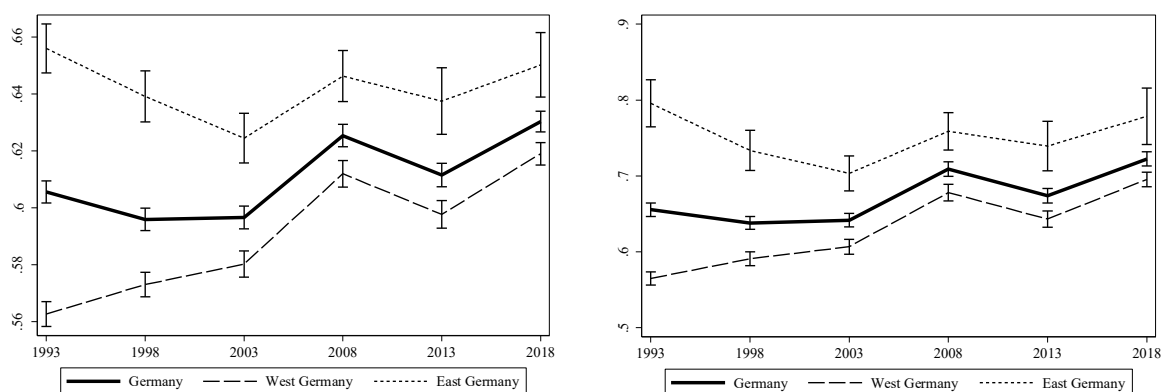


Note: Upper panel gives the Gini index, while the bottom panel gives the Theil index.

Figure 5: Inequality indices for equivalent income (left panel) and consumption

Wealth inequality trends in East and West Germany went into opposing directions until the early 2000s, as Figure 6 displays. While the wealth distribution became more unequal in West Germany, discrepancies decreased in East Germany until 2003. Thereafter, wealth inequality increased in both parts of Germany until 2008 when housing prices started to increase. The wealth inequality peak in 2008 is also found by Albers et al. (2020). The recent increase in house prices has an equalizing effect on the wealth distribution because portfolios of the middle-class mostly consist of housing wealth. Thus, both the Gini (left-hand graph) and the Theil (right-hand graph) do not show a statistically significant change between 2008 and 2018.

The Gini coefficient of about 0.6 is significantly lower than estimates of the above cited studies based on HFCS or SOEP data like Grabka and Halbmeier (2019). As mentioned above, EVS does not survey business wealth, which is very unequally distributed. Hence, wealth inequality measured with the EVS is systematically lower compared to surveys including business wealth. Albers et al. (2020) impute business wealth in EVS data and, then, find similar wealth inequality levels using EVS, HFCS and SOEP.



Note: Gross wealth is the sum of real estate wealth, financial assets and insurance wealth. The left-hand graph gives the Gini index, while the right-hand graph gives the Theil index.

Figure 6: Inequality indices for gross wealth

6 CONCLUDING REMARKS

In this paper, we discuss economic inequality in Germany. We review the literature, which documents an increase in income and wealth inequality in the 1980s and 1990s – the hightide of the old paradigm. Since the early 2000s, Germany saw no further major increases in wage inequality, but further increases in earnings inequality. This resulted from falling hours worked, an increase in mini-jobs and the selection of low-wage households into part time jobs. The increase in wealth inequality has been moderated by a rise in housing prices, which benefitted the middle class. Yet, the absolute gap between the bottom and top of the income and wealth distribution has widened if we look at percentile thresholds. While relative inequality measured by the Gini coefficient has been the more prominent concept in applied work by economists, it is absolute inequality – the absolute distance between different income and wealth groups - that many people see in their daily lives and that motivates their concerns about distributive justice (Ravallion et al., 2004, p.23).

A second contribution of the paper is that we compare inequality trends in households' equivalent disposable income, consumption, and wealth for Germany since reunification. Using the Income and Expenditure Survey comes with some caveats but allows us to estimate for the first-time inequality along the three dimensions. The results suggest that, between 1993 and 2013, disposable income inequality increased, wealth inequality remained fairly stable, and consumption inequality declined. Disposable income evolved quite differently across the distribution. In West Germany, disposable income in the 10th percentile is at about 1,100 euros between 1993 and 2003, but declines thereafter to about 1,000 euros. In East Germany, disposable income slightly increased from about 900 euros in 1993 to about 1,000 euros in 1998, but then returns to its initial level. For the 90th percentile, we find a stable upward trend for East Germany from about 2,200 euros in 1993 to almost 3,000 euros in 2013. In West Germany, disposable equivalent income for the 90th percentile remains about constant

over the two decades at about 3,800 euros. As a consequence, disposable income inequality slightly increased in Germany. The increase is particularly sharp in East Germany, but the inequality level is still lower than in West Germany.

Consumption inequality is lower than income inequality, which is consistent with the theoretical argument of consumption smoothing, according to which households try to stabilize consumption for transitory income changes by saving or dissaving. Between 1993 and 2013, consumption inequality declined.

Average household wealth in Germany remained quite stable between 1993 and 2018 at about 200,000 euros, but slightly increased since 2008. An average East German household still owns about half of what a West German household owns in 2018, even though average household wealth increased substantially from less than 70,000 in 1993 to more than 120,000 euros in 2018. In overall Germany, the 90th percentile remained rather stable at about 500,000 euros and then increased since 2008; the 50th percentile fluctuated around 100,000 euros. In contrast, the 10th percentile decreased from almost 4,000 euros in 1993 to zero in 2018. Wealth inequality in Germany slightly increased in the 1990s until the early 2000s. However, wealth inequality in East Germany decreased during the 1990s. With the increase in housing prices, which disproportionately enriched middle-class, wealth inequality first declined between 2008 and 2013 and then increased between 2013 and 2018. However, these recent changes in wealth inequality are not statistically significant.

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