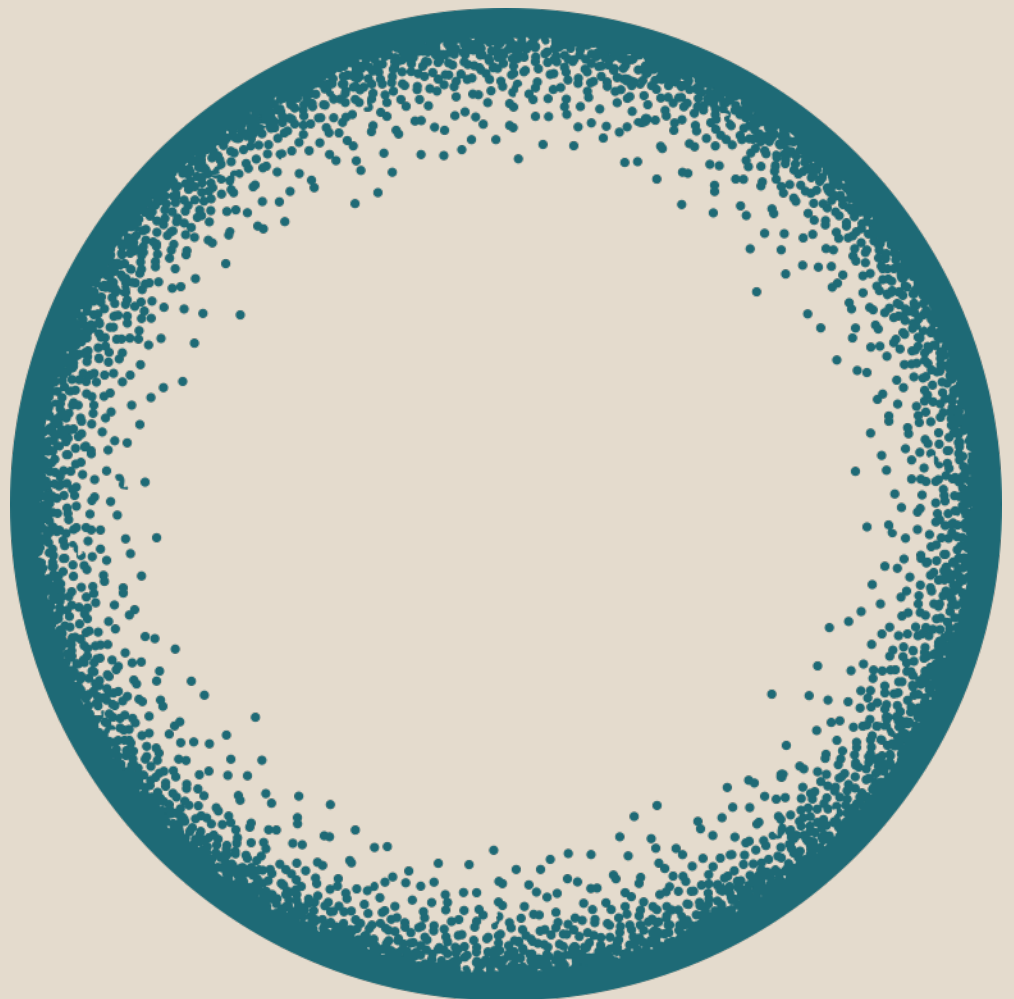# FORUM FOR A NEW ECONOMY

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The role of rental income, real estate and rents for inequality in Germany

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Impressum:

THE ROLE OF RENTAL INCOME, REAL ESTATE AND RENTS FOR INEQUALITY IN GERMANY

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Abstract. We quantify the contribution of rental income to pre- and post-government equivalent household income inequality and of housing wealth to net wealth inequality between 2002 and 2017 in Germany by means of a factor decomposition. Further, we differentiate by region types (urban vs. rural, large vs. small municipalities) and federal states. We find that housing wealth, housing ownership and rental income particularly increased in large municipalities and urban areas; that rental income explains an increasing share of income inequality; and that the wealth inequality contribution of primary residence has increased over time, while the contribution of other real estate has decreased. Finally, we find an increasing rent load for the second quintile and the top quintile of the income distribution.

CONTENT

1 INTRODUCTION

Since the unification of Germany in 1990, income and wealth inequality has increased. Next to many other studies, this trend is documented in the first paper of this series by Bartels/Schröder (2020). What are the factors driving these changes? Real estate is at the center of the debate on rising wealth inequalities in many countries, including Germany. This is for several reasons. First, the average German household holds half of its wealth in real estate. Second, the middle class is highly invested in real estate (Albers et al., 2020). Third, housing prices increased by 50% between 2010 and 2018 in Germany (Bulwiengesa index), enriching those who already owned a house and those with sufficient capital to enter the housing market. Ownership of (owner-occupied) real estate is also important for income and consumption inequalities: While real estate provides an income to landlords, increasing rents restrict material resources for other types of household spending.

We estimate the contribution of equivalent rental income to equivalent household income inequality and the contribution of net housing wealth to household net wealth inequality in Germany for the 2002 to 2017 period. We provide results for overall Germany but also take a regional perspective because the location of the house is central for rent and house price. Most importantly, not only do urban areas and large municipalities generally feature higher house prices and rents, but these have also seen faster increases recently. In our regional exercises, we distinguish between urban and rural areas, large and small municipalities, and federal states. Finally, we investigate to what extent the rent load has increased disproportionately for households in urban areas, large municipalities, and at the bottom of the income distribution.

We embed our investigation of inequality drivers related to the housing market into a literature overview on the causes for rising inequality. This overview entails the most recent evidence on causes of rising labor income inequality in Germany. We also summarize the emerging international literature on causes of wealth inequality.

This paper is structured as follows. Section 2 presents data, definitions, and methods. Section 3 focuses on the causes of income inequality, Section 4 on wealth inequality, and Section 5 on consumption inequality. Section 6 concludes.

2 DATA AND METHOD

2.1 Data

Our analysis is based on the German Socio-Economic Panel (SOEP v35).[1] Households form our unit of observation. We select the years 2002, 2007, 2012, and 2017, because SOEP only surveys household wealth in these years. All wealth and income variables are defined on the household level and price-adjusted to the year 2017 using the consumer price index of the German Federal Statistical Office.[2] Following the conventions in the literature, we convert household income into equivalent units using the OECD modified equivalence scale. We do not adjust household wealth because pooling of wealth is less likely to occur than for income.

While providing information on a wide array of question, surveys are known to miss the very wealthy at the top of the distribution, which creates a downward bias for income and wealth inequality measures (Bartels/Metzing, 2019; Schröder et al., 2020).

Our focus variables of net wealth (including net real estate wealth), household income (including rental income), and rent load are defined as follows:

- **Total net wealth** is the sum of the household net real estate, financial assets, insurances, business assets, reduced by housing debt and consumer debt. The concept applied in this paper does not consider vehicles or student loans. In case of item-nonresponse, we include imputed values. More information on the survey and imputation methods of SOEP household wealth is provided in Grabka and Westermeier (2015).
    - **Net value of household's prime residence** (p011ha): Market value of owner-occupied property net of mortgages.
    - **Net value of other real estate** (e011ha): Market value of tenant-occupied multi- or single-family homes/apartments and vacation/weekend homes or undeveloped land net of mortgages.
    - **Financial assets** (f010ha): Market value of financial assets such as savings accounts, bonds, shares, and other financial investments, except for building loans (*Bausparverträge*) and insurances (see below). In 2002, respondents were only asked to state their financial assets if they exceed 2,500 Euros. Assets below this threshold are imputed.
    - **Building loans and insurances** (i010ha): The total sum of building loan credit balances (*Bausparguthaben*) as well as insurances such as life insurance policies or private retirement plans (incl. *Riester* and *Rürup* pensions).

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[1] See Goebel et al. (2019) for more information on the SOEP.
[2] Destatis (2020): Verbraucherpreisindizes für Deutschland- Lange Reihen ab 1948, June 2020.

- o **Business assets** (b010ha): The market value of assets originating from the ownership of a commercial enterprise (company, shop, office, farm, etc.).
  - o **Consumer debt** (c010ha): The amount of debt from loans (except for mortgages on homes and property) given out by banks, other institutions, or individuals for which household members are personally liable.
- **Annual pre-government household income** (*i11101 in the pequiv dataset*) is the sum of labor income, asset income, private transfers, and private retirement income. **Annual post-government household income** (*i11102 in the pequiv dataset*) is annual pre-government household income and public transfers reduced by household taxes and social contributions. We single out the role of income from rental and leasing, which is part of households' asset income:
  - o **Annual income from rental and leasing** is the net value of revenue from income and leasing (*renty* in the *pequiv* dataset) reduced by operation and maintenance costs (*opery* in the *pequiv* dataset).
- **Rent load** is the ratio of monthly rent without heating costs (*Kaltmiete, hgrent*) to the imputed monthly disposable income of the household (*hgi1hinc*). Rent load is only calculated for households who are not living in their own property and who pay a non-zero amount of rent.

For the regional analysis, we draw on additional information on the location of the SOEP respondents' residence. The location of the SOEP respondent's residence is classified into the following regional classifications:

- **Federal state (*Bundesland*)**
- **Size of municipality (*Gemeindegröße*)** refers to the city or municipality size of the household's place of residence. All 11,054 municipalities in Germany are clustered into three categories: Up to 20K inhabitants, 20K to 100K inhabitants, or more than 100K inhabitants.
- **District type (*Siedlungsstrukturelle Kreistypen*)** refers to the settlement structure of the household's region of residence. The total of 412 districts in Germany are clustered into three types: Highly consolidated (*Kernstädte & Hochverdichtete Kreise*), consolidated (*verdichtete Kreise und Umland*), and rural (*ländliches Umland und ländlicher Raum*).

Table 1 shows our number of observed households per year and the weighted share of tenants, households living in large municipalities, and urban (=highly consolidated) districts. We further display the mean, 10th, 50th, and 90th percentile of the distribution of pre-government and post-government income as well as rent load conditional on positive values. Statistics for net wealth include negative and zero values.

Table 1: Descriptive characteristics

		2002	2007	2012	2017
Number of households	All (non-weighted)	12,584	11,589	14,889	15,740
	Tenants (%)	49	48	51	52
	Living in large municipalities (%)	32	32	31	32
	Living in urban districts (%)	47	46	45	47
Pre-government income	Mean	25,914	25,245	26,267	28,213
	P10	1,106	788	881	1,119
	P50	21,713	21,349	21,997	23,640
	P90	51,899	52,080	53,241	57,324
	Zero income (%)	4	5	5	5
Post-government income	Mean	22,425	22,622	23,067	24,522
	P10	11,109	10,494	10,935	11,055
	P50	19,681	19,591	20,068	21,347
	P90	35,538	36,288	36,941	39,641
Net wealth	Mean	246,490	221,158	206,318	247,824
	P10	1235	-911	-525	500
	P50	116,077	96,763	102,473	129,893
	P90	545,267	491,786	459,840	540,000
Rent load (%)	Mean	26	27	26	26
	P10	13	14	14	13
	P50	23	24	24	24
	P90	42	41	41	42

Note: SOEP v35, own calculations. Pre- and post-government income statistics conditional on income larger than zero; net wealth includes zero and negative values. Income and wealth in prices of 2017. Number of household observations non-weighted. All other statistics weighted using household weights.

2.2 Methods

We apply Shorrocks' (1982) factor decomposition to quantify the inequality contribution of rental income to total income inequality and of net real estate to net wealth inequality, respectively. We include all households in the factor decomposition. This means that transfer-receiving households with zero pre-government income enter the decomposition of pre-government income with zero income. Shorrocks' decomposition method uses the coefficient of variation (CV) as its measure of inequality, which is the ratio between standard deviation and mean. In our analysis, the variable $totvar$ represents either total net wealth or total household income (both pre- and post-government household income). When analyzing the role of rental income for income inequality, $factor_f$ represents either rental income or other household income. When analyzing the role of net real estate wealth for net wealth inequality, $factor_f$ represents the asset types listed in 2.1. We measure inequality in a certain outcome, $totvar$ (total income or wealth), by means of the coefficient of variation, CV. We denote the relative contribution of $factor_f$ to total inequality by s_f. Shorrocks (1982) shows that this coefficient can be expressed as the sum of relative inequality contributions as

$$CV(totvar) = \sum_f s_f \cdot CV(totvar) \qquad (1)$$

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$$s_f \equiv \rho_f \cdot \frac{\sigma(factor_f)}{\sigma(totvar)} \qquad (2)$$

In equation (2), ρ_f is the correlation between $factor_f$ and $totvar$, $\sigma(factor_f)$ is the standard deviation of a factor and $\sigma(totvar)$ is the standard deviation of $totvar$.

3 CAUSES FOR CHANGING INCOME INEQUALITY

Pre-government income can be broadly defined as the sum of labor income and capital income. The largest part of the population relies on labor income and receives only small capital incomes. Consequently, a large literature investigates the causes behind changing labor income inequality as the dynamics uncovered affect much of the population. We review this literature for Germany in Section 3.1. In contrast, capital income is quite concentrated at the top of the income distribution, such that rising capital income – for example, from rental and leasing – mechanically increases income inequality. Capital income, as a factor behind income inequality, is the subject of Section 3.2.

Post-government income additionally includes taxes and transfers. Recipients of social security pensions, unemployment benefits, social assistance, or other types of government transfers have positive post-government incomes, but zero pre-government income. Changes in the tax and transfer system contributed considerably to rising inequality of post-government equivalized income inequality between 1999/2000 and 2005/2006 (Biewen/Juhasz, 2012), but did not significantly alter the distribution after 2005 (Biewen et al., 2019).

3.1 Labor income

This section presents an overview on the causes of individual labor income inequality in Germany. Individual labor income is the product of (paid) hourly wages and working hours. Most empirical studies investigate individual wage inequality because working hours are less frequently documented in data sources. We add the existing evidence on individual labor income inequality and working hours at the end of this subsection. Individual labor income inequality differs from household labor income inequality. There is a large literature investigating the implications of female labor supply decisions in the household context for household labor income inequality (see, e.g., Hyslop, 2001). For Germany, Pestel (2017) finds evidence that positive assortative mating[3] increases labor income inequality, especially in East Germany. In the following, we summarize the findings on causes of individual wage inequality in Germany in more detail.

- **Between-firm inequality** is identified as the key driver for the 1985-2009 period (Card et al., 2013), for 2000-2010 (Ohlert, 2016), and for 2001-2006 (Antonczyk et al., 2010). Between-firm inequality captures the workplace component of wage inequality that arises because some firms pay higher wages than others for equally skilled workers. Card et al. (2013) identify three channels through which between-firm inequality raised wage inequality: higher wage premium between different establishments, higher heterogeneity between workers, and increasing assortativeness of people who would tend to earn more into better paying establishments.

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[3] Assortative mating describes a phenomenon where people choose to mate with persons similar to themselves. The economic literature focuses on earnings, i.e., high-income earners mate with other high-income earners.

However, Biewen and Seckler (2019) find only small effects of firm heterogeneity for 1995 to 2010.

- **De-Unionization** is identified as the dominating effect underlying rising wage inequality from 1995 to 2010 by Biewen and Seckler (2019) as well as for rising wage inequality in the lower tail during the 1990s by Dustmann et al. (2009). Union coverage declined from 82% in 1996 to 55% in 2015. Further, the share of *opening clauses* (*Öffnungsklauseln*)[4] in industry-wide collective contracts in manufacturing increased from 5% in 1995 to 60% in 2004.

- **Skill-biased technological change**[5] is identified as the main cause for increasing wage inequality at the top of the distribution in the 1980s. According to Dustmann et al. (2009), technology asymmetrically affected the bottom and the top of the wage distribution by substituting for routine tasks and complementing nonroutine tasks. As a result, occupations that were at the top of the 1980 wage distribution experienced the largest growth rates.

- **Tasks** performed on the job are argued to affect wage inequality through skill-biased-technological changes. The main hypothesis is that recent technological change is biased toward replacing routine tasks, leading to lower wages at the bottom of the wage distribution, thereby increasing wage inequality. The study by Spitz-Oener (2006) identifies a substantial effect of nonroutine cognitive tasks benefitting workers who are in charge of analytical and interactive tasks. In contrast, task changes are found to have only moderate effects from 1995 to 2010 (Biewen and Seckler, 2019) or even wage inequality reducing effects between 1999 and 2006 (Antonczyk et al., 2009).

- **Outsourcing/Offshoring** has a marked effect on wages, increasing high-skill wages and decreasing low-skill wages according to Geishecker and Görg (2008).

- **Exporting activity** is associated with up to 30% of within and between skill group wage inequality for West German manufacturing firms 1993-2007, as exporters have higher wage dispersion (Klein et al., 2013). Additional evidence for the disequalizing role of exporting is produced by Baumgarten (2010), who shows that the wage differential between exporters and domestic establishments increased substantially from 1996 to 2007. The increased wage differential contributed to increasing wage inequality both within and between skill groups. In contrast, only small effects of internationalization (measured by exporting behavior of firms, offshoring pressure, and import competition) are found by Biewen and Seckler (2019).

- **Compositional effects of personal characteristics,** such as age and education, are identified as the second most important effect for rising wage inequality 1995-2010 by Biewen and Seckler (2019). During both the 1980s and 1990s, changes in workforce composition – rising

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[4] *Opening clauses* give the possibility of adapting general sectoral or regional collective agreements to the specific needs of individual enterprises at the plant-level.

[5] Skill-biased technological change describes a shift in the production technology favoring skilled workers over unskilled workers by increasing skilled workers' relative productivity and, therefore, their relative demand.

education – explain up to 50% of the increase in upper-tail wage inequality, but at most 15% of the increase in lower-tail wage inequality (Dustmann et al., 2009).

- **Hours changes** and part-time work explain 10-30% of male and 37-47% of female labor income changes between 2001 and 2010 (Biewen and Plötze, 2019). Beckmannshagen and Schröder (2020), analyzing the period between the early 1990s and 2017, find that rising inequality of working hours (especially, the increasing covariance of working hours and wages) played an important role for increased individual labor income inequality, while rising wage inequalities explain only 10%.

All in all, the literature on wage inequality for 1985-2009 highlights **between-firm inequality** as the key driver (Card et al., 2013) and, for 1995-2010, studies identify **de-unionization** as the dominating effect (Biewen and Seckler, 2019), especially at the lower tail of the wage distribution (Dustmann et al., 2009) and **compositional effects** of personal characteristics such as age and education as the second most important effect (Biewen and Seckler, 2019), particularly at the upper tail (Dustmann et al., 2009). The rising inequality of **working hours** is key for explaining increased individual labor income inequality (Beckmannshagen and Schröder, 2020).

3.2 Capital income

Capital income consists of interest income, dividends, and income from rental and leasing. Capital income is concentrated at the top of the income distribution (see, e.g., Bartels, 2019, for Germany). As a result, the macroeconomic share of capital income is closely linked to income inequality. The higher the capital share, the higher the inequality of income (see, e.g., Bengtsson/Waldenström). This section investigates the role of income from rental and leasing - a source of capital income that receives increasing attention in the public debate. We will present and discuss the share of households receiving this type of capital income, its regional distribution, and the contribution of rental income to overall income inequality in Germany.

Across German Federal states, between 5% and 17% of households receive income from rental and leasing, as shown in Figure 1. Households living in the West German states are much more likely to receive income from rental and leasing than households located in East German states, particularly in the southern states of Bavaria and Baden-Württemberg as well as Rhineland-Palatinate, where more than 15% of households receive income from rental and leasing. Average incomes from rent and leasing show a similar regional pattern with higher average incomes in the West German states than in the East German states. Annual rental income is between 10,000 and 15,000 Euros (in prices of 2017) in the West German states, and less than 10,000 Euros in the East German states.
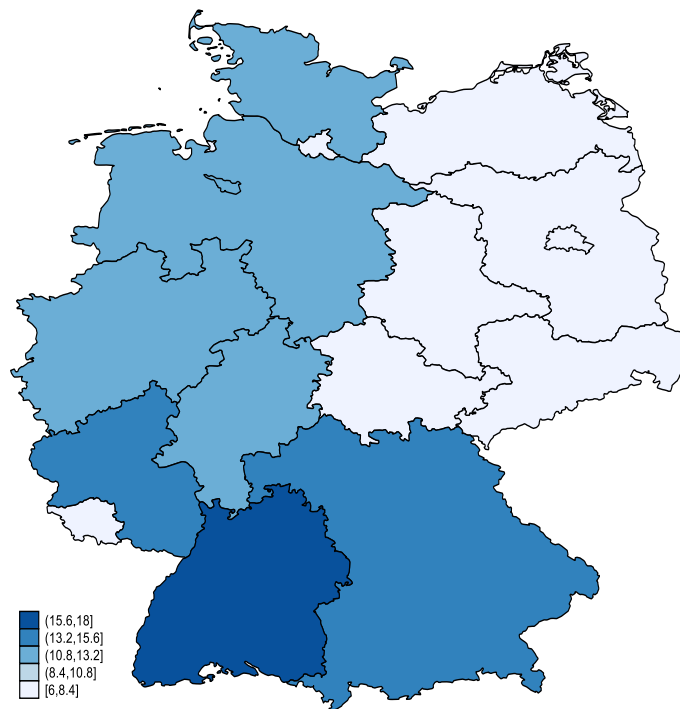
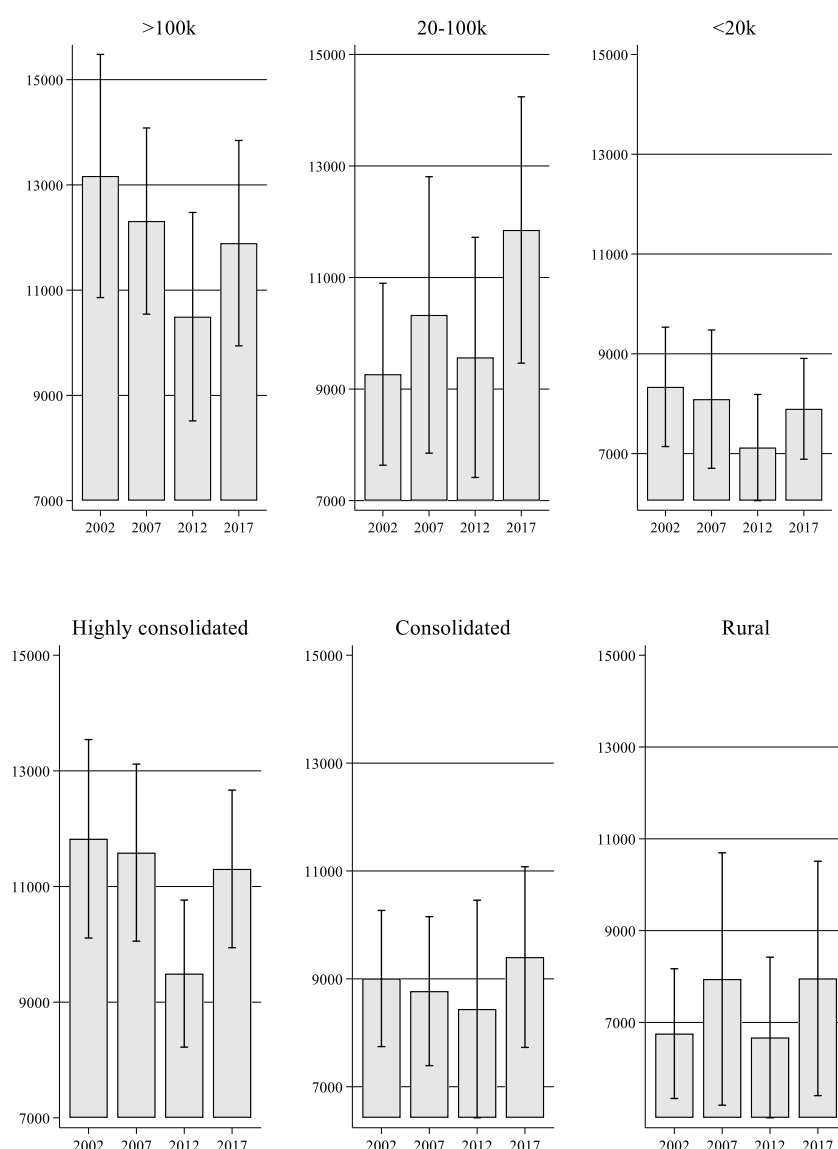Note: SOEP v35, own calculations using household weights.

Figure 1: Share of households with income from rental and leasing by federal state, 2017

The share of landlord households significantly increased across all regional types between 2002 and 2017, as shown in Figure 2. In small municipalities, the share increased from 10% to 13% and, in large municipalities, the share increased from 7% to 9%. In highly consolidated districts, the share increased from 8% to 10% and in rural districts from 8% to 11%. Figure 3 displays the average income from rental and leasing in 2017 euros conditional on receiving this income type. The larger the municipality and the more urban the region of the landlord household, the higher the average income from rental and leasing. Between 2002 and 2012, average income from rental and leasing decreased in real terms in large municipalities and urban regions. Between 2012 and 2017, we observe a sharp income increase across all regional types. In 2017, households located in municipalities with fewer than 20,000 inhabitants received about 8,000 Euros per year, on average. Households in municipalities with more than 100,000 inhabitants received about 12,000 Euros, on average. Households in rural areas earned about 8,000 Euros and households in highly consolidated areas slightly more than 11,000 Euros, on average.
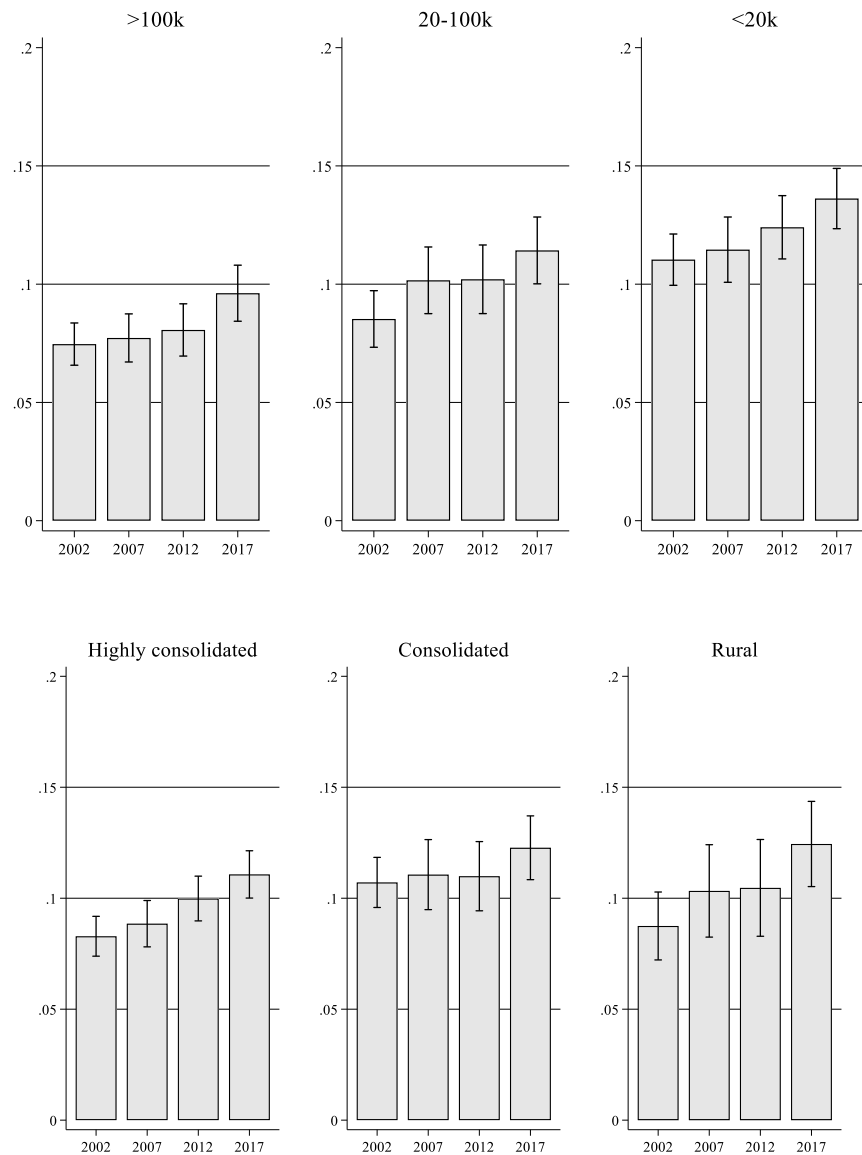
Note: SOEP v35, own calculations weighted using household weights. Share of households receiving positive income from rental and leasing. Whiskers indicate bootstrapped 95% confidence intervals.

Figure 2: Share of landlord households by region type, 2002-2017

Note: SOEP v35, own calculations weighted using household weights. Yearly average income in 2017 prices conditional on receiving income from rental and leasing. Incomes equivalized using the modified OECD scale. Top-coded incomes, i.e. the top 0.1% is replaced with the value of the 99.9 percentile. Whiskers indicate bootstrapped 95% confidence intervals.

Figure 3: Average income from rental and leasing by region type, 2002-2017

To pin down the impact of rental income on overall income inequality, we decompose inequality of pre-government and post-government income with respect to income sources applying Shorrocks' decomposition, as explained in Section 2.2. Table 2 shows the result of this exercise. The table reads as follows: The coefficient of interest, the inequality contribution s_f of rental income, is displayed in column 3. Between 2002 and 2017, this component increased from 9% to 16% for pre-government

income and from 19% to 31% for post-government income. This means that the importance of rental income for explaining overall income inequality increased. One should note, however, that the number of households with positive rental income in our dataset is small. As a result, bootstrapped confidence bands are wide (in parentheses below the point estimates) and we cannot claim that the increase is statistically significant.

The inequality contribution s_f of rental income is the product of the correlation of rental income with total income ρ_f (column 1) and the standard deviation $\sigma(factor_f)$ of rental income (column 2) divided by the standard deviation of total income $\sigma(totvar)$ (column 9) (see Equation 2). While the correlation of rental income and total income – both for pre- and post-government income – increased slightly, the standard deviation of rental income more than doubled. As Figure 2 shows, more and more households receive rental income. The increased standard deviation of rental income highlights the increased dispersion of rental income.

The substantial contribution of rental income to total income inequality stands in contrast to its small share in overall (pre- and post- government) income. The share of rental income in pre-government and post-government income is about 3% in 2017 (column 4), on average. However, the low average masks the high concentration of rental income: about 10% of German households receive rental income (see Figure 2). This small number of landlord households receives, on average, between 8,000 and 12,000 Euros per year depending on the region of the household (see Figure 3). This magnitude is substantial given that the *average* household disposable income is 25,000 Euros in Germany in 2017. As rental income positively correlates with household income (see column 1 of Table 2) – i.e. rental income comes on top of other high incomes from labor or other types of capital – it contributes a substantial share to total income inequality.

Table 2: Income inequality decomposition by factor components (Shorrocks' method)

	Pre-government household income									
	Income from rental and leasing				Other incomes				Total	
	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total income	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total income	Stand. Dev. $\sigma(totvar)$	Stand. Dev. $CV(totvar)$
2002	0.38 [0.34;0.43]	4854 [2869;6839]	**0.09** [0.04;0.13]	0.02 [0.02;0.03]	0.97 [0.94;1]	20054 [19162;20945]	0.91 [0.87;0.96]	0.98 [0.97;0.98]	21367 [20060;22673]	1.06 [1.01;1.11]
2007	0.45 [0.33;0.58]	6825 [3061;10589]	**0.12** [0.02;0.22]	0.03 [0.02;0.03]	0.95 [0.92;0.98]	21555 [20152;22952]	0.88 [0.78;0.98]	0.97 [0.97;0.98]	23534 [21239;25830]	1.12 [1.02;1.22]
2012	0.41 [0.22;0.60]	8180 [1303;15057]	**0.12** [-0.03;0.27]	0.02 [0.02;0.03]	0.97 [0.94;1]	27482 [22044;32920]	0.88 [0.73;1.03]	0.98 [0.97;0.98]	30107 [23382;36832]	1.27 [1.00;1.54]
2017	0.42 [0.29,0.54]	10388 [2980;17797]	**0.16** [0.00;0.31]	0.03 [0.02;0.04]	0.96 [0.93;0.99]	27883 [25838;29928]	0.84 [0.69;1.00]	0.97 [0.96;0.98]	31155 [26420;35890]	1.16 [1.00;1.33]
	Post-government household income									
	Income from rental and leasing				Other incomes				Total	
	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total income	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total income	Stand. Dev. $\sigma(totvar)$	Stand. Dev. $CV(totvar)$
2002	0.43 [0.39;0.48]	4854 [2869;6839]	**0.19** [0.09;0.28]	0.03 [0.02;0.03]	0.87 [0.76;0.99]	10084 [9519;10648]	0.81 [0.72;0.91]	0.97 [0.97;0.98]	11162 [10359;11966]	0.61 [0.57;0.65]
2007	0.58 [0.45;0.70]	6825 [3061;10589]	**0.27** [0.08;0.46]	0.03 [0.02;0.04]	0.85 [0.75;0.95]	11426 [10520;12332]	0.73 [0.54;0.92]	0.97 [0.96;0.98]	13603 [11761;15444]	0.68 [0.60;0.77]
2012	0.48 [0.30;0.66]	8180 [1303;15057]	**0.25** [-0.03;0.52]	0.03 [0.02;0.03]	0.90 [0.81;1.00]	14635 [11397;17873]	0.75 [0.48;1.03]	0.97 [0.97;0.98]	17069 [12729;21409]	0.78 [0.59;0.97]
2017	0.48 [0.37;0.58]	10388 [2980;17797]	**0.31** [0.03;0.58]	0.03 [0.03;0.04]	0.87 [0.77;0.97]	15107 [13773;16441]	0.69 [0.42;0.97]	0.97 [0.96;0.97]	17651 [14592;20710]	0.72 [0.60;0.84]

Note: SOEP v35, own calculations weighted using household weights. Inequality decomposition following Shorrocks (1982). Bootstrapped 95% confidence intervals from 100 drawings in parentheses. SOEP v35, own calculations weighted using household weights. Incomes equivalized using the modified OECD scale.

4 CAUSES FOR CHANGING WEALTH INEQUALITY

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). While the top ten percent were able to double their wealth, the bottom 50% saw their wealth increase by less than ten percent. The consequence is that the average wealth of the top ten percent, which in 1993 was "only" 50 times higher than the bottom half's, increased to being 100 times higher than that of the bottom half in 2018. The share of total wealth owned by the bottom 50% has nearly halved from above five percent to less than three percent since 1993.[6]

The wealth growth of the middle class (homeowners) has almost kept pace with the rich such that the Gini coefficient increased only slightly. Standard inequality measures like the Gini-coefficient mostly illustrate the wealth inequality among the upper half of the wealth distribution, who own substantial amounts of wealth. Hence, the Gini-coefficients fail to show that the distance to those with very little or no wealth (the bottom half) has increased substantially.

The emerging literature on wealth inequality dynamics highlights capital gains and savings as the main forces behind changing wealth inequality.[7] Capital gains from equity and housing create different wealth inequality dynamics because of the heterogeneity of portfolios held by the bottom, middle, and top of the wealth distribution. While housing is the most important asset of the middle class, equity is mostly held by the richest class, i.e., the top decile or the top percentile. For example, the middle 40% (50-90%) of the wealth distribution in Germany own 53% of total net real estate wealth, but only 30% of total stocks. The top decile holds 46% of total real estate and 66% of total stocks (Albers et al., 2020). Thus, housing booms tend to reduce wealth inequality by producing capital gains for the middle class, while stock market booms increase wealth concentration at the top (Garbinti et al., 2020; Kuhn et al., 2019; Martinez-Toledano, 2020). In Germany, rising housing prices since 2010 and high savings of the middle class have largely offset the inequality increasing effects of rising stock prices. Empirical studies document that wealth inequality in Germany, as measured by the Gini coefficient, remained rather stable between 2002 and 2017 (Grabka/Halbmeier, 2019) and increased since unification (Albers et al., 2020; Bartels/Schröder, 2020).

The location of the house is a crucial determinant of its value, with urban areas and large municipalities generally featuring higher housing prices. Hence, this section analyzes how the share of housing ownership and average net housing wealth varies across German regions. We then estimate the portion of wealth inequality in Germany that is explained by real estate wealth.

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[6] The increased number of single households which is often argued to mechanically increase inequality between households. A counterfactual analysis reveals that holding the number of single households constant over time mitigates these growing discrepancies only to a small, negligible extent.

[7] Most studies on the role of inheritances find that inheritances equalize the wealth distribution (see, for example, Bönke et al., 2017, or Elinder et al., 2018). However, Palomino et al. (2020) estimate that the net contribution of inheritances and gifts to wealth inequality in France, Germany, United Kingdom is between 23% and 30%.

Figure 4 shows the share of households with non-zero net real estate assets across Federal states. Housing ownership is substantially higher in the West German states, where about half of all households are invested in real estate. In contrast, 40% or less of those households living in East German states own a house. Independent cities like Hamburg and Berlin have the lowest ownership rates, around 30%.
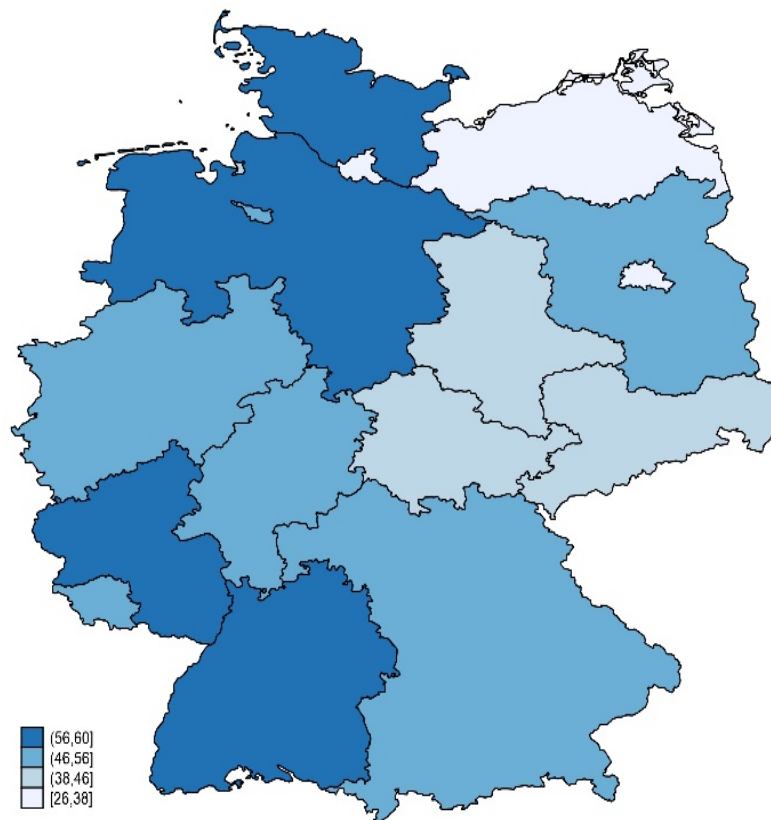
Note: SOEP v35, own calculations weighted using household weights. Share of households with non-zero net real estate in percent.

Figure 4: Housing ownership by state in 2017

Average net real estate in the West German states is much higher than in the East German states, as shown in Figure 5. The highest housing wealth is found in Bavaria and Hamburg, with more than 350,000 Euros net real estate wealth, on average. This is followed by Baden-Württemberg, Hesse, Rhineland-Palatinate, and North Rhine-Westphalia, with average values between 250,000 and 350,000 Euros. In the East German states, average housing wealth is between 100,000 and 150,000 Euros.
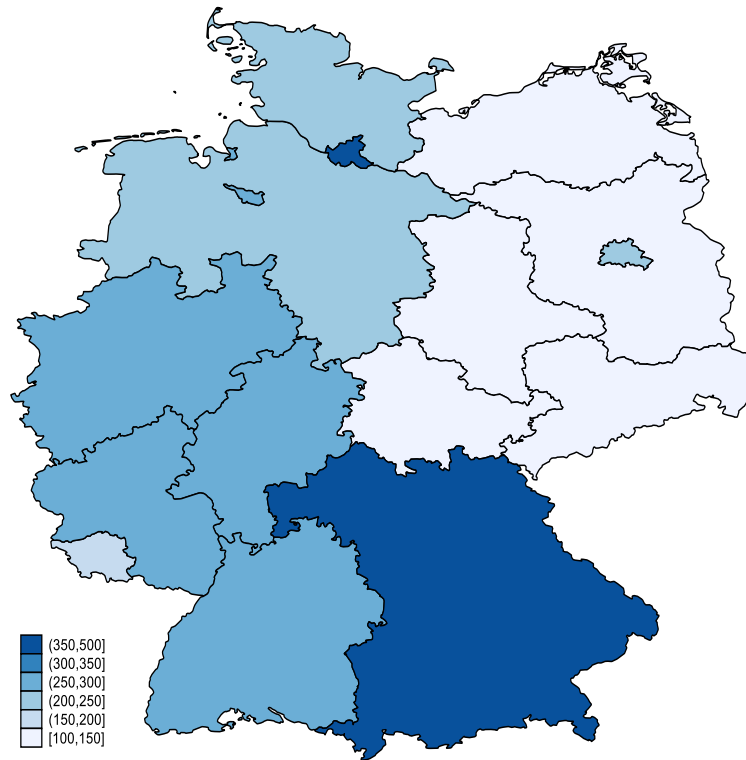
Note: SOEP v35, own calculations weighted using household weights. Average real estate wealth in 1000 Euros in 2017 prices conditional on non-zero net real estate wealth.

Figure 5: Average Net Real Estate Assets wealth by Federal states in 2017

We now analyse ownership and average net real estate wealth by regional type. Figure 6 displays the share of housing ownership across our two regional classifications. Two findings are worth noting. First, housing ownership is higher in rural areas (about 60%) and smaller municipalities (more than 60%). In urban areas and large municipalities, between 30% and 40% of households own real estate. Second, the share of housing ownership has increased significantly in urban, highly consolidated areas, and in larger municipalities.
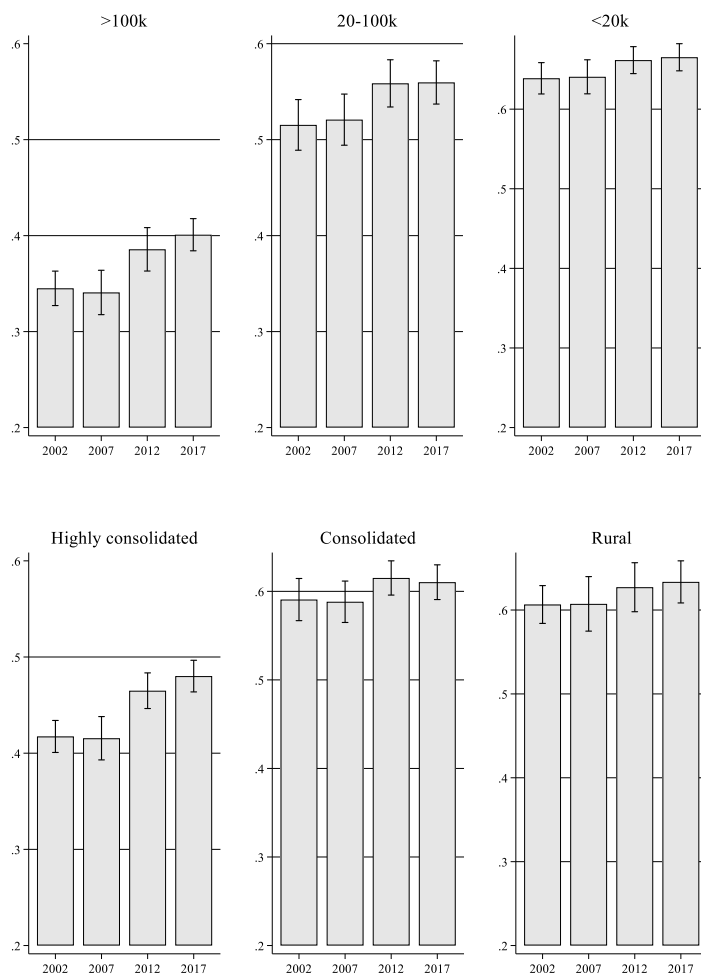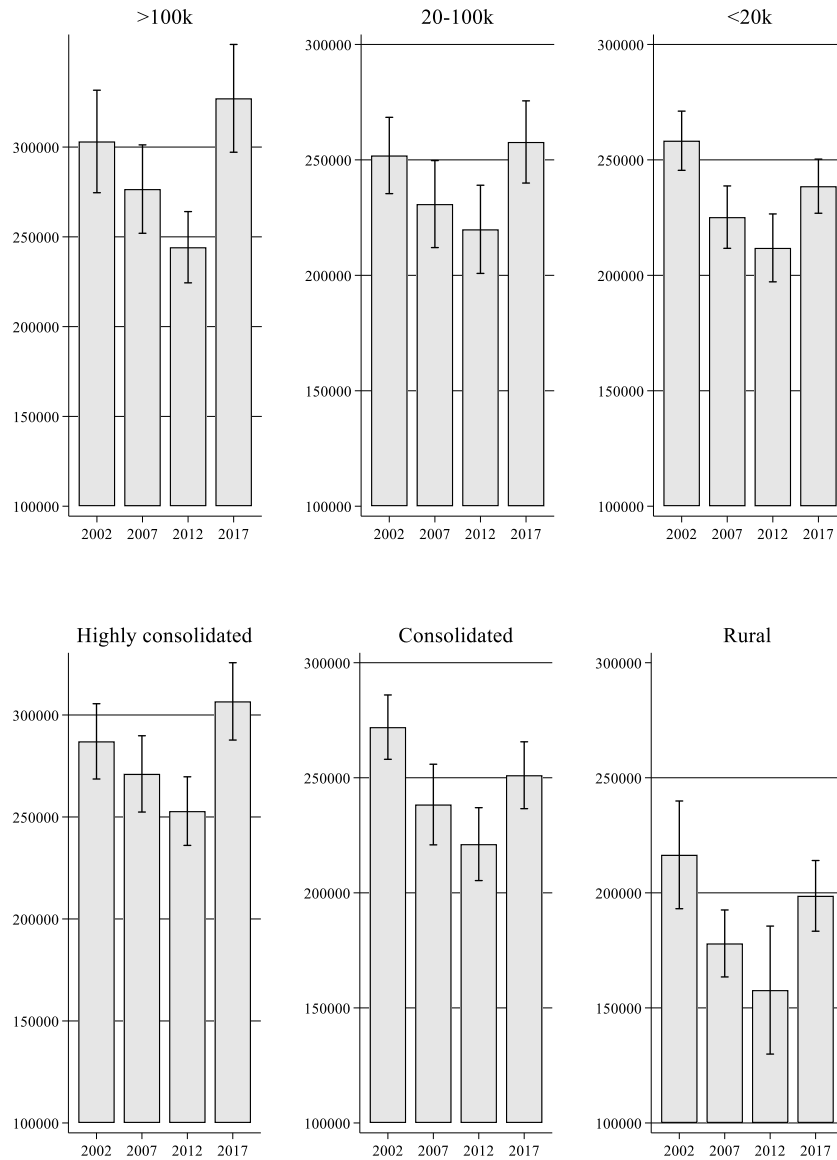
Note: SOEP v35, own calculations weighted using household weights. Share of households with non-zero net real estate. Whiskers indicate bootstrapped 95% confidence intervals.

Figure 6: Share of households with net real estate assets by regional type,

The evolution of price-adjusted average net real estate wealth is displayed in Figure 7. Average net real estate wealth declined from 2002 to 2012 and then quite sharply increased between 2012 and 2017. This trend is found across all region types. Price indices for real estate wealth, like the Bulwiengesa index,[8] decreased in real terms until 2010, then started increasing thereafter. In urban, highly consolidated areas, and large municipalities with more than 100,000 inhabitants, we observe that real estate wealth in 2017 is higher than in 2002 in real terms. In contrast, average net real estate wealth declined in real terms in rural areas between 2002 and 2017. Between 2012 and 2017, when housing prices started to increase, average net real estate wealth increased by more than 50,000 Euros in large municipalities, and highly consolidated areas. While the changes between 2002 and 2017 are not statistically significant, the marked increase between 2012 and 2017 is statistically significant across all regions.

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[8] The Bulwiengesa housing price index of the real estate data analyst firm Bulwiengesa is a widely used price index for real estate, e.g., by the Bundesbank.

Figure 7: Average net real estate by regional type, 2002-2017

Figure 7: Average net real estate by regional type, 2002-2017

What is the contribution of real estate wealth to overall wealth inequality in Germany? We now decompose the net wealth inequality with respect to asset types. Table 3 shows the results of the Shorrocks decomposition explained in Section 2.2. As for the income inequality decomposition, we focus our discussion on the contribution of each factor to total net wealth inequality denoted by s_f. The primary residence contributes between 11% and 16% to net wealth inequality (column 3) and represents about half of overall net wealth (column 4). Between 2012 and 2017, the inequality contribution

decreased and the portfolio share of the primary residence increased, as rising house prices enriched house owners. However, changes over time are not statistically significant.

Other real estate wealth contributes between 20% and 30% to net wealth inequality and represents a fifth of total net wealth, on average. Between 2002 and 2017, the inequality contribution of other real estate declined. Both the correlation with total net wealth (column 5) and the standard deviation (column 6) have declined over time. This alludes to our previous finding that more households receive rental income. With broader parts of the population investing in tenant-occupied housing, the correlation of this asset type with total net wealth declines and it contributes less to total net wealth inequality. However, changes over time are not statistically significant.

Business assets are the most important factor for net wealth inequality. This asset type contributes about 50% to net wealth inequality. The high level of ρ_f highlights the strong correlation between business assets and total net wealth. The higher a household's business assets, the higher their total net wealth.

In 2017, real estate – the typical asset of the middle class – explains 35% of net wealth inequality, while business wealth – the typical asset of the upper class – explains 55% of net wealth inequality. While almost half of the population invests in real estate, firm ownership is heavily concentrated at the top of the wealth distribution. For example, the top 1% of the wealth distribution owns about two-thirds of overall business wealth. At the same time, aggregate real estate wealth is about two times higher than aggregate business wealth (both corporate and non-corporate) in Germany in 2018 (Albers et al., 2020). Business assets represent a substantial fraction of German household wealth, but are concentrated in the hands of few; thereby, it is the important factor for wealth inequality in Germany.

Table 3: Wealth inequality decomposition by factor components (Shorrocks' method)

	Household net wealth											
	Primary residence				**Other real estate**				**Financial assets**			
	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total wealth	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total wealth	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total wealth
2002	0.37 [0.19;0.54]	139873 [131081; 148665]	**0.11** [0.05;0.16]	0.49 [0.46;0.51]	0.76 [0.67;0.84]	257477 [164264; 350689]	**0.32** [0.20;0.43]	0.16 [0.13;0.18]	0.30 [0.18;0.42]	70122 [52783;87461]	0.04 [0.02;0.06]	0.10 [0.10;0.11]
2007	0.46 [0.36;0.57]	145168 [133833; 156503]	**0.17** [0.11;0.23]	0.48 [0.46;0.49]	0.63 [0.47;0.79]	198787 [134704;262870]	**0.27** [0.15;0.39]	0.15 [0.13;0.16]	0.43 [0.36;0.50]	129250 [54140; 204360]	0.13 [0.03;0.23]	0.13 [0.12;0.15]
2012	0.47 [0.33;0.61]	149047 [136739;161355]	**0.18** [0.10;0.25]	0.51 [0.49;0.53]	0.68 [0.61;0.75]	175603 [133823; 217382]	**0.28** [0.20;0.35]	0.14 [0.12;0.16]	0.40 [0.29;0.52]	87877 [68777; 106977]	0.09 [0.04;0.13]	0.13 [0.12;0.14]
2017	0.43 [0.18;0.67]	200755 [169521;231989]	**0.16** [0.04;0.28]	0.53 [0.51;0.55]	0.50 [0.23;0.77]	201654 [159764; 243543]	**0.19** [0.05;0.33]	0.15 [0.13;0.16]	0.37 [0.19;0.56]	117668 [85200;150137]	0.08 [0.01;0.16]	0.13 [0.12;0.14]

	Business assets				**Building loans and insurances**				**Total**		
	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total wealth	Correlation ρ_f	Stand. Dev. $\sigma(factor_f)$	Ineq. Contr. s_f	Share in total wealth		Stand. Dev. $\sigma(totvar)$	Stand. Dev. $CV(totvar)$
2002	0.85 [0.65;1.06]	365758 [209237; 522279]	**0.48** [0.29;0.67]	0.13 [0.11;0.16]	0.41 [0.14;0.68]	76971 [46049; 107894]	0.06 [0.01;0.11]	0.12 [0.11;0.12]		595282 [431269; 759295]	3.35 [2.52;4.18]
2007	0.77 [0.62;0.92]	262909 [145803; 380015]	**0.39** [0.22;0.57]	0.10 [0.08;0.12]	0.30 [0.24;0.37]	54338 [48487;60188]	0.04 [0.02;0.05]	0.15 [0.14;0.16]		481461 [383657; 579266]	2.75 [2.26;3.23]
2012	0.84 [0.71;0.97]	255738 [171798; 339679]	**0.43** [0.30;0.56]	0.10 [0.09;0.12]	0.27 [0.19;0.35]	41035 [37048; 45021]	0.03 [0.02;0.04]	0.11 [0.11;0.12]		451067 [366415; 535719]	2.51 [2.09;2.94]
2017	0.85 [0.59;1.11]	434734 [141988; 727481]	**0.55** [0.23;0.88]	0.10 [0.08;0.12]	0.25 [0.14;0.36]	45739 [38017;53461]	0.02 [0.01;0.04]	0.10 [0.09;0.10]		615890 [408587;823194]	2.83 [1.91;3.75]

Note: SOEP v35, own calculations weighted using household weights. Net wealth including negative values. Components for consumer debt are not shown for space reasons. Bootstrapped 95% confidence intervals from 100 drawings in parentheses.

5 CAUSES FOR CHANGING CONSUMPTION INEQUALITY

In this section, we analyze the role of rent for consumption inequality given that rent is the most important consumption item for tenant households. An increasing rent load limits the consumption possibilities of tenant households. As rents have disproportionately increased in urban areas and rent load is higher for lower income households, we focus our analysis on the evolution of the rent load across regional types and across income quintiles. Tenant households have less post-government income, on average, than owner households, as Figure 8 shows. Although average post-government incomes are generally higher in larger municipalities and urban areas, income growth for owners was higher. The growing income gap between tenants and owners highlights the importance of studying the rent load for tenants.
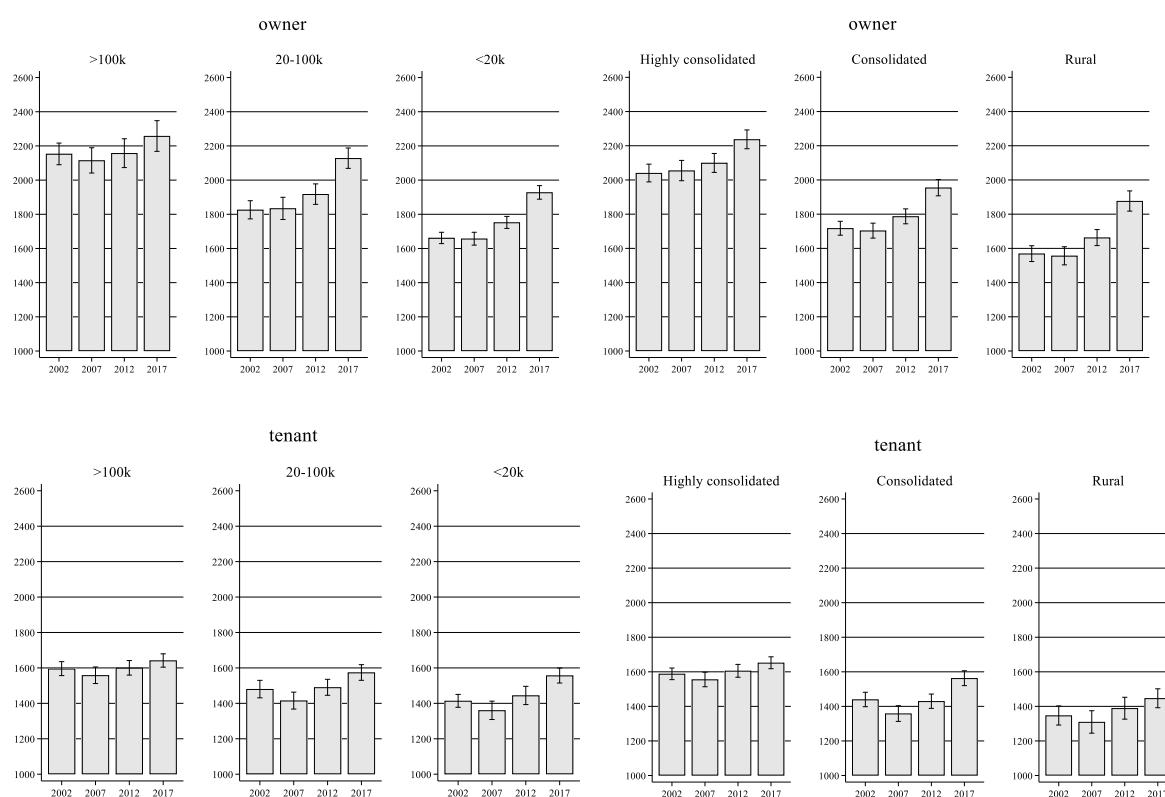
Note: SOEP v35, own calculations weighted using household weights. Incomes winsorized at the 0.5th and 99.5th percentile. Incomes equivalized using the modified OECD scale and in prices of 2017. Whiskers indicate bootstrapped 95% confidence intervals.

Figure 8: Average monthly disposable income by region, 2002-2017: house owner vs. tenant

Did rents increase faster than incomes? As a measure for rent load, we use the share of basic rent (*Kaltmiete*) relative to disposable income for tenants. Figure 9 shows the rent load for tenants across regions and over time. In most regions, the rent load is between 25% and 28%. A slightly rising rent load is identified in municipalities with more than 100,000 inhabitants and in highly consolidated districts, where the rent load increased from about 26% to 27%.
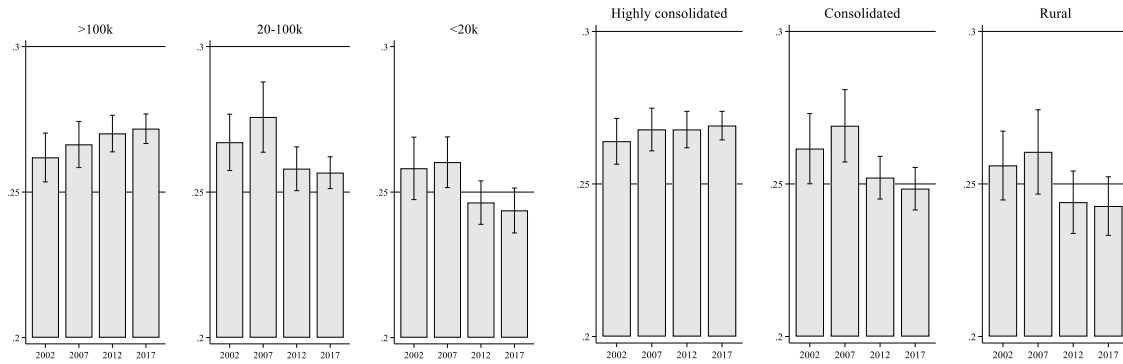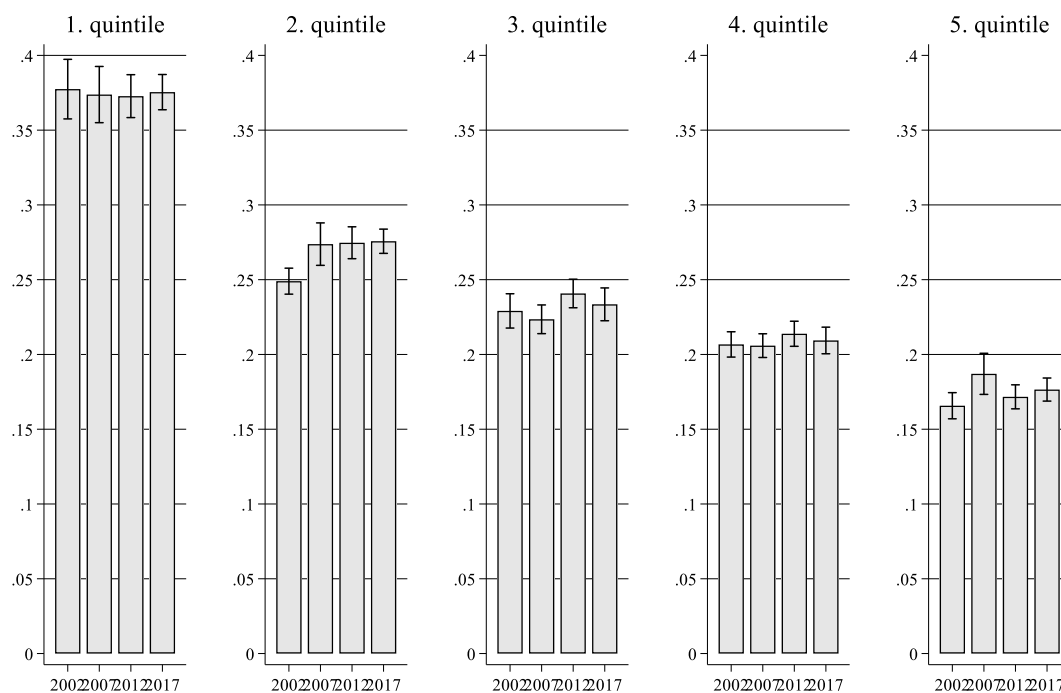
Note: SOEP v35, own calculations weighted using household weights. Rent load is the share of basic rent (*Kaltmiete*) in monthly disposable income conditional on not living in own property and on paying rent. Incomes winsorized at the 0.5th and 99.5th percentile. Incomes and rent equivalized using the modified OECD scale. Whiskers indicate bootstrapped 95% confidence intervals.

Figure 9: Rent load by region type, 2002-2017

Has the increased rent load in large municipalities disproportionately affected low-income households? Figure 10 shows the rent load for tenants by quintiles of disposable income in large municipalities (>100k inhabitants). Two findings stand out. First, the rent load is substantially higher for low-income households. For the bottom quintile, rent represents almost 40% of their disposable income. For the top quintile, the rent load is less than 20%. One should note that three out of four households in the bottom quintile are net government transfer recipients, i.e., their disposable income is higher than their market income. Second, the increase of the rent load is concentrated at the second and the fifth quintile. For the bottom quintile, whose monthly disposable household income was about 800 Euros per month, on average in 2017, the rent load remained rather stable.[9] Four in five households in the bottom quintile are net government transfer recipients, i.e., their disposable income exceeds their market income. More frequent removals probably contributed to stabilize the rent load of the bottom quintile. In 2017, 35% of the bottom quintile has changed their address within the past five years, while this share is 26% in the second quintile. The increasing rent load for the top quintile is, amongst others, connected to a steadily increasing apartment size. While the average apartment size remained at around 64 square meters for the bottom quintile and at 74 square meters for the second quintile, the average apartment size of the top quintile increased from about 98 square meters in 2002 to 108 square meters in 2017.

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[9] Dustmann et al. (2018), using EVS survey data, find that housing expenditures disproportionately increased for the bottom quintile, particularly between 1993 and 2003. It should be noted that their definition of housing expenditures for renters also includes energy costs on top of basic rent. Further, their analysis includes both renters and owners, meaning that results are not directly comparable.

Note: SOEP v35, own calculations weighted using household weights. Rent load is the share of basic rent (*Kaltmiete*) in disposable income conditional on tenant household, i.e. not living in own property and paying rent. Incomes winsorized at the 0.5th and 99.5th percentile. Incomes and rent equivalized using the modified OECD scale. Quintiles are computed on the full distribution of both tenants and house owners in large municipalities (>100k). Whiskers indicate bootstrapped 95% confidence intervals.

Figure 10: Rent load in large municipalities by quintile of disposable household income

6 CONCLUSION

This paper studies inequality trends in Germany with a particular focus on regional differences in wealth and income inequality through house prices and rental income.

The section on income inequality summarizes the literature showing that rising wage inequality in Germany arose from between-firm inequality, de-unionization, and technological change. Increasing rents and house prices have shaped the public debate. Our data shows overall increasing shares of households that receive income through rents between 2002 and 2017. In particular, East German households still show significantly lower shares of landlord households and also lower average incomes from rental income than West German households with no visible catch-up effect. The contribution of rental income to overall income inequality increased between 2002 and 2017.

Wealth inequality changes are mainly driven by capital gains from housing and equity prices as well as differential savings rates. Rising house prices tend to reduce wealth inequality, while rising equity prices increase wealth inequality. The 2010s have seen the share of homeownership increase across German federal states and across region types, particularly in urban areas and larger municipalities. Hence, a rising share of German households benefitted from rising house prices and wealth inequality did not change significantly between 2002 and 2017. We document substantial housing ownership and housing wealth differences between East and West Germany. Whereas about half of all households is invested in real estate in West Germany in 2017, this share is lower than 40% in East Germany. In 2017, households in Bavaria and Hamburg show the highest net real estate wealth, at more than 350,000 Euros, on average. Across East German states, average housing wealth is between 100,000 and 150,000 Euros. From 2012 to 2017, average net real estate wealth quite sharply increased, particularly in large municipalities and urban districts. Business assets explain more than half of total net wealth inequality in Germany, followed by net real estate wealth.

Consumption inequality is substantially affected by the share of rent expenditure on disposable income. The rent load slightly increased in municipalities with more than 100,000 inhabitants and urban districts. Overall, the rent load remained quite stable, yet at sizeable level of more than 25%. The rent load significantly increased for the second quintile, but remained stable for the bottom and the upper quintiles. Apparently, disposable income growth kept pace with rent growth, even for the bottom quintile. However, it is worth noting that the bottom fifth of the income distribution pays almost 40% of their income for rent, while this figure is smaller than 20% for the top quintile. Hence, increasing rents hit the poorest the most, thus underlining the importance of preventing rent levels from further increases.

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