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Why a labour market boom does not necessarily bring down inequality: putting together Germany's inequality puzzle

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Abstract

After an economically tough start to the new millennium, Germany experienced an unprecedented employment boom after 2005, only stopped by the COVID-19 pandemic. Persistently high levels of inequality despite a booming labour market and drastically falling unemployment rates constituted a puzzle, suggesting either that the German job miracle mainly benefitted individuals in the mid- or high-income range or that other developments offset the effects of the drastically improved labour market conditions. The present paper solves this puzzle by breaking down the observed changes in the distribution of disposable incomes between 2005–06 and 2015–16 into the contributions of eight different factors, one of them being the employment boom. Our results suggest that, while the latter did have an equalising impact, it was partially offset by the disequalising impact of other factors, and substantially dampened by the transfer system. Our results point to a strong role of the German transfer system as a distributional stabiliser implying that, if the COVID-19 shock were to persistently reverse all the employment gains that occurred during the boom, this would only have a moderately disequalising effect on the distribution of net incomes.

KEYWORDS

employment, income distribution, labour market reform, social insurance

JEL CLASSIFICATION

C14, D31, I30

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1 | INTRODUCTION

Following reunification in 1990, Germany had to face difficult economic conditions throughout the 1990s and the early 2000s: low economic growth, a high fiscal deficit and increasing unemployment. In the mid 2000s, however, the so-called ‘sick man of Europe’ took off and experienced an unprecedented employment boom that has been chasing its own records in recent years.¹ Not even challenging events such as the global financial crisis in 2008–09 or the drastically increased immigration since 2014 (often referred to as the ‘refugee crisis’) have interrupted Germany’s economic upsurge, which was only stopped by the global COVID-19 crisis starting in 2020.

The magnitude of this boom is shown in Figure 1. After several years of stagnation, employment rates began to rise significantly for men, and even more so for women. The boom drastically reduced unemployment and boosted labour market participation, particularly female participation. A number of previous contributions have examined the structure of these employment gains. For instance, Rothe and Wälde (2017) claim that a large number of the unemployed who found a job during the boom did not go into full-time work. Rather, they observe a substantial increase in part-time employment and non-standard work (e.g., marginal employment). However, Ehrich, Musasib and Roy (2018) and Carrillo-Tudela, Launov and Robin (2021) emphasise that the boom increased participation in general, drawing individuals into the labour market who would not have participated otherwise. This was particularly true of women who often entered part-time or marginal employment from non participation.

At the same time, and as shown below, income inequality in Germany first stagnated after the onset of the boom in 2005 but then followed a slight upward trend from 2010 onwards. Given the nature of the boom, this constitutes somewhat of a puzzle. In view of the drastic reduction in unemployment from over five million individuals to around half this value, and the additional participation in part-time and marginal employment, the boom should have massively benefitted those at the bottom of the income distribution, leading to a reduction of income inequality.

A small number of previous contributions have considered the development of income inequality in Germany after 2005. Peichl, Hufe and Stöckli (2018) document the evolution of inequality measures for disposable incomes over the same period, as we do in this paper.² These studies provide evidence for first stagnating and then slightly increasing inequality but do not attempt to relate this finding to other changes such as the employment boom. Biewen, Ungerer and Löffler (2019) consider the period 2005–10 but struggle to establish an effect of both the massive expansion and the compositional changes in employment after 2005 on the resulting distribution of household disposable incomes. Dustmann, Fitzenberger and Zimmermann (2018) present an analysis of inequality trends based on the alternative data set *Einkommens- und Verbrauchsstichprobe* (EVS). They also find slightly rising inequality between 2003 and 2013 but their focus is on the role of housing expenditures on inequality.

In this paper, we aim to make the following contributions. First, we provide more evidence on the exact structure of the ‘German labour market miracle’,³ which has drawn a lot of attention in the literature.⁴ We show that the boom was not a shift from full-time to part-time employment but involved net gains in both categories with the strongest component coming from the expansion of female part-time employment.

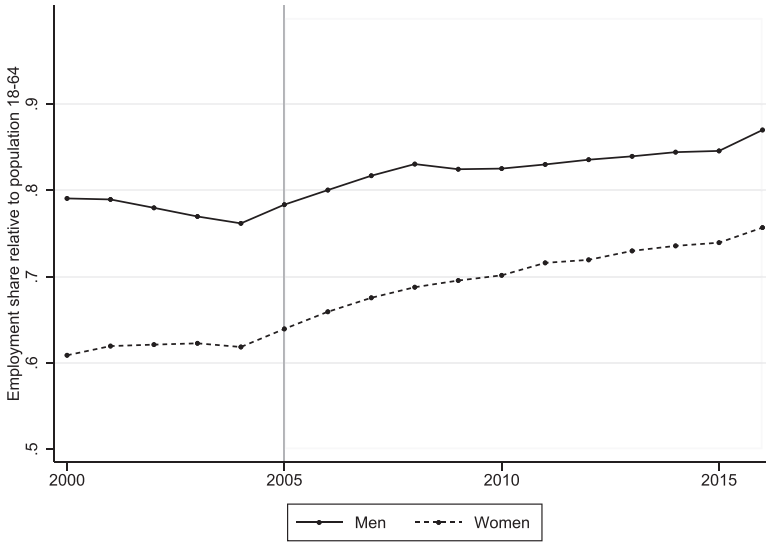
¹ Dustmann et al., 2014.

² See also *Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung* (2019), *Aufstiegschancen sichern, Arbeitsanreize stärken, Jahresgutachten 2019/20*, pp. 316–374.

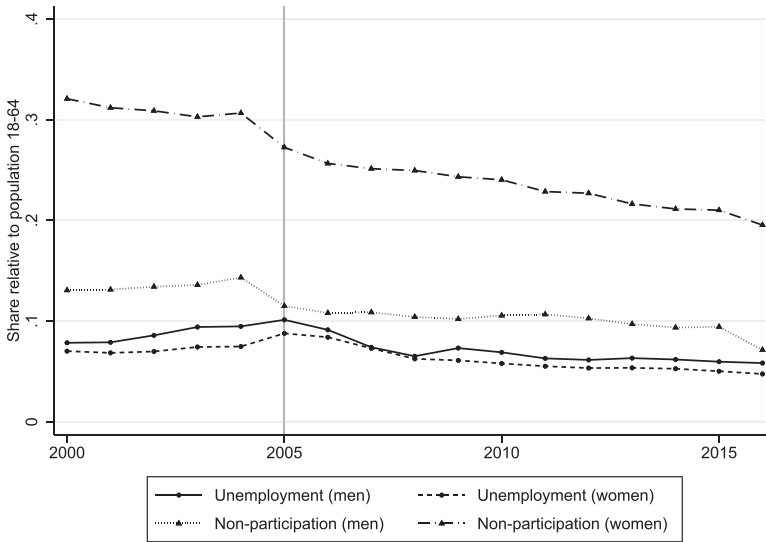
³ Burda, 2016.

⁴ A number of alternative explanations for the boom have been proposed: wage restraint and de-unionisation (Dustmann et al., 2014; Kügler et al., 2018), export boom (Dauth, Findeisen and Suedekum, 2017, 2021), Hartz reforms (controversial; see Akyol, Neugart and Pichler, 2013; Launov and Wälde, 2013, 2016; Hartung, Jung and Kuhn, 2018; Bradley and Kügler, 2019; Hutter et al., 2019; Burda and Seele, 2020; Hochmuth et al., 2021), and changes in the legislation for early retirement (Riphahn and Schrader, 2020) and parental leave (Bick, 2015; Geyer, Haan and Wrohlich, 2015).

FIGURE 1 Aggregate employment, unemployment and non-participation shares by gender, 2000–16



(a) Employment shares



(b) Unemployment and non-participation shares

Source: Federal Statistical Office.

Second, we present an explicit analysis of the effects of the boom on the distribution of net incomes based on rich microdata. Such an analysis is challenging because such effects depend on who exactly gained from the boom, how employment structures changed within households, and how the tax and transfer system transformed gains into net incomes. We explicitly consider heterogeneous effects of the boom on households by modelling in detail changes in labour market participation conditional on a rich set of individual and household characteristics. As employment trends are not the only source of changes in the distribution of net incomes, we also consider the effects of confounding factors such as changes in pay structures, changes in the composition of the population, changes due to immigration, changes in other income sources, such as capital income, and changes in the tax and transfer system.

Third, we contribute to a surprisingly small body of literature that analyses possible causes for changes in the distribution of net incomes – which is the income distribution relevant for welfare analysis and policy – but which is the complex result of a large number of elements such as employment, pay structures, household arrangements and institutional circumstances.⁵ Much of the literature deals with gross incomes⁶ or individual income components, such as wages, which makes it difficult to assess the consequences for the final distribution of net incomes.⁷ An important take-away from our analysis is the distinction between developments in pre- and post-tax/transfer incomes.

We reach the following conclusions. Despite the continuing trend of rising income inequality after 2005, the employment boom did have an equalising effect. This effect, however, was substantially dampened by the generous social security system, in particular unemployment insurance. One of the main purposes of this system is to insure income losses due to job loss or other unforeseen causes. On the positive side, this substantially alleviates the effect of economic downturns. On the negative side, however, this also reduces the effects of economic upturns on net incomes. The impact of the German social security system appears particularly strong in this respect. Our results suggest that even if the economic consequences of the COVID-19 shock were to reverse all the employment gains that occurred during the boom, this would only have modest effects on the distribution of net incomes. We further show that much of the employment boom took the form of additional part-time and marginal part-time work for women, both in single and in non-single households. Thus, our results demonstrate that a long expansion of employment may have a favourable effect on the distribution of incomes, even if much of the employment gains take the form of part-time and marginal part-time work, which are often seen as inferior forms of employment. Finally, we demonstrate that distributional effects of employment changes may be masked by other developments, making it hard to determine their exact magnitude. In our case, we show that the equalising impact of the boom was partly offset by immigration of individuals with low disposable incomes and by long-term compositional changes in the population (educational upgrading and population aging).

The remainder of this paper is structured as follows. In Section 2, we describe the data underlying our study. In Section 3, we provide an overview of recent trends in the German income distribution. In Section 4, we present and discuss our empirical results. We conclude in Section 5. The online Appendix contains a more detailed outline of our methods, whose description in the main text is kept brief.

2 | DATA

Our study is based on the German Socio-Economic Panel (SOEP), a representative study of households living in Germany, collected and maintained by the German Institute for Economic Research (DIW).⁸ In spite of the general limitations of survey data, the SOEP constitutes the only data source containing sufficient information for a study covering all relevant aspects of the distribution of net household incomes, such as different income components, employment outcomes and socio-economic characteristics of all household members. Besides the SOEP core survey, we exploit the information in the SOEP migration samples as well as in the IAB–SOEP refugee sample to assess potential effects of immigration (see details below).

The focal point of our analysis is the distribution of annual net equivalised incomes between the years 2005–06 (when the employment boom set in) and 2015–16 (the most recent survey years with

⁵ Hyslop and Maré, 2005; Daly and Valletta, 2006; Biewen and Juhasz, 2012; Blundell et al., 2018; Jessen, 2019; Sologon, Almeida and Van Kerm, 2019.

⁶ These are often derived from tax records (see, e.g., Armour, Burkhauser and Larrimore, 2013).

⁷ See Armour et al. (2013) for a related point.

⁸ See Goebel et al. (2019).

available income information at the time our study was carried out).⁹ Our measure of net equivalised income is based on annual household net income

$$y = y_{Market} + y_{Pens} + y_{Trans} - ssc(y_{Labour}, y_{Pens}) - tax(y_{Tax}), \quad (1)$$

where y_{Market} denotes the sum of all household members' annual market incomes (labour income and capital income, such as income from interest, dividends, rents¹⁰), y_{Pens} is the sum of all pension incomes (private and public), and y_{Trans} is the sum of public transfers received. Household public transfers include the full range of government transfers, such as unemployment benefits, child benefits, student grants and subsistence allowances (among others; for simplicity, we also include under this label transfers between private households). The terms $ssc(y_{Labour}, y_{Pens})$ and $tax(y_{Tax})$ represent deductions of social security contributions (pensions, health, unemployment and old age care insurance) as well as income taxes paid by the household. We compute both of these components for each household using our own income tax and social security contributions module, which is described in the online Appendix. In order to focus only on real income changes, we inflate nominal income measures to prices of our most recent year 2016 (in the case of taxes and social security contributions we do this after the respective calculations). Finally, we equalise annual net household income using the commonly used modified OECD equivalence scale, and we attribute the resulting equivalised income measure to each household member.

A big strength of a survey data set such as the SOEP is the availability of individual income components, mostly at the individual level.¹¹ This is crucial for our purpose as we aim to counterfactually alter individual components such as labour incomes in order to determine their effect on the resulting distribution of annual household net incomes. An important ingredient to this analysis is the availability of summary calendar information on monthly employment activities in different categories (full-time, part-time, marginal part-time, unemployment) as well as information on income earned in different employment activities (main job, side job, self-employment).¹² The information on employment in full-time, part-time and marginal part-time work is based on the self-reports of the survey participants intending to provide a summary picture of all their employment activities during a given year. In particular, they include the possibility of cumulative, parallel and/or multiple employment spells. The distinction between full-time, part-time and marginal part-time work is made by the survey participants themselves, but we expect them to follow the fact that most full-time jobs in Germany have a contractual working week of 35–41 hours. Part-time jobs usually have much lower working hours. Marginal part-time work is typically either occasional or additional employment with few or irregular working hours or takes a standardised form with certain exemptions from taxes and social security contributions ('mini-jobs', typically 400–450 euros per month).

Based on the information in the monthly income and employment calendars, we construct for each individual the annual number of months worked in different employment categories (full-time, part-time, marginal part-time) along with the average monthly wage received in the respective category.¹³ We include in our definition of employment both dependent and self-employment. Our construction is such that multiplying and adding up individuals' months worked and monthly wages yields the

⁹ We pool years in order to increase statistical precision and to make our analysis less dependent on individual years as in Hyslop and Maré (2005) and Blundell et al. (2007).

¹⁰ Following common practice, we also include imputed rental values for owner-occupied housing and imputed social security contributions for civil servants in household market income.

¹¹ See Grabka (2017).

¹² Given our interest in the distribution of annual incomes, we do not focus on hours worked or hourly wages apart from our distinction into full-time, part-time and marginal part-time work. See Carrillo-Tudela et al. (2021) for some information on changes in hours worked during the period under consideration.

¹³ This requires some choices to reconcile the information in the employment and income calendars, see online Appendix B for more details, which also provides information regarding the comparability of SOEP employment data with data from other sources.

TABLE 1 Individual and household characteristics in 2005–06 and in 2015–16

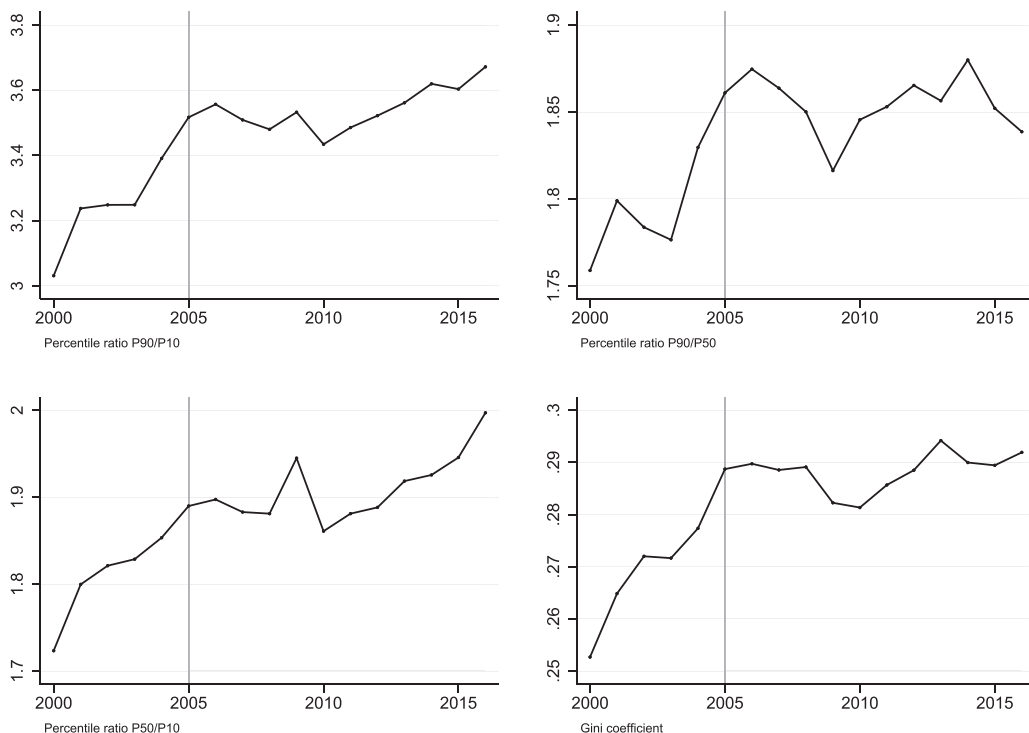
Variable	Average		Difference
	2005–06	2015–16	
Household head			
Female	0.37	0.43	+0.06
Foreign nationality	0.08	0.10	+0.02
Age	50.18	52.47	+2.29
University degree	0.19	0.25	+0.06
Vocational training	0.63	0.59	−0.04
Less than vocational training	0.18	0.15	−0.02
Work experience (years)	12.22	13.35	+1.13
Partner or second oldest person (if any)			
Female	0.72	0.63	−0.09
Foreign nationality	0.11	0.10	−0.01
Age	46.97	49.28	+2.31
University degree	0.14	0.17	+0.03
Vocational training	0.59	0.51	−0.08
Less than vocational training	0.27	0.32	+0.04
Work experience (years)	9.95	10.40	+0.45
Other household characteristics			
East Germany	0.21	0.20	−0.01
Number of children in household	0.70	0.61	−0.08
Number of children 0–3 years	0.11	0.11	0.00
Number of children 4–6 years	0.12	0.10	−0.02
Number of children 7–17 years	0.47	0.41	−0.07
More than two adults	0.18	0.17	0.00

Source: SOEP; own calculations.

annual labour income of each individual as reported in the SOEP and allows us to separately change employment quantities and wage rates in our counterfactual simulations.¹⁴

Our analysis makes use of a large number of further characteristics at the individual and household levels. In general, we distinguish between the following six different household types: (i) single pensioner households (65 years or older); (ii) multiple pensioner households (at least one household member 65 years or older and no household member under 55 years); (iii) single adults without children; (iv) multiple adults without children; (v) single adults with children; and (vi) multiple adults with children. Within households, we consider detailed individual information on the household head and (if present) the partner or the second oldest adult in the household (gender, age, nationality, educational qualification in three categories, work experience in years; see Table 1). For certain purposes, we also use information on individual employment histories (such as the number of months

¹⁴ The full use of employment information from the annual activity calendars of household members is an important difference from our previous study (Biewen et al., 2019), which only used crude information on employment at the household level and only from the survey month (rather than over a full calendar year) along with descriptive information about different income measures over time. This turns out to be a crucial difference, as Biewen et al. (2019) failed to establish a clear relationship between employment changes and changes in the distribution of net incomes. Another important difference is that our earlier paper considered only the short time period 2005–06 to 2010–11, whereas the current paper covers the whole period of the economic upturn 2005–06 to 2015–16.

FIGURE 2 Inequality in equivalised net incomes

Source: SOEP.

worked in different employment categories in the past three years; see below for more details). In addition to the characteristics of individual household members, we consider information on the number of children in the household in different age categories (0–3, 4–6 and 7–17 years), the number of further adults in the household, and whether the household resides in East or in West Germany.

All our computations make full use of the SOEP sampling weights provided by the DIW, which ensure that our results represent the full German population. For statistical inference, we use bootstrapping, taking into account the repeated observations of the same households in different years and the clustering of individuals within households when computing bootstrap confidence intervals.¹⁵

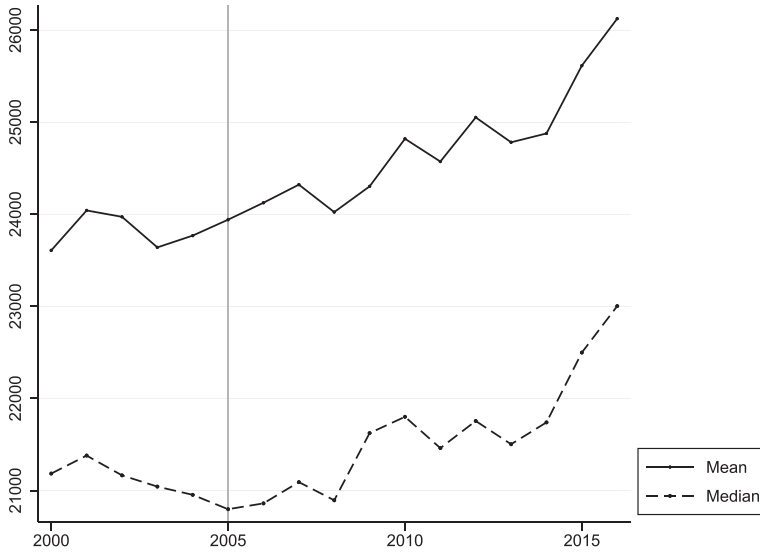
3 | GENERAL TRENDS

Figure 2 displays inequality trends in equivalised net incomes since the year 2000. Consistent with previous contributions, the graphs show that income inequality first stagnated after the onset of the labour market boom in 2005 but then followed a slight upward trend from 2010 onwards. The upward trend after 2010 is present in the upper half of the distribution (percentile ratio P90/P50), but is even more pronounced in the lower half (percentile ratio P50/P10).

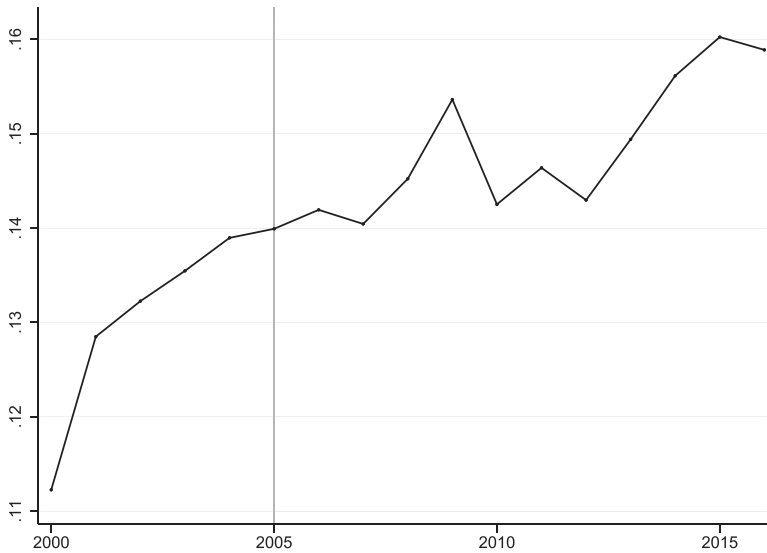
The development of mean and median equivalised income is shown in Figure 3(a). After years of stagnation between 2000 and 2005, the average living standard started to grow again in the same year as the employment boom began. Figure 3(b) shows the development of the semi-official ‘at-risk-of-poverty rate’ (the proportion of individuals with incomes below the relative poverty line of 60 per cent of the median), suggesting further strong increases in relative poverty risk after 2010.

Finally, Figure 4 presents a more detailed description of distributional change for our period under investigation. The figure displays the relative change of the percentiles of the distribution of net

¹⁵ Biewen, 2002.

FIGURE 3 Development of mean/median income and relative poverty rate

(a) Mean/median equivalised income (euros/year)

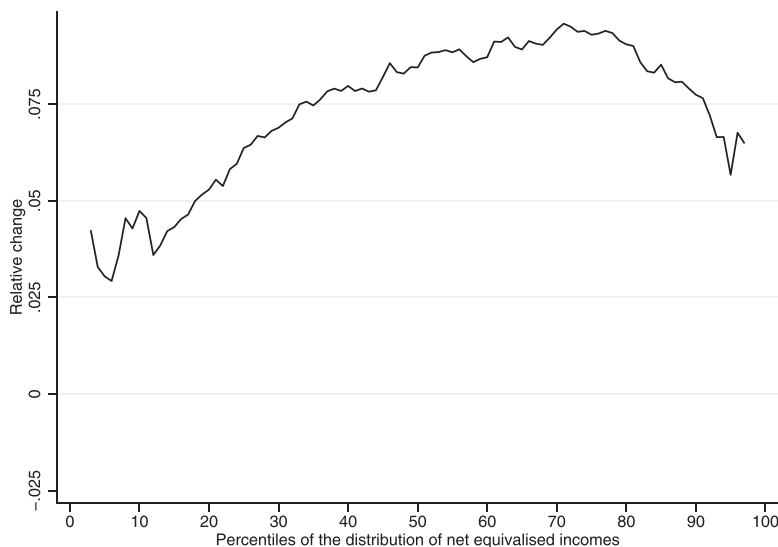


(b) Relative poverty rate

Source: SOEP.

equivalised incomes between 2005–06 and 2015–16, indicating in which parts of the distribution (real) income growth was largest. It turns out that all parts of the distribution were shifted upwards, but that growth was relatively modest in the lower part (2.5–7.5 per cent), larger at the very top (around 7.5 per cent), and largest in the upper-middle part (7.5–10 per cent), leading to a small increase in inequality between 2005–06 and 2015–16.¹⁶

¹⁶ See Dustmann et al. (2018) for an analysis of inequality trends based on the alternative data set, EVS. Dustmann et al. (2018) also find slightly rising inequality between 2003 and 2013, but because the EVS is only available every four years, and there are a number of differences in survey design, it is difficult to compare their analysis with our comparison of the years 2005–06 versus 2015–16.

FIGURE 4 Relative changes of income percentiles of net equivalised income 2005–06 versus 2015–16

Source: SOEP.

4 | EMPIRICAL ANALYSIS

The goal of the following analysis is to determine the contribution of the substantial changes in the level and composition of employment between 2005–06 and 2015–16 with regards to the observed changes in the income distribution, as shown in Figure 4. In order to assess the role of potential confounders, we also describe the contribution of factors other than employment to the pattern shown in Figure 4. Our general method will be to compute counterfactual distributions of net equivalised incomes for the target period 2015–16 in which we change only one factor (e.g., employment), while keeping all other factors as they are in 2015–16. The comparison of counterfactual versus factual change will then yield an estimate of the isolated effect of the given factor on the income distribution as observed in 2015–16.¹⁷

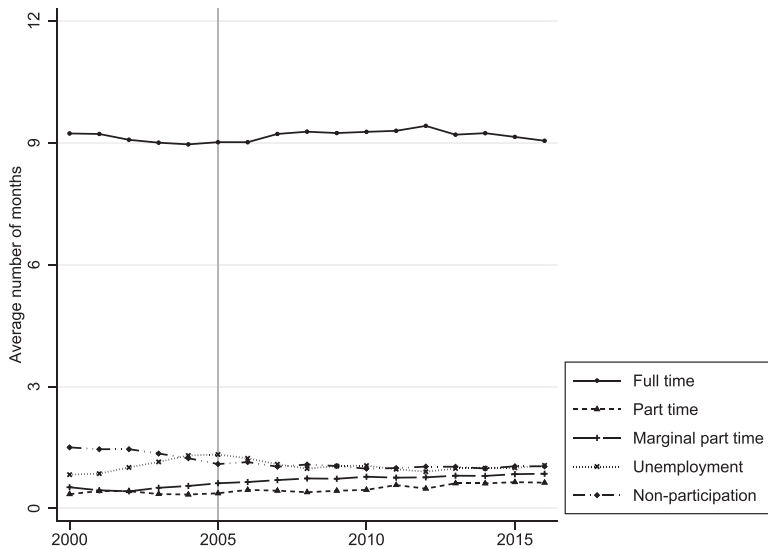
4.1 | Distributional effects of the employment boom

4.1.1 | Employment changes

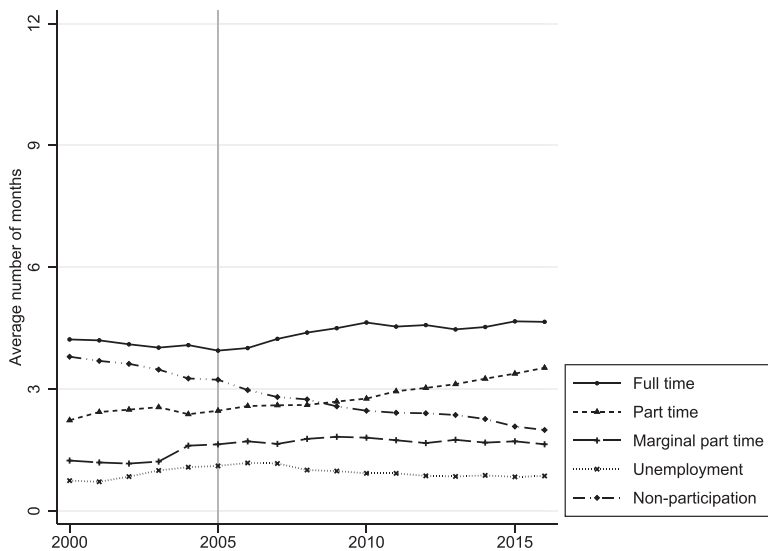
We now turn to our analysis of the effects of the employment boom on the distribution of incomes. As described above, our data include detailed information on the annual number of months worked in the different categories of full-time work, part-time work and marginal part-time work. We model counterfactual changes in these employment quantities below. In order to see how the employment boom affected the different forms of employment, we plot in Figure 5 the evolution of the average number of months worked per year in the different employment categories, separately for men and

¹⁷ This is commonly accepted methodology in econometric decomposition analysis (see Fortin, Lemieux and Firpo, 2011). It is important to note that this approach does not address general equilibrium effects. On the positive side, it avoids the large number of potentially controversial assumptions that are necessary to model such effects. Policymakers often prefer this approach over equilibrium models for transparency. We view both methods as complementary. The advantage of the method used here is that the potential quantitative importance of different channels of distributional change can be determined in a transparent way with minimal assumptions. It provides an ‘anatomy’ of observed changes that allows us to assess which factors were important and which factors played a negligible role, not claiming their role as final causal determinants. See the online Appendix for additional discussion.

FIGURE 5 Annual number of months worked in different employment categories, individuals aged 18–64 years, not in education



(a) Men



(b) Women

Source: SOEP.

women. For men, we observe an increase in full-time work between 2005 and 2010, but a stagnation or even decline after 2012 (Figure 5(a)). Male part-time and marginal part-time work consistently grew after 2005, albeit at a relatively low level. Interestingly, male non-participation did not decline after 2005 as strongly as unemployment did.

Employment changes were much more dynamic for women (see Figure 5(b)). In particular, female full-time employment grew considerably between 2005 and 2010. Female part-time employment also consistently increased after 2005, and its growth substantially accelerated after 2010. Female participation in marginal part-time employment also continued to grow after 2005, but growth rates

were much lower than in 2003 when this form of employment was liberalised. The steep decline in female non-participation shows that female employment gains mostly came out of non-participation.

To sum up, the employment boom after 2005 led to substantial employment growth for both men and women, but its most important component was additional full- and part-time employment of women out of non-participation. This evidence is consistent with that from other data sources; see Section 1, Carrillo-Tudela et al. (2021), Riphahn and Schrader (2020) and online Appendix B.¹⁸

Before we turn to our detailed micro-analysis of the effect of employment changes on the income distribution, we present a suggestive preliminary analysis aimed at describing the incidence of employment growth across the deciles of the distribution. Figure 6(a) plots the average yearly gains in the number of months worked in the different employment categories per household across different positions of the distribution of equivalised incomes.¹⁹ It appears as if households in the lower part of the distribution substantially gained full-time employment months, while households in the upper part lost over the period 2005–16. This would be a misleading interpretation, however, because it is likely that households in the lower part always tend to gain employment (even in the absence of an employment boom because low income is associated with low employment that can only be increased), while households in the upper part tend to lose employment (because high income is typically associated with a high degree of employment that often cannot be increased further; i.e., mean reversion).

Therefore, in order to determine the effect of the employment boom compared with the previous situation, it makes sense to subtract from Figure 6(a) the corresponding Figure 6(b) for the period before the boom (i.e., 2000–04). The differential effect shown in Figure 6(c) suggests that households at the bottom of the distribution indeed benefitted substantially from full-time employment gains due to the boom and that there were also gains in the middle of the distribution, albeit to a lesser extent. The pattern for part-time employment is similar but not as pronounced. Note that the general level of part-time employment is lower, so that relative gains are still substantial. The growth of marginal part-time employment tends to be negative relative to the period 2000–04. This can be explained by the fact that this type of employment experienced idiosyncratic gains in the year of its liberalisation 2003. Summing up, our preliminary analysis suggests that the employment boom led to employment gains for most parts of the distribution, but that the lower part gained more than the upper part.

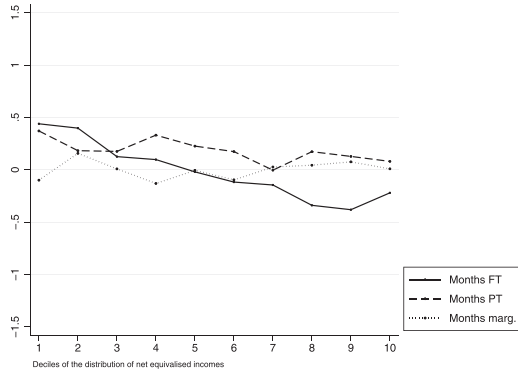
We now turn to our more detailed analysis of the effects of the employment boom on the distribution of incomes. Our goal is to model for each individual aged 18–64 and not in education counterfactual employment quantities for 2015–16 that would have prevailed if the boom had not taken place (i.e., if the labour market situation in 2015–16 had been as unfavourable as in 2005–06). In order to do this, we describe the number of months worked per year in the different employment categories (full-time, part-time, marginal part-time) conditional on individual characteristics using logit models.²⁰ We estimate separate models for each gender and each employment category conditional on the following covariates: nationality, East German residence, disability status, age, age squared, educational qualifications in three categories, work experience, work experience squared and the number of children in different age categories. To account for state dependence in labour market participation, we also include the number of months unemployed/employed in the different employment categories (full-time, part-time, marginal part-time) in the past three years. We estimate such models for the labour market situation in both 2005–06 and 2015–16. Comparing the predictions from these models for a given individual yields a correction term, reflecting how much less/more this individual would have worked in 2015–16 if the labour market situation had still been as in

¹⁸ Carrillo-Tudela et al. (2021) focus on the age group 25–54 years. Riphahn and Schrader (2020) show that the workers aged 55–64 significantly increased their participation after 2005, countering the trend of declining male participation in younger age groups.

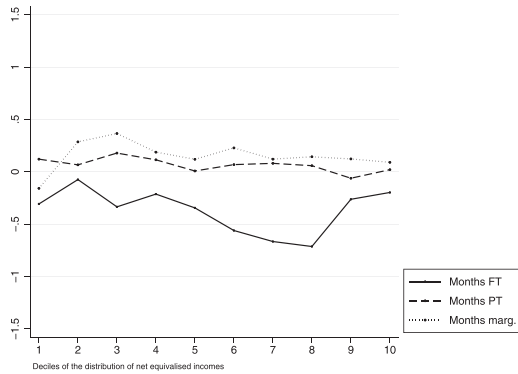
¹⁹ More precisely, we compute for each household from a particular income decile the change in months worked in the different categories from year t to year $t + 1$, and we average these changes over years and over households from the respective decile.

²⁰ What follows is an abbreviated description of our calculations. See online Appendix C for more details and online Appendix D for detailed estimation results.

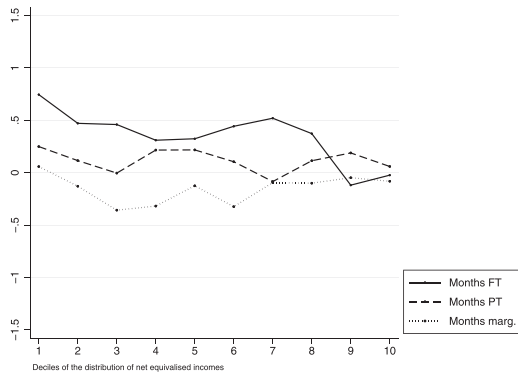
FIGURE 6 Growth of the absolute annual number of months worked per household across the deciles of the distribution of net equivalised incomes



(a) Average annual growth of the number of months worked per household per year, 2005–16



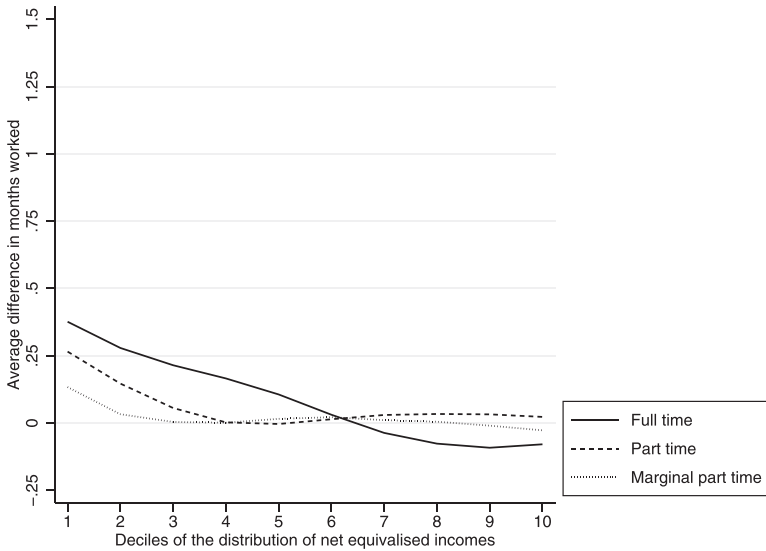
(b) Average annual growth of the number of months worked per household per year, 2000–04



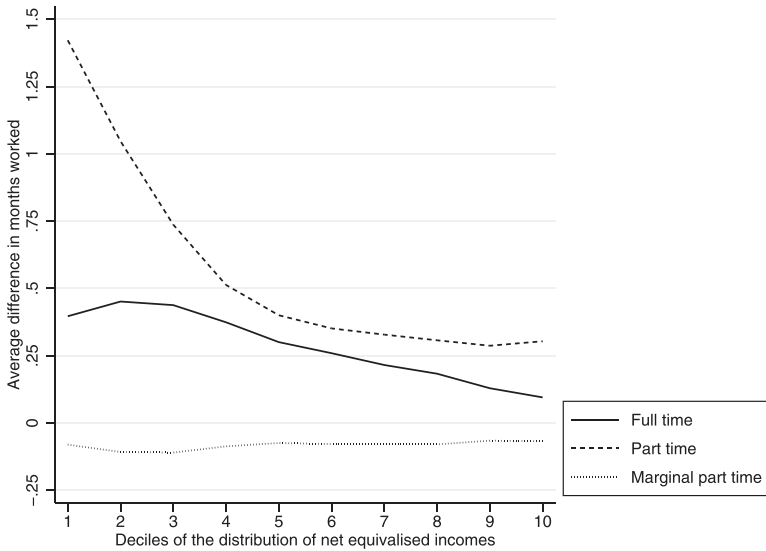
(c) Differential effect (growth incidence in months worked per year 2005–16 relative to 2000–04)

Source: SOEP.

FIGURE 7 Difference annual months worked 2015–16 compared with counterfactual situation with individual employment probabilities as in 2005–06, individuals aged 18–64, not in education



(a) Men



(b) Women

Source: SOEP; own calculations.

2005–06. We use this correction term to adjust the factual number of months of each individual observed in 2015–16 into the direction of a counterfactual representing the number of months this individual would have worked in 2015–16 if the employment boom had not taken place.

Figure 7 shows the value of these correction terms across the deciles of the distribution of equivalised incomes, separately for men and women.²¹ Again, it turns out that absolute employment gains compared with a counterfactual situation in which employment quantities were as in the

²¹ We thank an anonymous referee for suggesting this representation.

pre-boom situation of 2005–06 were particularly strong for individuals in the lower part of the distribution. For example, men's average number of full-time months was around a quarter of a month higher in the lower third of the distribution compared with the counterfactual pre-boom situation (Figure 7(a)). For women, the average number of part-time months was 0.5 to 1.5 months higher in the lower part of the distribution compared with the pre-boom situation, while the number of full-time months was higher by 0.25 to 0.5 months. For women, we also observe sizeable gains in part-time and full-time months in the upper half of the distribution (Figure 7(b)).

Given the finding that women, especially, increased their participation, it is interesting to see whether this was an added worker effect (i.e., wives entering full-time or part-time work) or increased participation in single households. This can be answered using transition rates between different labour market states (see Tables A.1 and A.2 in the online Appendix). The comparison of average annual transition rates for the pre-boom period 2000–04 with those for the period 2005–16 suggests that, for men, the moderate increases in full-time and part-time employment were mainly fuelled by increased transitions from non-participation or part-time employment to full-time employment as well as by increased transitions from unemployment to part-time employment in non-single households. A further striking finding is the decline in the transition rate from unemployment, part-time and marginal part-time into non-participation.²²

For women, the comparison suggests that the increases in female full-time and part-time work were related to increased transitions from non-participation to full-time or part-time work in non-single households (supporting an added worker effect). Transitions to marginal part-time out of unemployment and non-participation also increased for women in non-single households, while downward transitions from part-time work to marginal part-time also became less frequent. Interestingly, we find no evidence for upgrading from part-time to full-time work, for either single or non-single women. While increased transition intensities to full-time and part-time work mostly applied to women in non-single households, the last columns of Tables A.1 and A.2 suggest that women in single households experienced a stabilisation of all forms of labour market participation in the sense that transitions from employment or unemployment to inactivity were considerably reduced (this was much less the case for women in non-single households). This indicates that women in single households benefitted from employment gains also.

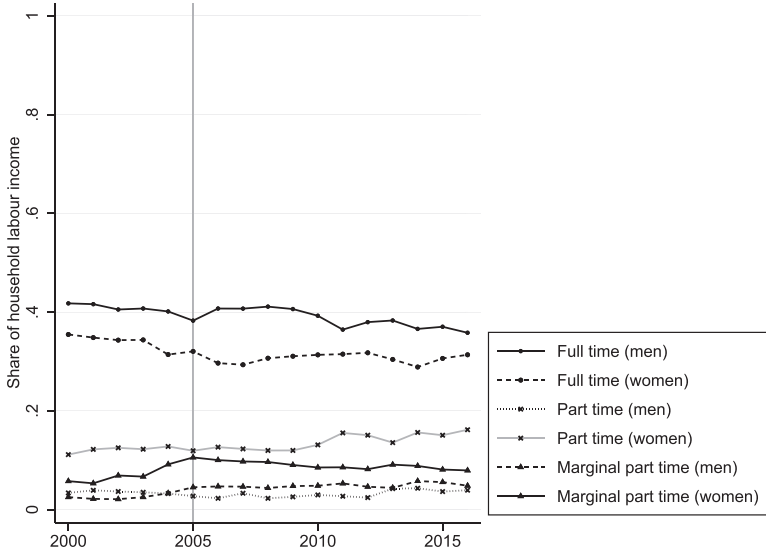
The fact that women experienced much higher employment gains than men is also reflected in the rising contribution of female labour income to overall labour income, as shown in Figure 8. The figure compares the share of household labour income that was contributed by men and women in the different employment categories among single and non-single households (excluding pensioner households; see Section 2 for the definition of different household types). Among single households, full-time labour income of men and women contributed almost equally to overall household labour income, but while the male full-time income share declined, that of women was stable and the female part-time share strongly increased (Figure 8(a)). The contribution of female marginal part-time income also declined in favour of more part-time labour income. We conclude that the substantial gains in female participation in part-time work was not only due to an added worker effect but also applied to a large extent to women in single households (possibly with children).

Among non-single households, increasing part-time participation by women also drove up the female part-time labour income share, providing evidence for an added worker effect. By contrast, the share of female full-time income in overall household income increased only slightly. In the online Appendix, we show that there were increases in the female full-time labour share in the upper two-thirds of the income distribution and in households with children, but these were counteracted by decreases in the lower third of the distribution. Increases in female part-time labour income shares mostly applied to the lower two-thirds of the distribution and were much weaker in the upper third.²³

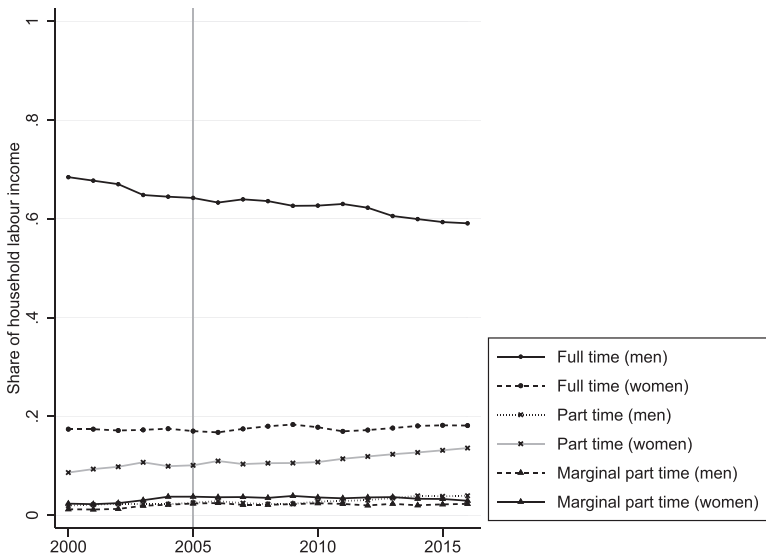
²² See Carrillo-Tudela et al. (2021) for related evidence, but for monthly rather than yearly transitions.

²³ It is possible that the labour income shares also changed because wage rates for the different forms of employment changed. We show in Section 4.2.4 however, that this happened only to a very small extent.

FIGURE 8 Share of different types of labour income in overall household income, non-pensioner households



(a) Single adults (one adult, possibly children)

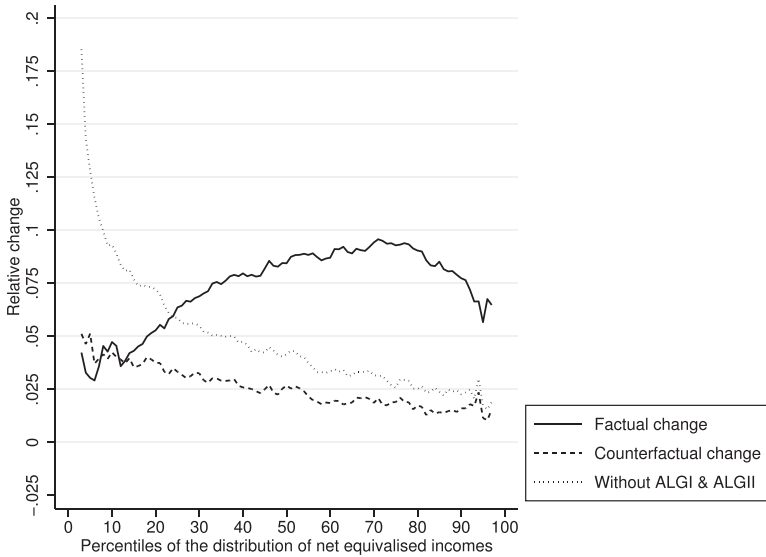


(b) Non-single households
(multiple adults, possibly children)

Source: SOEP; own calculations.

4.1.2 | Effects on the distribution of net incomes

In order to trace the consequences of these employment changes for equivalised household incomes, we multiply the counterfactual employment months with the monthly wage of the individual in the respective employment category (if observed), or with a monthly wage that we predict using the same set of individual characteristics as in the models for employment in cases in which we do not observe

FIGURE 9 Relative change of income percentiles due to the employment boom

Source: SOEP; own calculations.

the individual's wage in the respective category (these cases were rare as most individuals reduced their employment in the counterfactual pre-boom scenario).

In cases in which individuals counterfactually lose employment (because they would have been unemployed or inactive in the labour market absent the employment boom), we check whether these individuals would be entitled to unemployment benefit I (ALG I), which depends on the individual labour market history. In order to account for the fact that labour market histories would have been much less favourable in 2015–16 if the employment boom had not taken place, we counterfactually correct each individual's labour market history to reflect how it would have looked under the labour market conditions of 2005–06 (see the online Appendix for more details). We then calculate the amount of ALG I, based on the corrected labour market histories, and impute this income source to all individuals eligible.

In a next step, we sum up all counterfactual income changes per household and recalculate income tax and social security contributions. If the resulting household net income lies below the household minimum income threshold (*Hartz IV Regelsatz*) plus housing costs, the household is entitled to the so-called unemployment benefit II (ALG II). In these cases, we compute the exact amount of ALG II (plus housing costs) and replace the net income of the household with this amount. Finally, we equalise the resulting household net incomes using our equivalence scale.

The comparison of the counterfactual income distribution for 2015–16 obtained in this way with the factual distribution of 2015–16 reveals which parts of the distribution gained from the boom in terms of net income and to what extent. The results shown in Figure 9 (dashed line) indicate that the lower part of the distribution benefitted more from the boom than the upper part, consistent with our preliminary analysis in Figures 6 and 7. An important reason why the effects of the boom are not larger is that the consequences of changing back employment quantities to the level of 2005–06 are considerably alleviated by the social security system. If the labour market situation in 2015–16 had been as bad as in 2005–06, not all the individuals affected would have been without income. Many of them would have been entitled to ALG I or II. In order to assess this aspect, the dotted line in Figure 9 shows the gross effect of the boom (i.e., without assigning unemployment benefits to individuals who counterfactually lost employment in our calculations). As expected, this effect is very substantial.

FIGURE 10 Relative changes of income percentiles 2005–06 to 2015–16 before and after taxes and transfers

Source: SOEP; own calculations.

Our counterfactual calculations are supported by Figure 10 displaying the factual changes in the distribution of equivalised incomes before and after taxes and transfers. Similar to Figure 9, we observe large relative gains in incomes before taxes and transfers at the bottom of the distribution, which are not translated into corresponding income gains after taxes and transfers. However, Figure 10 includes the effect of all other factors (apart from employment) and does not disentangle the effects of individual aspects as we do in our counterfactual analyses (see below).

Summing up, we draw the following tentative conclusions about the impact of the employment boom on the German income distribution.

- (i) The employment boom led to substantial income gains across the whole distribution.
- (ii) The lower part of the distribution benefitted more than the upper part, most likely because the boom prevented many individuals from being unemployed in 2015–16 (this is implicitly revealed by the difference between the dotted and dashed lines in Figure 9).
- (iii) The main source of income gains was additional female labour income from part-time and, to a lesser extent, from full-time work out of non-participation or unemployment. Female employment expanded both in single and in non-single households.
- (iv) The effects of the boom were substantially dampened by the generous social security system as many of the individuals who gained employment through the boom would have been eligible for unemployment benefits or household minimum income without it. It is well known that, due to its generosity, in-work net income in the German system is often not much higher than out-of-work net income, especially for households at the bottom of the distribution and/or with many children. In a more general sense, the effects of additional employment on incomes were also dampened by the progressive tax system, which in part taxes away additional income (this applies in particular to additional income earned by second earners in the household due to the joint taxation of spouses in the German tax system). To put it differently, the boom made incomes before taxes and transfers more equal, but this effect was less pronounced after taxes and transfers because the system is effective at counteracting inequality.

- (v) On balance, the boom had an equalising effect on the distribution of net incomes, albeit a moderate one. This follows from the first column of Table 3 where we compute the effect of the counterfactual changes on different inequality measures.
- (vi) Finally, while the boom produced a substantial contribution to overall distributional change (see the solid line in Figure 9), there must be other factors that also contributed.

4.2 | Other factors

Given that the employment boom cannot fully account for the changes in the distribution between 2005–06 and 2015–16, we look at a number of other potential explanations: (i) immigration; (ii) changes in household types; (iii) changes in individual and household characteristics; (iv) changes in the level and structure of pay; (v) changes in capital incomes; and (vi) changes in the tax and transfer system. Considering the effect of other factors is important for our understanding of the effects of the boom because its impact may have been wiped out or masked by the countervailing impact of other developments.

4.2.1 | Immigration

Like many other countries, Germany experienced substantial immigration during the period under investigation, in particular in the context of the so-called ‘refugee crisis’ of 2014–15, in the course of which a large number of individuals from the Middle East found refuge in the country. Our database contains information on immigration through a number of refreshment samples (SOEP samples, M1 Migration 1995–2010, M2 Migration 2009–13, M3/4 Refugees 2013–15). In order to assess the potential effect of immigration on the distribution of net incomes, we carry out the following counterfactual exercise: we omit all individuals (as well as their children) who immigrated to the country after 2005 from our sample. As in our other computations, this will ignore the potential general equilibrium effects of immigration. Such effects are expected to be small however, as many of the individuals who immigrated after 2005 were refugees who were not allowed to participate in the labour market in the first years after their arrival. Unfortunately, income information on individuals who immigrated as refugees is available for the first time for the year 2016, so that the following results compare 2005–06 to 2016 (rather than to 2015–16).

Table 2 gives an overview of the number of individuals in our sample counted as having immigrated into the country after 2005 (grossed up to population figures using the sample weights). The total figure of around 3.6 million corresponds well to that reported by the Federal Government.²⁴ Apart from *Aussiedler* (ethnic Germans born in Eastern European countries with the right to migrate to

TABLE 2 Number of individuals who immigrated to Germany between 2005 and 2016 (*Source*: Socio-Economic Panel)

Migration group	Number of individuals
<i>Aussiedler</i> , Germans living abroad	132,574
EU foreigners	924,646
Asylum seekers/refugees	792,356
Other/no information	1,748,241
Sum	3,598,817

Source: SOEP; grossed-up numbers using sample weights.

²⁴ Bundesamt für Migration und Flüchtlinge, 2017.

TABLE 3 Effects on inequality measures

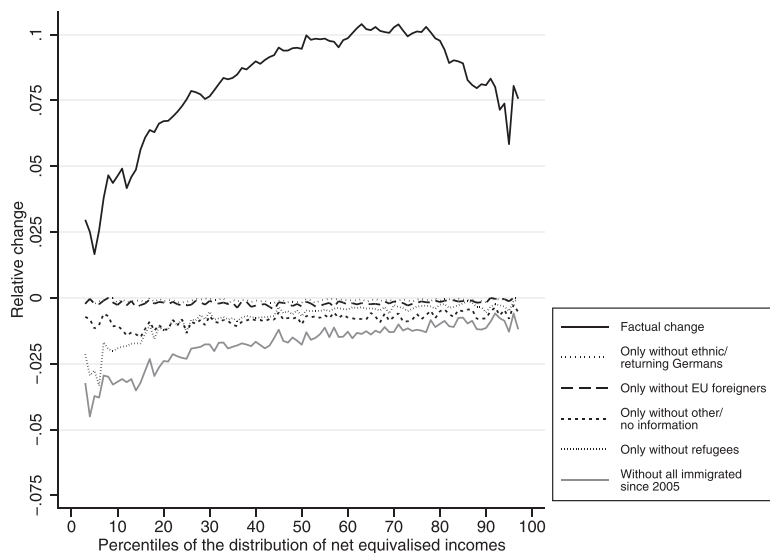
Index	Employment boom	Immigration	Household types	Household characteristics	Pay structures
Mean	+471.037 [+314.302; +626.474]	-362.008 [-429.526; -293.971]	+79.502 [-49.634; +205.381]	+908.138 [+668.401; +1,146.968]	+160.299 [-63.717; +385.391]
Median	+512.069 [+320.035; +717.644]	-366.039 [-485.849; -254.829]	+61.764 [-62.887; +188.914]	+749.205 [+510.938; +972.845]	+209.604 [+26.584; +400.229]
P90/P10	-0.073 [-0.131; -0.019]	+0.078 [+0.038; +0.121]	+0.025 [+0.002; +0.053]	+0.090 [+0.021; +0.156]	+0.001 [-0.055; +0.057]
P90/P50	-0.019 [-0.036; +0.000]	+0.011 [-0.004; +0.024]	+0.004 [-0.004; +0.014]	+0.025 [-0.001; +0.051]	-0.005 [-0.030; +0.018]
P50/P10	-0.019 [-0.047; +0.006]	+0.031 [+0.010; +0.052]	+0.010 [+0.000; +0.021]	+0.023 [-0.003; +0.048]	+0.006 [-0.012; +0.025]
Gini	-0.003 [-0.005; -0.001]	+0.004 [+0.003; +0.005]	+0.001 [+0.000; +0.002]	+0.005 [+0.002; +0.008]	-0.001 [-0.004; +0.004]
Poverty rate	-0.002 [-0.007; +0.002]	+0.005 [+0.002; +0.008]	+0.001 [-0.001; +0.003]	+0.004 [-0.001; +0.009]	+0.002 [-0.001; +0.006]

TABLE 3 (Continued)

Index	Capital incomes	Transfers	Tax and SSC	Sum	Factual change
Mean	-159.121 [-210.710; -108.257]	+117.167 [+112.257; +121.559]	+526.212 [+506.540; +544.972]	+1,741.358 [+1,322.354; +2,162.391]	+1,919.746 [+1,477.581; +2,344.251]
Median	-144.170 [-198.236; -87.573]	+154.761 [+117.870; +196.741]	+518.147 [+452.883; +585.615]	+1695.39 [+1,244.221; +2,154.239]	+1921.334 [+1,539.278; +2,312.802]
P90/P10	-0.006 [-0.026; +0.014]	-0.053 [-0.074; -0.030]	+0.050 [+0.024; +0.080]	+0.112 [-0.027; +0.261]	+0.121 [-0.011; +0.246]
P90/P50	-0.002 [-0.009; 0.006]	-0.012 [-0.016; -0.007]	+0.001 [-0.012; +0.014]	+0.003 [-0.057; +0.061]	-0.014 [-0.063; +0.038]
P50/P10	-0.001 [-0.010; +0.006]	-0.016 [-0.027; -0.004]	+0.027 [+0.016; +0.038]	+0.059 [-0.001; +0.117]	+0.080 [+0.027; +0.136]
Gini	-0.000 [-0.001; +0.000]	-0.003 [-0.003; -0.002]	+0.001 [+0.001; +0.002]	+0.005 [-0.001; +0.011]	+0.003 [-0.006; +0.011]
Poverty rate	-0.000 [-0.002; +0.001]	-0.003 [-0.005; -0.002]	+0.004 [+0.002; +0.007]	+0.011 [-0.001; +0.022]	+0.020 [+0.011; 0.030]

Note: 95 per cent bootstrap confidence intervals in brackets (1,000 replications).

Source: SOEP, own calculations.

FIGURE 11 Relative change of income percentiles due to immigration between 2005 and 2016

Source: SOEP; own calculations.

Germany) and Germans returning from abroad, EU foreigners and refugees constitute the largest groups among the individuals who immigrated after 2005. Our data also contain a large number of immigrants without information on their exact status (the ‘Other/no information’ group in Table 2). Judged from their observable characteristics, most of these individuals are likely to also belong to the ‘Asylum seekers/refugees’ group.

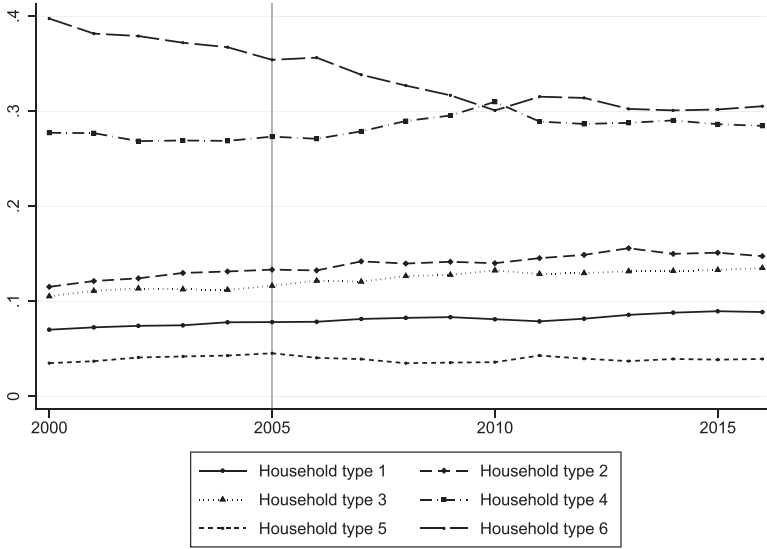
Figure 11 shows the effect of omitting individuals who immigrated since 2005 from the distribution of incomes in 2016. The lower grey line demonstrates that the overall effect of immigration was such that lower parts of the distribution were pulled downwards by up to 4 per cent. The other lines show that this was mainly due to the group of refugees and the ‘no information’ group, while the group of EU foreigners and ethnic Germans did not differ much in their composition of incomes compared with the native population. The effect at the lower end is substantial and suggests that the mere fact that a large number of individuals with very low incomes joined the population may account for some of the poor income growth at the bottom of the distribution of net incomes (and may neutralise some of the positive effects of the employment boom). In Table 3, we show that this had an inequality-increasing effect.

4.2.2 | Changes in household types

Changes in the composition of the population with respect to household types constitute another factor that potentially masks the effects of the employment boom on the income distribution. If the share of household types with low equivalent income secularly increases (e.g., lone parents, pensioners), this will lead to increasing inequality, independent of employment gains for low-income households.

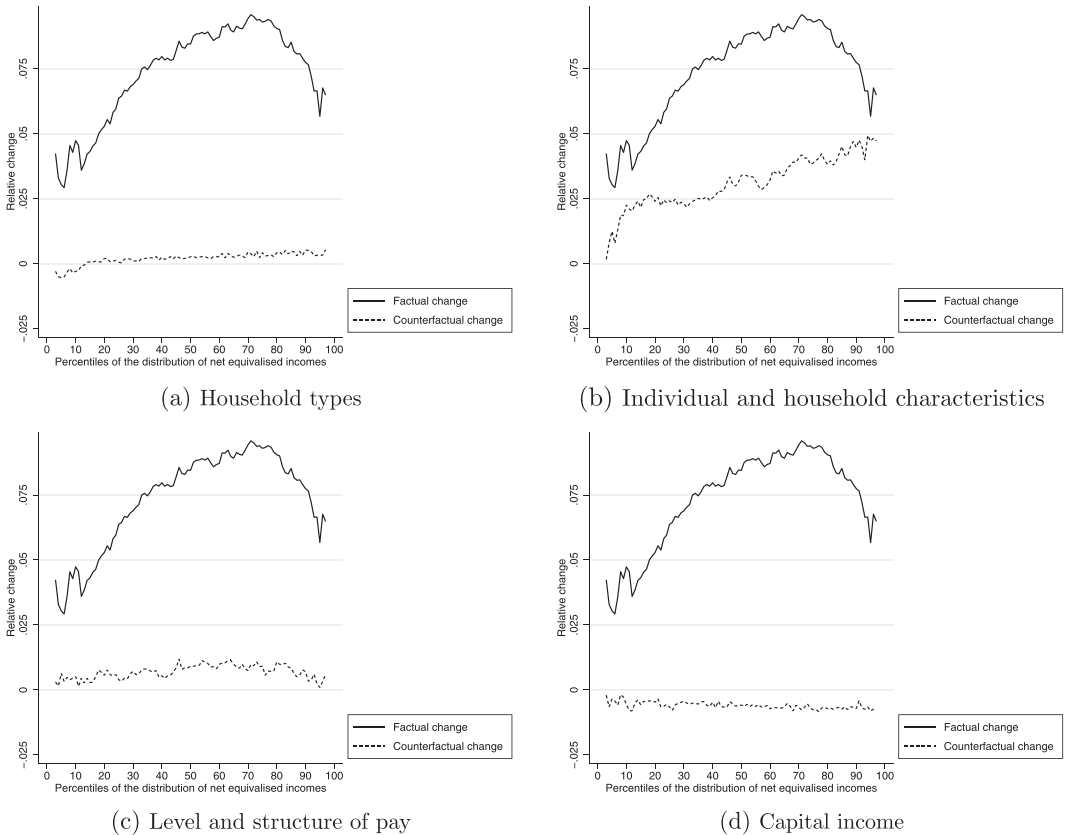
Figure 12 shows that changes in household types over the period under investigation were substantial. In particular, multiple adult households without children and pensioner households increased their population shares at the expense of multiple adult households with children. In order to assess the effect of this development on the income distribution, we counterfactually change the population weights of the different household types in the income distribution of 2015–16 to those in 2005–06 (see the online Appendix for more details). Figure 13(a) shows that, despite the substantial changes, the effect of doing this is negligible (i.e., changes in household types do not help to account for changes in the distribution between 2005–06 and 2015–16).

FIGURE 12 Development of household types over time



Note: Household types are: (1) single pensioners; (2) multiple pensioners; (3) single adults without children; (4) multiple adults without children; (5) single adults with children; (6) multiple adults with children.
Source: SOEP; own calculations.

FIGURE 13 Relative changes of income percentiles due to other factors



Source: SOEP; own calculations.

4.2.3 | Changes in individual and household characteristics

Next, we consider finer compositional changes in the structure of the population. For example, it may be the case that educational upgrading and population ageing induced more income inequality because a shift towards higher educational qualifications and older age groups raised the share of population subgroups with high income dispersion (increasing within-group inequality), or increased the divide between education or age groups (increasing between-group inequality). Table 1 summarises the changes in the individual and household characteristics we have considered. As expected, there is a trend towards higher age, work experience and education as well as towards more households with female heads and fewer children.

We compute the effect of these changes on the income distribution in 2015–16 by reweighting the distribution of these characteristics back to the one observed in 2005–06, leaving everything else constant. We do this separately by household type using the semi-parametric reweighting procedure proposed by DiNardo, Fortin and Lemieux (1996) (see the online Appendix for more details). Figure 13(b) shows that the impact of changes in these characteristics on the distribution of incomes was considerable. The shift towards higher age and education groups implied higher income levels, especially in the middle and at the top of the distribution. This contributed to increasing inequality, counteracting the pro-poor income growth induced by the employment boom (see the fourth column of Table 3). The compositional effects of changing income-relevant characteristics is consistent with findings in the literature showing that these can account for a large part of changes in the distribution of wages.²⁵

4.2.4 | Changes in the level and structure of pay

Apart from quantities, prices for employment may have changed over the period we have considered. In order to describe the potential effect of this factor on the distribution of net incomes, for each individual observed in 2015–16 we form a counterfactual wage that mimics the wage this person would have earned under the pay structures of 2005–06.²⁶ To this end, we regress monthly (log) wages on the following characteristics: nationality, East German residence, disability status, age, age squared, three education categories, work experience and work experience squared. We do this separately for the three employment categories, the two genders, and the two situations 2005–06 and 2015–16, the latter representing the pay structures in 2005–06 and in 2015–16, respectively. We then compute for each individual observed working in 2015–16 a correction term based on the difference in wage predictions under the pay structures of 2005–06 and 2015–16, reflecting how much higher/lower the individual's wage would have been under the pay structure of 2005–06. We also consider changes in pay for unobservables (i.e., wage residuals) assuming that the individual would have had the same rank in the distribution of residual wages in 2005–06 as in 2015–16. The resulting counterfactual wages are then multiplied by the observed number of months worked in the different employment categories, yielding changes in individual and household market income. Finally, we compute taxes and social security contributions for the changed sum of incomes and carry out the equivalisation.

Note that this procedure captures changes in both the level and the structure of wages.²⁷ The results of this exercise are shown in Figure 13(c). It turns out that changes in pay played only a minor role for the development of the income distribution between 2005–06 and 2015–16. There were small real wage gains, which were slightly higher for the middle of the distribution. This did not significantly

²⁵ Dustmann, Ludsteck and Schönberg, 2009; Biewen and Seckler, 2019.

²⁶ See online Appendix C for more details and online Appendix D for detailed regression results.

²⁷ Recall that we only consider changes in real wages as all of our wage information is expressed in prices of 2016.

affect income inequality (see the last two columns of Table 3). The (missing) effect of changes in pay structures for the period under investigation found in our analysis is consistent with evidence from administrative data showing that, after increasing inequality before 2005, the quantiles of the wage distribution mostly developed in a horizontal way, implying stagnating real incomes and no increasing inequality after 2005.²⁸ The important conclusion for our analysis is that the income effects of the boom did not operate much through increasing wages in a tighter labour market or by changes in productivity sharing but mainly by increasing employment quantities at constant pay.

4.2.5 | Changes in capital incomes

Changes in capital incomes may also have influenced the income distribution in the period we have considered. We investigate this by constructing a counterfactual distribution of net incomes that results if one changes back the distribution of capital incomes to its state in 2005–06, leaving everything else constant. We do this by transforming each household's rental income and each household's other capital incomes by multiplying them by the ratio of the percentiles of these distributions in 2005–06 and 2015–16 based on the corresponding ranks of the household in 2015–16 (see the online Appendix for more details). Again, this reflects changes in both the level and the dispersion of capital incomes.

The effect of changing rental and other capital incomes is shown in Figure 13(d). The figure suggests that changes in capital incomes depressed the income distribution. This is in line with the fact that real interest rates fell over the period considered. Perhaps surprisingly, these effects occurred uniformly across the distribution. Our analysis comes with the caveat that survey data (e.g., from SOEP) do not cover developments at the very top of the income distribution.²⁹ However, the results in Bartels and Jenderny (2015) suggest that changes at the very top of the German income distribution were relatively modest compared with those in other countries such as the United States. Also note that the respondents in our survey may report certain capital incomes as income from self-employment (in our study included in labour income). Drechsel-Grau, Peichl and Schmid (2015) have shown that, on the basis of tax data, if one excludes incomes from owner-run enterprises, capital incomes are indeed approximately uniform across the German income distribution. Overall, we do not find any evidence for an important role of capital incomes for changes in the distribution of net incomes, but we certainly cannot rule out effects at the very top not covered by our data.

4.2.6 | Changes in the tax and transfer system

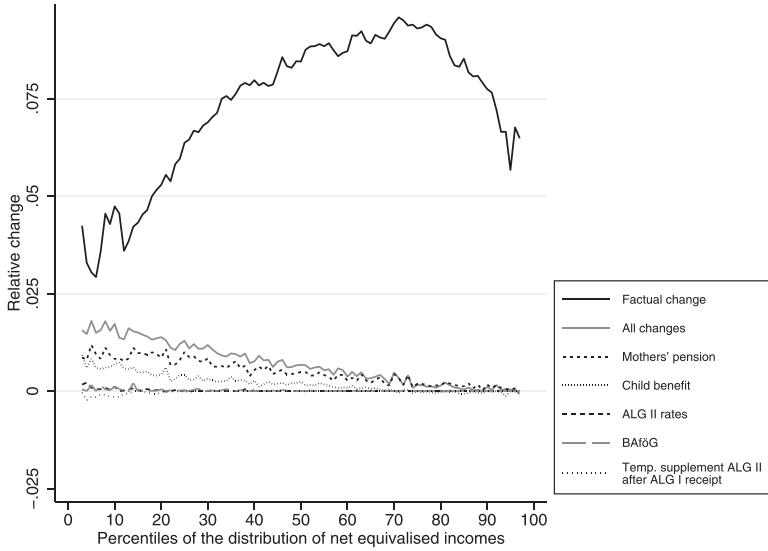
We consider the effect of the following changes in the German tax and transfer system that occurred between 2005–06 and 2015–16.

Changes in transfers:

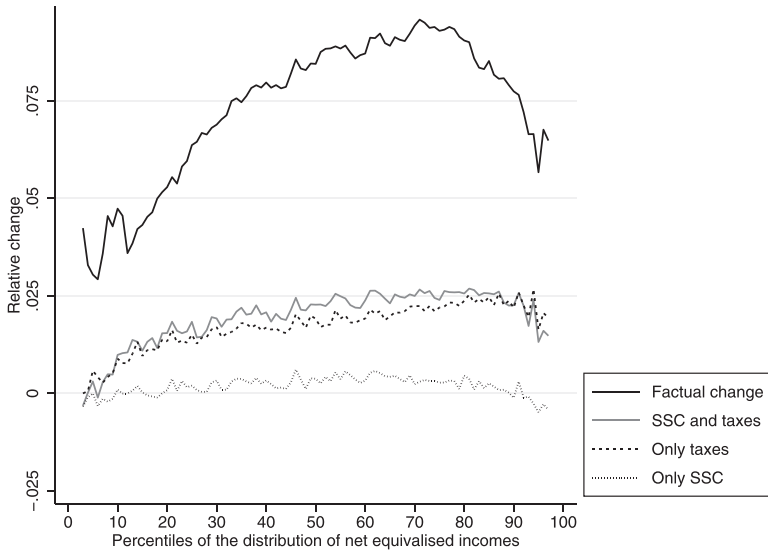
- extension of mothers' pensions (two years, instead of one year, of implicit contributions for children born before 1992);
- abolishment of the temporary supplement to ALG II after receipt of ALG I (transitory payment for individuals whose ALG I ran out, amounting to two-thirds of the difference between ALG I and ALG II in the first year, and one-third in the second year);
- higher child allowances, higher student allowances and higher ALG II (we only consider the part of the increase since 2005 that was higher than inflation).

²⁸ See Baumgarten, Felbermayr and Lehwald (2020, p. 7, Figure 1b).

²⁹ Bartels and Jenderny, 2015.

FIGURE 14 Relative change of income percentiles due to tax and transfer changes

(a) Transfer system

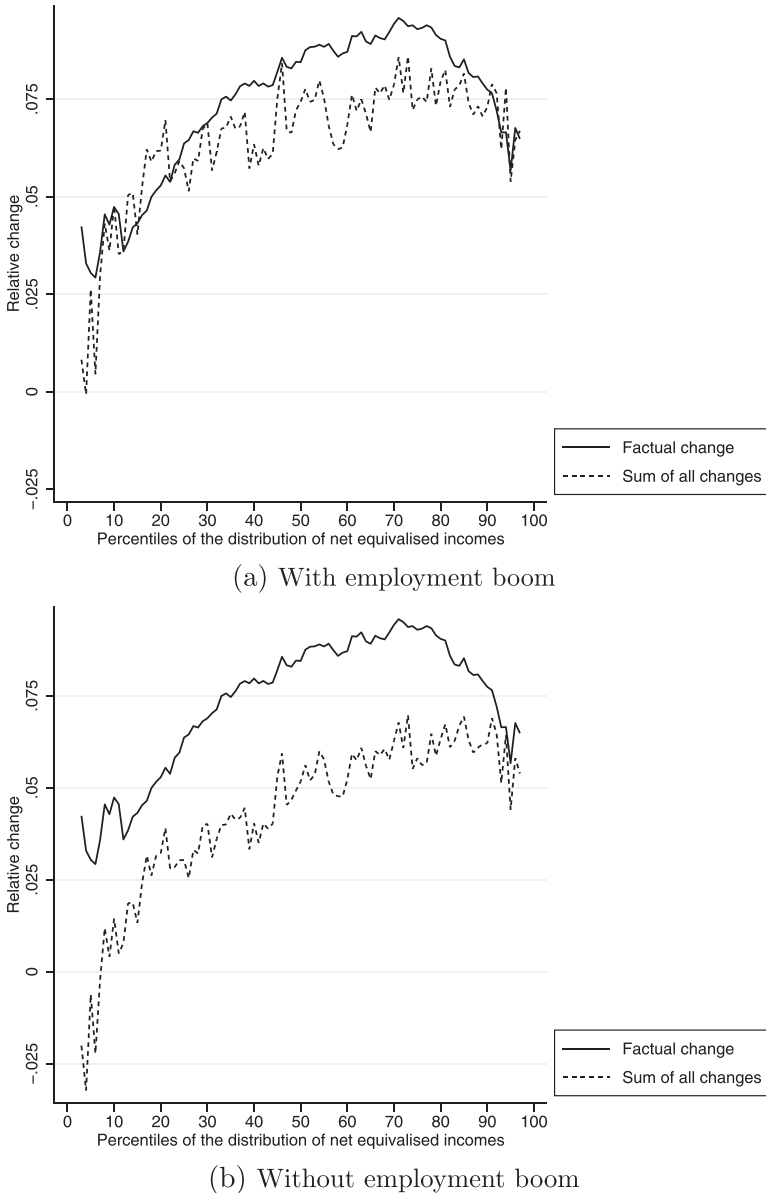


(b) Tax and SSC system

Source: SOEP; own calculations.

Changes in the tax system (including changes in social security contribution rates):

- introduction of a 'rich tax' (marginal tax rate of 45 per cent instead of 42 per cent starting from 250,000 (500,000) euros taxable income per annum);
- withholding tax for capital incomes (flat rate of 25 per cent instead of personal tax rate);
- changes in the tax schedule (changes in a number of tax allowances plus various changes in marginal tax rates);
- changes in social security contribution rates (mainly reductions, e.g., lower contribution rates to unemployment insurance due to falling unemployment).

FIGURE 15 Factual change versus sum of counterfactual changes with and without employment boom

Source: SOEP; own calculations.

We describe the effects of these changes on the distribution of net incomes by counterfactually undoing each of these reforms. We emphasise that, as in our other computations, we ignore potential behavioural reactions to these changes.³⁰ The results of these operations are shown in Figure 14. Figure 14(a) and the values in Table 3 demonstrate that the changes in the transfer system tended to have an equalising effect, mainly due to the extended mothers' pensions and the higher child allowances. However, the changes in the tax schedule mainly benefitted households in the middle and the top part of the distribution (households at the bottom of the distribution typically do not

³⁰ Such reactions are likely to be small and they typically counteract the original effects (Jessen, 2019), rendering our calculations upper bounds.

pay income tax). This had an inequality-increasing effect (see Figure 14(b) and Table 3). The fall in social security contribution rates led to small income gains in the middle of the distribution, but not at the bottom and the top (households at the bottom are typically not employed and labour incomes in households at the top typically exceed the social security contributions ceiling).

4.3 | Summary of changes

How successful are our calculations at putting together Germany's inequality puzzle? Figure 15 shows that the sum of all changes we have modelled reconstructs the observed changes in the distribution strikingly well. This is also the case for the inequality calculations in Table 3, although these are more affected by the non-smooth form of the sum of changes (Figure 15). Figure 15(b), showing the sum of all changes without the employment boom, suggests that the employment boom indeed contributed substantially to distributional change between 2005–06 and 2015–16, but that its impact was masked by a number of other developments, which also undid some of its inequality-reducing effects.

5 | CONCLUSION

In this paper, we have addressed the question of why income inequality and poverty risk remained persistently high in Germany, despite an unprecedented labour market boom that drastically reduced unemployment and particularly boosted employment in the lower part of the distribution. We reach the following conclusions. First, the boom indeed increased incomes and reduced inequality as lower parts of the distribution benefitted more than the middle or the upper part. Second, the effects of the boom on net incomes were substantially dampened by the social security system and the progressive tax system, which reduce the impact of economic downturns on disposable incomes, but also that of economic upturns. Third, much of the boom took the form of additional female part-time and full-time employment, demonstrating that such employment gains may not only boost incomes but have equalising effects. Fourth, the effects of the boom on the income distribution were masked by a number of other developments such as immigration of individuals with low incomes and changes in the composition of the population (educational upgrading and population ageing), making it difficult to determine their exact magnitude. Finally, our results imply that if the COVID-19 shock were to reverse all the employment gains that occurred during the boom, this would only have a moderately disequalising effect on the distribution of net incomes due to the strong role of the German tax and transfer system as a distributional stabiliser.

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REFERENCES

- Akyol, M., Neugart, M. & Pichler, S. (2013), Were the Hartz reforms responsible for the improved performance of the German labour market? *Economic Affairs*, 33, 34–47.
- Armour, P., Burkhauser, R. & Larrimore, J. (2013), Deconstructing income and income inequality measures: a crosswalk from market income to comprehensive income. *American Economic Review*, 103(3), 173–177.
- Bartels, C. & Jenderny, K. (2015), The role of capital income for top income shares in Germany. WTID Working Paper No. 1-2015.
- Baumgarten, D., Felbermayr, G. & Lehwald, S. (2020), Dissecting between-plant and within-plant wage dispersion: evidence from Germany. *Industrial Relations: A Journal of Economy and Society*, 59, 85–122.
- Bick, A. (2015), The quantitative role of child care for female labor force participation and fertility. *Journal of the European Economic Association*, 14, 639–68.
- Biewen, M. (2002), Bootstrap inference for inequality, mobility and poverty measurement. *Journal of Econometrics*, 108, 317–42.
- Biewen, M. & Juhasz, A. (2012), Understanding rising income inequality in Germany, 1999/2000–2005/2006. *Review of Income and Wealth*, 58, 622–47.
- Biewen, M. & Seckler, M. (2019), Unions, internationalization, tasks, firms, and worker characteristics: a detailed decomposition analysis of rising wage inequality in Germany. *Journal of Economic Inequality*, 17, 461–98.
- Biewen, M., Ungerer, M. & Löffler, M. (2019), Why did income inequality in Germany not increase further after 2005? *German Economic Review*, 20, 471–504.
- Blundell, R., Gosling, A., Ichimura, H. & Meghir, C. (2007), Changes in the distribution of male and female wages accounting for the employment composition using bounds. *Econometrica*, 75, 323–63.
- Blundell, R., Joyce, R., Keiller, A. N. & Ziliak, J. P. (2018), Income inequality and the labour market in Britain and the US. *Journal of Public Economics*, 162, 48–62.
- Bradley, J. and Kügler, A. (2019), Labor market reforms: an evaluation of the Hartz policies in Germany. *European Economic Review*, 113, 108–35.
- Bundesamt für Migration und Flüchtlinge. (2017), *Migrationsbericht 2016/2017: Zentrale Ergebnisse*, Nürnberg: Bundesamt für Migration und Flüchtlinge.
- Burda, M. (2016), The German labor market miracle, 2003–2015: an assessment. SFB 649 Discussion Paper No. 2006-005.
- Burda, M. & Seele, S. (2020), Reevaluating the German labor market miracle. *German Economic Review*, 21, 139–79.
- Carrillo-Tudela, C., Launov, A. & Robin, J.-M. (2021), The fall in German unemployment: a flow analysis. *European Economic Review*, 132, 103658.
- Daly, M. C. & Valletta, R. G. (2006), Inequality and poverty in United States: the effects of rising dispersion of men's earnings and changing family behaviour. *Economica*, 73, 75–98.
- Dauth, W., Findeisen, S. & Suedekum, J. (2017), Trade and manufacturing jobs in Germany. *American Economic Review*, 107(5), 337–42.
- Dauth, W., Findeisen, S. & Suedekum, J. (2021), Adjusting to globalization in Germany. *Journal of Labor Economics*, 39, 1–30.
- DiNardo, J., Fortin, N. & Lemieux, T. (1996), Labor market institutions and the distribution of wages, 1973–1992: a semiparametric approach. *Econometrica*, 64, 1011–44.
- Drechsel-Grau, M., Peichl, A. & Schmid, K. (2015), Einkommensverteilung und gesamtwirtschaftliche Entwicklung in Deutschland. *Wirtschaftsdienst*, 95, 684–8.
- Dustmann, C., Fitzenberger, B., Schönberg, U. & Spitz-Oener, A. (2014), From sick man of Europe to economic superstar: Germany's resurgent economy. *Journal of Economic Perspectives*, 28(1), 167–88.
- Dustmann, C., Fitzenberger, B. & Zimmermann, M. (2018), Housing expenditures and income inequality. IZA Discussion Paper No. 11953.
- Dustmann, C., Ludsteck, J. & Schilberg, U. (2009), Revisiting the German wage structure. *Quarterly Journal of Economics*, 124, 843–81.
- Ehrich, M., Musasib, A. & Roy, D. (2018), The Hartz reforms and the German labor force. *European Journal of Political Economy*, 55, 284–300.
- Fortin, N., Lemieux, T. & Firpo, S. (2011), Decomposition methods in economics. In O. Ashenfelter and D. Card (eds), *Handbook of Labor Economics*, Vol. 4A, Chapter 1, Amsterdam: Elsevier, 1–102.
- Geyer, J., Haan, P. & Wrohlich, K. (2015), The effects of family policy on maternal labor supply: combining evidence from a structural model and a quasi-experimental approach. *Labour Economics*, 36, 84–98.
- Goebel, J., Grabka, M. M., Liebig, S., Kroh, M., Richter, D., Schröder, C. & Schupp, J. (2019), The German Socio-Economic Panel (SOEP). *Jahrbücher für Nationalökonomie und Statistik*, 239, 345–60.
- Grabka, M. (2017), SOEP 2016 – Codebook for the PEQUIV file 1984–2016: CNEF variables with extended income information for the SOEP. SOEP Survey Papers, Series D – Variable Descriptions and Coding.
- Hartung, B., Jung, P. & Kuhn, M. (2018), What hides behind the German labor market miracle? Unemployment insurance reforms and labor market dynamics. CEPR Discussion Paper No. 133280.

- Hochmuth, B., Kohlbrecher, B., Merkl, C. & Gartner, H. (2021), Hartz IV and the decline of German unemployment: a macroeconomic evaluation. *Journal of Economic Dynamics and Control*, 127, 104114.
- Hutter, C., Klinger, S., Weber, E. & Trenkler, C. (2019), Which factors are behind Germany's labour market upswing? IAB Discussion Paper No. 20/2019.
- Hyslop, D. R. & Maré, D. C. (2005), Understanding New Zealand's changing income distribution, 1983–1998: a semi-parametric analysis. *Economica*, 72, 469–95.
- Jessen, R. (2019), Why has income inequality in Germany increased from 2002 to 2011? A behavioral microsimulation decomposition. *Review of Income and Wealth*, 65, 540–60.
- Kügler, A., Schönberg, U. & Schreiner, R. (2018), Productivity growth, wage growth and unions. In *ECB Conference Proceedings: Price and Wage-Setting in Advanced Economies*, Frankfurt, European Central Bank, 215–47.
- Launov, A. & Wälde, K. (2013), Estimating incentive and welfare effects of nonstationary unemployment benefits. *International Economic Review*, 54, 1159–98.
- Launov, A. & Wälde, K. (2016), The employment effect of reforming a public employment agency. *European Economic Review*, 84, 140–64.
- Peichl, A., Hufe, P. and Stöckli, M. (2018), Ökonomische Ungleichheit in Deutschland – ein Überblick. *Perspektiven der Wirtschaftspolitik*, 19, 185–99.
- Riphahn, R. & Schrader, R. (2020), Institutional reforms of 2006 and the dramatic rise in old-age employment in Germany. *Industrial Labor Relations Review*, 20, 1185–225.
- Rothe, T. & Wälde, K. (2017), Where did all the unemployed go? Non-standard work in Germany after the Hartz reforms. IAB Discussion Paper No. 18/2017.
- Sologon, D., Almeida, V. & Van Kerm, P. (2019), Accounting for the distributional effects of the 2007–2008 crisis and the economic adjustment program in Portugal. Luxembourg Institute of Socio-Economic Research Discussion Paper No. 2019-05.

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