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Inequality in turbulent times: income distribution in Germany and Britain, 1900–50[†]

By MARÍA GÓMEZ LEÓN and HERMAN J. DE JONG*

Using social tables, this article provides new data on inequality in Germany and Britain on an annual basis for the first half of the twentieth century. Inequality trends in these two countries tended to follow opposite patterns. The decline in inequality in Germany was interrupted during the First World War and the Nazi period, while in Britain the reversal took place between the end of the First World War and the Great Depression. Results show that the drop in inequality during the twentieth century in Europe did not follow secular trends, thus supporting the notion of inequality cycles.

In recent years a number of influential studies on the historical evolution of inequality and its causes have sparked new interest in the topic.¹ While it seems clear that inequality declined in western European countries during the twentieth century until approximately the 1980s, the slowdown—commonly referred to as the ‘great levelling’ or egalitarian revolution—has been attributed to different drivers, from demographic and economic factors to political forces or the interplay of these factors.²

Was the deceleration of inequality smooth and alike across European countries? Could the different forces underlying inequality have led to different patterns? Turbulent periods during the first half of the twentieth century—including two world wars and the Great Depression—seen from different economic, social, and political perspectives suggest that inequality trends might be very different across European countries. Yet, as shown in figure 1, we have little empirical evidence,

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¹ Alfani, ‘Economic inequality’; Lindert and Williamson, *Unequal gains*; Milanovic, *Global inequality*; Piketty, *Capital*.

² Lindert and Williamson, ‘Growth’; Milanovic, *Global inequality*; Piketty, *Capital*; van Zanden, Baten, Foldvari, and van Leeuwen, ‘Changing shape’; Kuznets, ‘Economic growth’.

Figure 1. *Inequality in western Europe, 1900–62*
 [Colour figure can be viewed at wileyonlinelibrary.com]

Notes: Western European countries included in van Zanden et al., ‘Changing shape’, are Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, and the UK.

Sources: Bourguignon and Morrisson, ‘Inequality’; Milanovic, *Global inequality*; van Zanden et al., ‘Changing shape’. In Milanovic, *Global inequality*, German data are from Grant, ‘Industrialisation’, while for UK the original sources are Lindert and Williamson, ‘Reinterpreting’, tab. 2, and Jonathan Cribb from the Institute of Fiscal Studies.

due to the lack of data on income distribution before 1950, especially for the interwar years.

Moreover, studies covering the whole period infer inequality trends from the evolution of proxies such as wage differentials or the evolution of top income shares, which include particular segments of the distribution.³ In this article, we move beyond previous literature in two ways. We develop social tables for two leading European countries, Germany and Britain, and obtain estimates of inequality from 1900 to 1950 on an annual basis.⁴ Second, we shed new light on the forces behind inequality changes within these two countries by exploring the whole range of the distribution, as well as on the factors explaining the differences between them.

Evidence from Germany and Britain generates two main results. First, the drop in inequality during the twentieth century did not follow secular trends, supporting the notion of inequality cycles—Kuznets curves—suggested by Milanovic and illustrated for the case of Spain by Prados de la Escosura.⁵ Second, inequality trends in Germany and Britain tended to follow totally opposite patterns. The decline in inequality in Germany was interrupted during the First World War and the Nazi period, while in Britain the reversal occurred between the end of the First World War and the Great Depression. Moreover, we find that for Germany

³ See, for example, Dumke, ‘Income inequality’; Söderberg, ‘Wage differentials’; Atkinson and Piketty, eds., *Top incomes over the twentieth century*; eisdem, *Global perspective*.

⁴ This connects to the literature in which a series of social tables is constructed (Bértola, Castelnova, and Willebald, ‘Distribution’; Gómez León, ‘Rise’; Rodríguez Weber, ‘La economía’) in which both the population shares and income of different social groups move periodically, ideally on an annual basis.

⁵ Milanovic, *Global inequality*; Prados de la Escosura, ‘Inequality’. For the case of Spain in particular, Prados de la Escosura, ‘Inequality’, p. 297, found that ‘the evolution of inequality presents the shape of a wide inverted W with peaks in 1918 and 1953 that, perhaps, could be part of one big Kuznets curve broken by the Civil War and its autarchic aftermath’.

before 1933 and from 1939 onwards, changes in the income distribution were driven by the variation in the relationship between property and labour incomes as well as changes in the labour earnings dispersion, while during the Nazi period it was only differences between owners and labour earnings that led to changes in inequality. In Britain, earnings dispersion among workers appears to have been the main driver of inequality changes before the First World War and after 1939. During the Great War and the interwar period, differences between proprietors and workers, as well as changes in earnings dispersion, caused variations in inequality. In line with Lindert and Williamson and Piketty, our conjecture is that political and institutional factors played an important role in driving inequality trends during this period.⁶

The rest of the article is structured as follows. Section I discusses indirect approaches for inferring inequality before 1950 and proposes social tables as a source for obtaining direct estimations of inequality. Section II focuses on the construction and standardization of social tables. Section III shows inequality trends obtained from social tables in these two countries, as well as the potential forces behind changes in inequality. Section IV analyses how periods of economic expansion and economic recession affected different social groups in both countries by means of the construction of growth incidence curves (GICs). Section V concludes.

I. Measuring inequality prior to 1950

The lack of historical data on inequality for periods before 1950 has been pointed out by several authors. For instance, Milanovic notes that '[after 1913] the next data point that we have for British inequality is unfortunately almost half a century later (1962) [while] the data for Germany are fragmentary [with] a long hiatus between 1913 and 1963'.⁷ Similarly, for Britain, Atkinson claims that 'the interwar period has been strangely neglected', since Soltow does not use any data for the interwar period, jumping directly from 1913 to 1962; Williamson's analysis stops in 1913; and Lindert moves directly from 1911 to 1938.⁸ In the same vein, Dell refers to earlier attempts to assess income distribution in Germany before the Second World War, which stop in 1913 or at best in 1919.⁹

Although the evidence is limited given the scarcity of data on income distribution for the last century, various studies have tried to fill in the gaps in several ways. Bourguignon and Morrisson, in their study of 'inequality among world citizens', use data on average incomes from Maddison,¹⁰ together with 33 income distributions of uneven coverage, where similar countries are assumed to have the same income distribution as the country for which historical data are available. This implies that countries within a geographical area tend to share the same income distribution.¹¹ Thus, Bourguignon and Morrisson's study offers data on inequality

⁶ Lindert and Williamson, *Unequal gains*; Piketty, *Capital*.

⁷ Milanovic, *Global inequality*, pp. 75, 78.

⁸ Atkinson, 'Distribution', p. 90; Soltow, 'Long-run'; Williamson, *British capitalism*; Lindert, 'Three centuries'.

⁹ See Dell, 'Top incomes in Germany'; Geisenberger and Müller, *Die Einkommenstruktur*; Procopovitch, 'Distribution'.

¹⁰ Bourguignon and Morrisson, 'Inequality'; Maddison, *Monitoring*.

¹¹ This point is made by Milanovic, 'Short history', p. 495.

in western Europe for more than 20 countries, but this is probably a very stylized picture.¹² Van Zanden et al. note that in Bourguignon and Morrison's work 'for the period before 1950 . . . changes in income inequality within countries are clearly underestimated'.¹³

Hence, van Zanden et al. enlarged the number of observations of inequality within countries, using backward projections of a national Gini coefficient based on the evolution of indirect estimates such as the unskilled-wage/GDP ratio and the distribution of male adult heights. This approach goes beyond the work of Bourguignon and Morrison since it incorporates inequality in individual countries. However, the use of these proxies also generates important shortcomings. First, the ratio between unskilled wages and GDP, introduced by Williamson,¹⁴ although easily computable for most countries, has led to inconsistent and exaggerated comparisons over time.¹⁵ Second, the distribution of adult heights is more an indicator of health and well-being during a particular period in life, and there are factors other than income that are more important in explaining the development of heights, such as food availability, exposure to disease, and workload.¹⁶ In any case, inequality has only an indirect relation to these factors.

Finally, we consider methodologies whereby movements in inequality within countries are measured using the evolution of the top income shares, based on tax records. This approach was introduced by Kuznets and extensively applied by Atkinson and Piketty.¹⁷ It has been particularly useful for filling gaps in inequality trends, given its correlation with direct inequality measures.¹⁸ However, since this statistic focuses on the top share of the income distribution, this indicator does not reveal what happens among the lower 90 per cent—or 99 per cent—of the distribution.¹⁹ This limitation may be particularly pronounced during eras of rapid structural change (for example, coinciding with an increase in the skilled labour force) when changes in inequality are mostly linked to increasing differences between the middle and the bottom part of the income distribution. Therefore, these proxies do not provide a comprehensive measure for examining changes in levels of inequality across the total distribution. In this respect, the best alternative for obtaining direct estimates of income distribution in the past is the construction of so-called social tables.

Essentially, social tables provide a concise and complete description of the social structure by collecting data on the number of people belonging to different social

¹² The sample includes western European countries and offshoots: Argentina, Chile, Australia, Canada, New Zealand, Austria, Czechoslovakia, Hungary, France, Germany, Italy, Scandinavian countries, Spain, Portugal, Switzerland, Benelux and microstates, the UK, Ireland, and the US.

¹³ van Zanden et al., 'Changing shape', p. 280.

¹⁴ Williamson, 'Globalization'.

¹⁵ This point is made by Prados de la Escosura, 'Inequality', pp. 5–6. Since this measure compares the returns to unskilled labour with the returns to all production factors, a fall indicates that unskilled labour returns increase more slowly than GDP per capita, suggesting increasing inequality. Consequently, inequality over long spans of time becomes overstated as the increasing skilled labour force in developed societies is translated into a lower proportion of unskilled workers, and thus a drop in the ratio, increasing inequality.

¹⁶ See Floud, Fogel, Harris, and Hong, *Changing body*.

¹⁷ Kuznets, *Shares*; Atkinson and Piketty, eds., *Top incomes over the twentieth century*; eisdem, *Global perspective*; Piketty, *Capital*.

¹⁸ See Leigh, 'Top income shares', p. 630.

¹⁹ Atkinson, Piketty, and Saez, 'Top incomes', p. 4: 'our series also suffer from important limitations . . . the series measure only top income shares and hence are silent on how inequality evolves elsewhere in the distribution'.

groups—or classes—and the estimated average incomes that can be linked to these groups.²⁰ Indeed, the methodology applied for this sort of construction is very similar to that used for the reconstruction of Historical National Accounts. The construction of social tables has been particularly useful for assessing inequality in the pre-1900 period.²¹ For Britain, the first social table was developed by King in 1688 to estimate the size and structure of the English and Welsh population.²² Following King, other British social tables were created by Massie for 1759, Colquhoun for 1801–3, and Baxter for 1867.²³ Lindert and Williamson then updated this work to explore British income distribution up to 1913.²⁴ For the European continent, we can find examples of social tables for France between 1788 and 1894 by Morrisson and Snyder, and for different European cities after 1500 by Hoffman et al. and van Zanden.²⁵

Social tables based on fixed social groups or occupations permit consistent comparisons of income distribution across long spans of time. An important limitation is that they might underestimate inequality when the number of groups is small or when the members belonging to one group are assumed to share the same average income.²⁶ These sources of bias (a small number of groups and heterogeneity within groups) can be mitigated by introducing the largest possible level of disaggregation within each occupational group.

Another limitation is that social tables cannot take account of family formation, as they are not based on household surveys. Moreover, since they are based on occupational censuses, they tend to be more biased during periods of greater female labour participation.²⁷ However, in the absence of surveys, they are a good alternative for our period.²⁸ Indeed, unlike household surveys, social tables avoid the imperfect inclusion of people at both ends of the income distribution.²⁹ However, they cannot capture as great a level of disaggregation within the richest group as fiscal sources do.³⁰

²⁰ Henceforth we use the terms ‘social classes’, ‘social groups’, and ‘occupational groups’ interchangeably.

²¹ See, for instance, Campbell, ‘Benchmarking’, for medieval Britain (c. 1290); Milanovic, ‘Estimate’, for Byzantium in the year 1000; Milanovic, Lindert, and Williamson, ‘Pre-industrial inequality’, for several societies ranging from the first-century Roman Empire to Brazil in 172; or the most recent work by Lindert and Williamson, *Unequal gains*, for America since 1700.

²² See Barnett, *Two tracts*.

²³ Lindert and Williamson, ‘Revising’.

²⁴ Ibid. The most recent revision of England’s social tables is that of Allen, ‘Class structure’, who considers servants as a separate group and includes the employment and earnings of women and children.

²⁵ Morrisson and Snyder, ‘Income’; Hoffman, Jacks, Levin, and Lindert, ‘Real inequality’; van Zanden, ‘Wages’.

²⁶ This point is made by Milanovic, ‘Short history’, p. 496.

²⁷ When both men and women work, and we do not know anything about family formation, inequality calculated from social tables could be underestimated (when there is assortative mating), or overestimated (if rich men/women marry poor women/men). We thank one of the reviewers for this comment.

²⁸ Very few countries conducted household surveys on a systematic basis before the 1970s. While female labour participation was high in traditional agricultural societies, it declined with industrialization and urbanization before increasing again after the Second World War.

²⁹ See Atkinson, ‘Distribution’, p. 84; Milanovic, *Global inequality*, pp. 15–16. In the bottom part of the distribution, the homeless, students, and people in sanitary or penitentiary institutions are not included in the surveys. Meanwhile, at the top, the richest people tend to under-report incomes or even refuse to participate in surveys.

³⁰ There is the possibility of combining different sources, but we have avoided this as such sources might not be totally comparable, for instance, due to different units of analysis in surveys (households), censuses (occupational groups), and fiscal records (individuals or married couples).

II. Building social tables for Germany and Britain

Social tables compile information on social classes with their associated average income and the number of individuals that can be linked to this income. Some previous social tables estimated average incomes from consumption patterns or tax records.³¹ However, there are disadvantages linked to the use of these sources. For example, there are relatively few historical household budgets for the period before the 1950s, and therefore these are not representative of the total population.³² Similarly, only a very small proportion of the population is likely to be included in tax records. According to Prados de la Escosura, ‘only a very small fraction of the population was subjected to individual income taxation in many countries prior to the mid twentieth century, while fraud and tax evasion challenge the reliability of fiscal records as we move back in time’.³³

In this article, we follow the approach of Milanovic and others and construct our social tables with information on the active population structure provided in the occupational censuses.³⁴ By using occupational censuses, we include between 50 and 60 per cent of the total population distributed by profession (including owners at the top and unoccupied people at the bottom of the distribution), which circumvents the previously mentioned problems of representativeness. We next compile nominal income data linked to each profession from different sources.³⁵ For German average earnings, we rely mostly on data from Hohls.³⁶ British data on average earnings are taken from Feinstein and Chapman and Knight.³⁷ Additionally, we use information from secondary sources to estimate the relative differences in earnings across work categories and gender. The most important assumptions are explained in this section and further details are provided in the online appendix tables.³⁸

We use average annual earnings, instead of wage rates, because earnings include other types of income, such as payments in kind and bonuses for overtime and night work.³⁹ This is important because, as pointed out by Scholliers, ‘if the development of the standard of living [and by extension inequality] is to be investigated, it should be kept in mind that wages are not the only source of income’.⁴⁰ Therefore, the use of earnings allows for the inclusion of different sources of income (except government transfers) and provides a more reliable picture of the pre-fisc income

³¹ See Hoffman et al., ‘Real inequality’; Campbell, ‘Benchmarking’; Morrison and Snyder, ‘Income’.

³² As pointed out by A’Hearn, Amendola, and Vecchi, ‘Historical household budgets’, p. 16: ‘The lack of underlying probabilistic survey design means that no collection of historical budgets, no matter how large, can be assumed to be a statistical sample representative of the population. Some strata will be under-represented, others unrepresented altogether in the data’.

³³ Prados de la Escosura, ‘Inequality’, p. 291.

³⁴ See Milanovic, Lindert, and Williamson, ‘Pre-industrial inequality’; Lindert and Williamson, *Unequal gains*.

³⁵ All German and British sources used in this article are detailed in online app. tabs. S3.1 and S3.5, distinguished by period, type of data, and sector.

³⁶ Hohls, ‘Sectoral structure’.

³⁷ Feinstein, *National income*; idem, ‘New estimates’; idem, ‘Changes’; Chapman and Knight, *Wages*.

³⁸ Consult online app. tabs. S3.2–3.4 for Germany, and S3.6–3.8 for Britain.

³⁹ In our sources, annual average earnings are typically estimated from weekly earnings, in which the number of days allowed for holidays are used for the conversion to annual income. From Huberman and Minns, ‘Times’, we find that the reduction of working days during this period was slow (two days per decade) and similar across European countries, so we think it is unlikely to influence our results.

⁴⁰ Scholliers, *Real wages*, p. 15. This idea was also pointed out by Chapman and Knight, *Wages*, p. 8; and Bry, *Wages*, p. 124.

distribution. The use of market income, while problematic in modern economies, is not an issue for periods when redistribution (through government transfers and taxes) is small. For the cases of Germany and Britain, Broadberry and Burhop show that redistribution schemes operated on a very small scale until the Second World War.⁴¹ Moreover, as Lindert argues, the choice of pre-fisc incomes entails a larger intellectual challenge with regard to explaining the forces behind inequality, as the redistributive component of post-fisc inequality is, by contrast, transparently attributable to government.⁴²

In a similar vein, by applying specific assumptions (for example, the incorporation of differences by gender and work status) we can obtain a more comprehensive picture of the whole social structure. In this respect, Allen argues that '[t]he more fully the tables are elaborated, the more powerfully they illuminate social change'.⁴³ Introducing specific assumptions requires a more thorough investigation and deeper knowledge of the countries' institutional context. For instance, an important question concerns how legislation and the bargaining power of unions affect the evolution of owners' profits, skill premiums, and gender inequalities in these two countries. We will now discuss the sources of the data used in the construction of the social tables for Germany and Britain in more detail.

Germany

In order to build the social table for Germany, information on the active population structure (by profession) was obtained from the occupational censuses (*Berufszählungen*) of 1907, 1925, 1933, 1939, and 1950, respectively, and summarized in the statistical yearbooks (*Statistisches Jahrbuch*).⁴⁴ For the occupational censuses, individuals were asked about their main occupation and were grouped according to their work category and gender. The 1907 census includes the population of the German Empire. The censuses of 1925 and 1933 refer to the resident population in the Weimar Republic excluding the Saarland, Posen, West Prussia, Alsace, and Lorraine. The census of 1939 includes the Saarland (reincorporated in 1935) and the territories of Austria and the Sudetenland which had been acquired up to that time. For 1950 we totalled the resident population reported in the German Democratic Republic census and the resident population in the Federal Republic of Germany (including the Saarland and West Berlin).⁴⁵

⁴¹ Broadberry and Burhop, 'Real wages', p. 412.

⁴² See Lindert, 'Three centuries', p. 6. Indeed he argued that 'pre-fisc is not even pre-fisc, inasmuch as prior fiscal interventions, such as state tax, affect the inequality of this year's original incomes'. The influence of government fiscal redistribution on pre-fisc incomes cannot be easily tracked; however, the examples of Britain and the US, exposed by Lindert, suggest that trends in pre-fisc inequality (equality) are preceded by trends toward regressivity (progressivity) of the fiscal structure.

⁴³ Allen, 'Revising', p. 14.

⁴⁴ See Statistisches Reichsamt for *Statistisches Jahrbuch* of the German Empire and the Weimar Republic; Staatliche Zentralverwaltung für Statistik for *Statistisches Jahrbuch* of the German Democratic Republic, and Statistisches Bundesamt for *Statistisches Jahrbuch* of the Federal Republic of Germany.

⁴⁵ While fiscal territories change, we observe that differences between benchmark years are small in terms of both coverage (more than half of the total population) and structure (see online app. tabs. S2.3 and S2.4).

Table 1. *Number/structure of occupational groups and classes in Germany*

Occupations ^a			Domestic services/ without profession			Owners		Total	
Number of groups	Class distinction by:		Number of groups	Class distinction by:		Number of groups	Class Distinction by: Sector (2):	Number of groups: (18+2+2)	Number of classes: (18*2*2) +(2*2)+2
	Work status (2):	Gender (2):		Work status (1):	Gender (2):				
18	Salaried employee/ wage worker	Male/ female	2	Wage worker	Male/ female	2	Agriculture/ industry and trade	22	78

Note: a These are: agriculture; mining and quarrying; building; metal working; the chemicals industry; paper and printing; wood and furniture; textiles; leather; clothing and cleaning; food, drink, and tobacco; trade; transport; public administration; liberal professions; insurance, banking, and finance; catering; and personal services.

Source: See section II.

For each occupation, we have re-classified work categories into three groups: first, ‘owners’, including the self-employed; second, ‘salaried personnel’, including tenants, managers, employees, and officials; and third, ‘wage-earners’, including family workers. Moreover, to make censuses comparable across time, the number of occupations has been standardized at 22. This results in 78 classes, structured as follows. There are 18 professional occupations, each with two working categories (salaried personnel and wage-earners) which are disaggregated, in turn, by gender (male and female). Next, there are four more classes for domestic servants and unemployed people (two for males and two for females).⁴⁶ Finally, two classes of owners (one in agriculture and one in industry and commerce) are distinguished.⁴⁷ Once the censuses were homogenized, we applied interpolation methods between the census benchmark years in order to obtain annual data on the active population structure of Germany between 1907 and 1950.

The next step was to allocate annual average incomes for the 22 occupations that we standardized in the occupational censuses. For this purpose, we relied mostly on Hohls, who compiled data on average earnings from accident insurance statistics.⁴⁸ Hohls provides data for 10 sectors: agriculture; mining; construction and civil engineering; basic materials and capital goods industries; the consumer goods industry; the food and related products industry; trading; transport and post; public administration; and services.⁴⁹

Next, we estimated earnings in 10 additional sectors that are absent from Hohls, using a two-step process. We first calculated the relative differences of earnings (in percentages) among sectors from other sources such as the Board of Trade, Bry, Hoffman, and the *Statistisches Jahrbuch*.⁵⁰ We then applied the percentages

⁴⁶ An example of the social table for the first census benchmark year in 1907 can be found in online app. tab. S2.1.

⁴⁷ Here males and females are aggregated since we assume no gender discrimination in the receipt of income from ownership.

⁴⁸ Hohls, ‘Sectoral structure’.

⁴⁹ The sectors that were included in these sectors can be found in online app. tab. S3.1.

⁵⁰ Board of Trade, *Report*; Bry, *Wages*; Hoffmann, *Das Wachstum*; Statistisches Reichsamt, *Statistisches Jahrbuch*; Staatliche Zentralverwaltung, *Statistisches Jahrbuch*; and Statistisches Bundesamt, *Statistisches Jahrbuch*.

obtained to Hohls's data.⁵¹ For instance, based on the work of Hoffmann, we estimated average earnings in domestic services as 30 per cent of average earnings in services. Then we applied this percentage to Hohls's average earnings in services to estimate average earnings in domestic services.⁵² Income for the 'unoccupied'—which is absent from the table—is assumed to be equal to that of the lowest income group, namely, domestic services.⁵³ Note that there are no available data on average earnings for the hyperinflation years 1921–3. The information on relative earnings from the *Statistisches Jahrbuch* and the Board of Trade—for occupations within the industrial sector—is only available for some benchmark years (1905, 1913, 1925, 1933, 1939, and 1949). We observe, however, that relative differences tend to remain similar across benchmark years. Nonetheless, the final ratio that we used is an average of all benchmark years.

Assumptions on earnings differences by work status were estimated using the salary ratio to the mean and the wage ratio to the mean, obtained from Bry and the *Statistisches Jahrbuch*.⁵⁴ Similarly, earnings differences by gender across sectors were estimated using the gender ratios (female earnings as a percentage of male earnings) obtained from Bry and the *Statistisches Jahrbuch*.⁵⁵ As in the case of the relative differences among sectors, information on skill premiums and gender ratios is only available for particular benchmark years, as shown in the respective tables.⁵⁶

Finally, data on proprietors' income are from Bry and the information provided in the *Statistisches Jahrbuch* (1907, 1913, 1925, 1933, and 1939) on the National Budget (*Völkswirtschaftliche Billanzen*), which distinguishes between different sources of national income, such as private income from agriculture and forestry and private income from industry and trade.⁵⁷ Here, totals for proprietors' income from forestry and industry are respectively divided by the total number of independent proprietors either in agriculture or industry, which are available from Bry for some benchmark years (1907, 1925, 1933, and 1939).⁵⁸ Estimations between benchmark years have been interpolated and from 1939 projected forward according to the evolution of consumer prices.⁵⁹ It is not possible to identify from our sources the proportion of workers receiving income from property, yet we believe this must have been a very small group. During this period property ownership was heavily concentrated in the upper part of the distribution.⁶⁰ An additional limitation is that we cannot estimate the dispersion of income within each group of proprietors. In particular, capturing the dispersion in the upper part

⁵¹ As in Hohls, sectors included in these additional sources are shown in online app. tab. S3.1.

⁵² Details for additional sectors can be found in online app. tab. S3.2.

⁵³ We tested the inclusion of zero income in the 'unoccupied' group. This obviously affects inequality levels (raising Gini coefficients by 0.06) but not the inequality trends.

⁵⁴ Bry, *Wages*; Statistisches Reichsamt, *Statistisches Jahrbuch*; Staatliche Zentralverwaltung, *Statistisches Jahrbuch*; and Statistisches Bundesamt, *Statistisches Jahrbuch*. See online app. tab. S3.3. The information mostly corresponds to negotiated wages and salaries.

⁵⁵ Bry, *Wages*; Statistisches Reichsamt, *Statistisches Jahrbuch*; Staatliche Zentralverwaltung, *Statistisches Jahrbuch*; and Statistisches Bundesamt, *Statistisches Jahrbuch*. See online app. tab. S3.4.

⁵⁶ An example of these calculations for particular benchmark years can be found in online app. fig. S3.1.

⁵⁷ Here private income includes business income + property income (rents). It does not include other kinds of property (dividends and interests), since we do not have any information on the separate components and distribution of totals.

⁵⁸ Bry, *Wages*.

⁵⁹ We use Metz's series compiled in Rahlf, 'German time series'.

⁶⁰ See Crosland, *Future*, p. 47; Holtfrerich, *German inflation*, pp. 267–9.

Table 2. *Comparisons of social table structures in Germany and Britain*

	Benchmarks	No. of occupations	No. of classes
Germany	1907	Owners and self-employed: 2	Owners and self-employed (agriculture/industry and trade): 2
	1925	Workers: 19	Workers (salaried and wage earners/males and females): 74
	1933	Without profession: 1	Without profession (males and females): 2
	1939	Total: 22	Total: 78
	1950		
Britain	1901	Owners and self-employed: 2	Owners and self-employed (agriculture/industry and trade): 2
	1911	Workers: 19	Workers (salaried and wage earners/males and females): 74
	1921	Without profession: 1	Without profession (males and females): 2
	1931	Total: 22	Total: 78
	1951		

of the distribution might modify the levels slightly, but we think it is unlikely to alter our trends.⁶¹

Britain

To reconstruct the British social table, we compiled the active population structure by profession reported in the occupational censuses of England and Wales.⁶² As for Germany, we have five censuses, developed in different years, but with occupational structures highly comparable to those of Germany. Indeed, before applying linear interpolations between benchmark years, 78 standardized classes were created, following the same structure used for Germany.⁶³ Annual estimations of the average earnings associated with each professional category by work status are based on Feinstein, Chapman and Knight, Routh, and the *Historical Record of the Census of Production*.⁶⁴

We compiled average wage earnings across 20 different occupations by period.⁶⁵ For 1900 to 1913 we used Feinstein's 1911 benchmark estimates on average full-time earnings projected backwards and forwards with the wage indexes (1911 = 100) for particular sectors, also provided by Feinstein.⁶⁶ For 1913 to 1920 we applied forward projections from 1913 based on the evolution of 'total manual' earnings.⁶⁷ For 1920 to 1950 we relied mostly on Feinstein's data for the main

⁶¹ For instance, for the case of Spain, Prados de la Escosura, 'Inequality', p. 295, observed that when testing constant vs. changing dispersion of property incomes, results were practically identical.

⁶² Census of England and Wales, *Occupation Tables*.

⁶³ An example of the social table for the first census benchmark year in 1901 can be found in online app. tab. S2.2.

⁶⁴ Feinstein, *National income*; idem, 'New estimates'; idem, 'Changes'; Chapman and Knight, *Wages*; Routh, *Occupation*; Business Statistics Office, *Historical Record*. For a further description, see online app. tabs. S3.6 and S3.7.

⁶⁵ See online app. tab. S3.6. Like in Germany, income for 'unoccupied' (absent from the table) is assumed to be equal to domestic servants. When testing the inclusion of zero income in the 'unoccupied' group, this affects Gini levels slightly, while it does not affect inequality trends.

⁶⁶ Feinstein, 'New estimates'.

⁶⁷ Feinstein, 'Changes'.

sectors.⁶⁸ For sectors not represented in Feinstein's study, we used Chapman and Knight for the period 1920–38.⁶⁹ For 1938 to 1950 we estimated the earnings in missing sectors by applying the relative differences (in percentages) obtained from the *Historical Record of the Census of Production* to Feinstein's data.⁷⁰ Since these percentages can be only estimated for benchmark years (1935, 1948, 1949, and 1950), we applied the average, as in the case of Germany.

We obtained estimations of salary earnings for 20 occupations.⁷¹ Between 1900 and 1920 the main source is the skill premium (salary earnings as a percentage of wage earnings) obtained from the Board of Trade and Routh, and applied to the corresponding wage-earnings series.⁷² From 1920 to 1938 we used data from Chapman and Knight and Feinstein on salary earnings in different sectors.⁷³ From 1938 to 1950 we used the skill premiums obtained from Feinstein and the *Historical Record of the Census of Production*.⁷⁴ For some sectors or periods information on skill premiums is only available for certain benchmark years. In those cases, skill premiums have been interpolated. Additionally, female earnings have been estimated from the gender ratios (female earnings as a percentage of male earnings) obtained from Routh and Lewis.⁷⁵ Here, as for skill premiums, gender ratios have been interpolated to construct annual series between available benchmark years.

Finally, annual incomes for owners in agriculture and industry are based on Feinstein, who provides total farmers' income (including rents) and non-farm incomes from self-employment (including rents and trading profits of companies).⁷⁶ Here totals are divided by the number of self-employed and owners in the two respective groups for various benchmark years (1901, 1911, 1921, and 1938) provided by Feinstein.⁷⁷ In this way, we can estimate the average income per owner in agriculture and industry in the benchmark years.⁷⁸ For the years in between we applied interpolation methods. For 1939 to 1950 we have used forward projections based on the evolution of total income from self-employment in Feinstein.⁷⁹

Sample adjustments

Even though the British and German occupational censuses are comparable in terms of sectoral structure and work categories, they have some compositional

⁶⁸ Ibid.

⁶⁹ Chapman and Knight, *Wages*.

⁷⁰ Business Statistics Office, *Historical Record*; Feinstein, 'Changes'.

⁷¹ See online app. tab. S3.7.

⁷² Board of Trade, *Report*; Routh, *Occupation*.

⁷³ Chapman and Knight, *Wages*; Feinstein, *National income*.

⁷⁴ Feinstein, *National income*; Business Statistics Office, *Historical Record*.

⁷⁵ Routh, *Occupation*; Lewis, *Women in England*. For further details, see online app. tab. S3.8. An example of these calculations for particular benchmark years can also be found in online app. fig. S3.2.

⁷⁶ Feinstein, *National income*, tab. 23. As in the case of Germany, we do not include dividends and interest here because it is not possible to identify the separate components of the total (that is, actual amounts received from companies, public corporations, public authorities, and from abroad).

⁷⁷ Ibid., tab. 7.2.

⁷⁸ As for Germany, we found evidence that the proportion of workers receiving property incomes in Britain during this period must be small, since property was almost exclusively owned by the upper class. See Lindert, 'Three centuries', p. 175; idem, 'Unequal English wealth', p. 1155.

⁷⁹ Feinstein, *National income*, tab. 10.

differences that needed to be addressed to make both samples comparable. On the one hand, there is evidence that during the early twentieth century the British censuses tended to under-report paid work carried out by married women, under the widespread assumption that they were housewives.⁸⁰ According to Hakim, this under-reporting occurred because working- and middle-class families wanted to conform to the ideal of a full-time housewife supported by a husband with a 'family wage'.⁸¹ Consequently—and unlike in Germany—we observe a large proportion of 'unoccupied' people in the British statistics that remains around 43 per cent until 1950, of which 56 per cent were married females. In the German statistics, by comparison, the 'unoccupied' group made up less than 20 per cent of the total active population, and was more evenly distributed between males and females.⁸² Therefore we have adjusted our British sample by leaving out the unoccupied married females (60 per cent of total unoccupied females and 20 per cent of the total active population). In that way, we obtain a sample that is more comparable to that of Germany and avoid the double counting that would result from the inclusion of women who actually lived on a family wage.⁸³

On the other hand, the German censuses tend to over-record women's work. According to Mason, the German censuses, unlike the British ones, included family workers or assistants, even though they had no labour contract, no insurance, and often worked for irregular periods without a regular wage.⁸⁴ These women usually worked on farms, in shops, or in cafés owned by their husbands or other male relatives. Therefore, to make both samples comparable and to avoid double counting, we have adjusted our German sample by leaving out female family workers (around 30 per cent of total females and 10 per cent of the total active population).⁸⁵

After these adjustments, the samples represent 50 per cent (standard deviation = 7.3) of the total population in Germany and 60 per cent (standard deviation = 1.8) of the total population in Britain. They have similar proportions of the male and female labour force (70 and 30 per cent respectively), but somewhat higher ratios of unoccupied females in Britain (65 compared to 55 per cent).⁸⁶ Sectoral structures also differ, as expected: Germany had a higher proportion of the occupied population in the agricultural sector (accounting on average for 23 per cent of the total labour force) than Britain (where it remained below 10 per

⁸⁰ Crafts, Gazeley, and Newell, *Work*, pp. 2–3; Roberts, *Women's work*, pp. 6–13.

⁸¹ Hakim, *Key issues*, p. 61.

⁸² To estimate the possible under-recording of unemployed people in Germany, especially in 1933, we have also tested the increase in the number of 'unoccupied' by adding two million 'invisible unemployed'; see B. A. Rahmer, 'Unemployment in Germany, 1932–1933', digitized archive, Modern Records Centre, University of Warwick, Publisher: Victor Gollancz, doc. ref. MSS.157/5/G/6, <https://wdc.contentdm.oclc.org/digital/collection/tav/id/3136> (accessed April 2016). These two million were previously subtracted from sectors more likely to be affected by seasonality as follows: one million from workers in agriculture (50% male and 50% female); 500,000 from male workers in building; and 500,000 from female workers in domestic service. The results do not show significant changes in original inequality levels, nor in trends.

⁸³ We assume that unoccupied single or widowed females had lower incomes than unoccupied married women. Of course, there might be other factors lowering the per capita incomes of unoccupied married females (such as family size); however, these cannot be inferred from the available sources.

⁸⁴ Mason, 'Women', p. 78.

⁸⁵ We have tested measuring inequality with the original samples. In both cases this results in higher inequality levels (since we are including more females, who tend to have the lowest incomes). However, we do not observe changes in inequality trends. See online app. fig. S1.1.

⁸⁶ See online app. tab. S2.3.

cent); the German proportion in services was lower (27 compared to 40 per cent); and proportions were similar in industry (around 50 per cent).⁸⁷ However, when we observed the potential effect of changes in the sectoral structure on inequality levels, we found that these must have been small. For instance, in Germany, average earnings in the service sector were higher than in industry, but the proportions of the total labour force in both sectors remained fairly stable over the period.⁸⁸ In Britain the earning levels in both sectors were quite similar, diminishing the potential impact of a transfer of labour from industry to services or vice versa.⁸⁹

III. Inequality in Germany and Britain, 1900–50

Figure 2 shows direct estimates of inequality (measured as Gini coefficients) obtained from the social tables of Germany and Britain.⁹⁰ When we compare the trends over time in both countries, parallel and smooth paths appear before the First World War, but opposite trends prevail afterwards.⁹¹ During the First World War, income inequality increased dramatically in Germany (from 40 to 52), but it declined sharply in Britain (from 44 to 36). During the postwar recession years, the trends reversed, with increasing inequality (by 7 percentage Gini points) in Britain and a pronounced drop in Germany (from 52 to 30). A new reversal took place between the Great Depression and the post-Second World War years, when inequality increased rapidly in Germany (up to 44) and declined in Britain (by 4 percentage Gini points).

Next we compare our inequality trends with those observed by other authors. We first compare trends between the benchmark years for which scholars have already provided estimations (shown in figure 1). We observe that before the First World War our trends coincide with the flat pattern observed by Grant for Germany, and with the trends inferred for the UK from the data points provided by Bourguignon and Morrisson (for 1910) and Lindert and Williamson (for 1913).⁹² Differences appear, however, after the First World War. Our series suggest a much deeper fall in inequality in Germany between 1913 and 1930, and a milder reduction in Britain. Between 1930 and 1950, we also register a slighter decline in inequality in Britain, whereas we find a large increase in Germany for the same period. This contrasts with the global drop inferred from the estimations mentioned above. We next compare our trends on an annual basis with the evolution of some inequality proxies based on top incomes. Incidentally, as recently highlighted by Bartels, the opposite trends registered in Britain and Germany from our social tables are

⁸⁷ See online app. figs. S1.2 and S1.3.

⁸⁸ See online app. figs. S1.2 and S1.4.

⁸⁹ See online app. figs. S1.3 and S1.5.

⁹⁰ The Gini coefficients from the social tables are estimated in the conventional way: $G = \frac{1}{\mu} \sum_{i < j}^n p_i p_j (y_j - y_i)$ where n is the number of social classes; μ is the overall mean income, p_i is the proportion of people belonging to the i -th social class; and y_i is the mean income of people belonging to the i -th social class and social classes are ranked in ascending order ($y_j > y_i$). As described in section II, we have 78 classes for both Germany and Britain.

⁹¹ We have estimated inequality from alternative generalized entropy indices (for example, the Theil index). Inequality trends in both countries coincide with those derived from Gini coefficients. Results are available from the authors upon request.

⁹² Grant, 'Industrialisation'; Bourguignon and Morrisson, 'Inequality'; Lindert and Williamson, 'Reinterpreting', tab. 2.

Figure 2. *Inequality trends in Britain and Germany (Gini coefficients)*
 [Colour figure can be viewed at wileyonlinelibrary.com]

Notes: Markers in white indicate census benchmark years from which we have interpolated the active population structure. Data on earnings are on an annual basis, only interrupted between 1920 and 1924 in Germany and in 1939 in Britain. Ginis are expressed in percentages.

Sources: See section II.

mirrored in the evolution of the top income shares in Germany and the UK.⁹³ Likewise, volatile inequality trends in Germany obtained from social tables match those inferred from the evolution of the β coefficient and skill premia in Dumke: increasing during the First World War, declining afterwards, and rising again during the Nazi period.⁹⁴

If we look at levels, we observe that in general Britain registers higher income inequality than Germany (except for the periods 1914–20 and 1941–50). However, inequality levels in Germany were much more volatile, with Gini coefficients ranging between 30 and 52 (standard deviation = 5.7), compared to those in Britain, which ranged between 35 and 44 (standard deviation = 2.4).⁹⁵ When comparing our data with previous work, we find lower inequality levels in Britain in 1913 than Lindert and Williamson suggest for 1913 in the UK.⁹⁶ This is probably due to the imperfect inclusion of the top 0.05 per cent in our series.⁹⁷ Meanwhile, we find higher inequality levels in early twentieth-century Germany than those obtained by Grant.⁹⁸ We believe that this is related to the under-representation of lower-income groups in the Prussian tax system between 1892 and 1914.⁹⁹

⁹³ See Bartels, 'Top incomes', p. 17.

⁹⁴ Dumke, 'Income inequality', p. 128. See online app. figs. S1.8 and S1.9.

⁹⁵ Gini coefficients are expressed in percentages ranging from 0 (perfect equality) to 100 (perfect inequality).

⁹⁶ Lindert and Williamson, 'Reinterpreting'.

⁹⁷ While our social tables are only based on census information, the social table of Lindert and Williamson also incorporates persons in the top ranks (0.05% of the total) with the information obtained from the super-tax statistics (in Stamp, *British incomes*, p. 338). As mentioned in section I, we avoided combining different sources as they might not be totally comparable across time.

⁹⁸ Grant, 'Industrialisation'.

⁹⁹ According to Grant, *ibid.*, after the reform of the Prussian tax system (in 1892), 76% of the population became exempt from income tax. Moreover, due to the abolition of the *Klassensteuer* (a class tax paid by the lower

Figure 3. *Evolution of inequality (Gini coefficients) and top income shares in Germany and Britain*

[Colour figure can be viewed at wileyonlinelibrary.com]

Notes: Lines with circles (represented on the left y-axis) show the evolution of inequality (Gini coefficients). Lines with diamonds (represented on the right y-axis) show the evolution of the top 1%.

Sources: Gini coefficients have been estimated from social tables; see section II. The top 1% income share is from Piketty, *Capital*, available in tab. S9.2 of the online appendix: <http://piketty.pse.ens.fr/en/capital21c2>.

Despite the potential downward bias that may result from the imperfect coverage of the top 0.05 per cent in the social tables, we believe that this does not influence the plausibility and consistency of our inequality trends.

Furthermore, as mentioned before (and shown in figure 3), our results are in line with inferences about inequality from Piketty and his associates on the basis of the evolution of the top income shares in Germany¹⁰⁰ and the UK. However, our trends in inequality present much more precision than is not registered by the evolution of the top income shares.¹⁰¹ This is because the evolution of the top income shares over national income during this period can only proxy inequalities between those receiving income from property (the upper part of the distribution) and those receiving income from labour.¹⁰² But our social tables also capture inequality linked to the dispersion of labour earnings. Both dimensions are necessary to draw reliable long-run trends in income distribution, so they should be considered jointly.¹⁰³ Furthermore, social tables allow us to develop alternative analyses that disentangle the different forces of inequality in these two countries, in particular the differences between proprietors and workers and the dispersion in labour earnings.

Figure 4 shows the evolution of different ‘inequality forces’ that help us to obtain a broader understanding of inequality changes in Germany and Britain. The

income groups and subject to their tax capacity or ability to pay), lower income groups were no longer registered in tax records. Although the exempt proportion decreased, it remained higher than 35% in 1914.

¹⁰⁰ Results are also in line with the updated top income series for Germany provided by Bartels, ‘Top incomes’.

¹⁰¹ A comparison between top income shares from social tables and from Piketty, *Capital*, can be found in online app. figs. S1.10 and S1.11. Our series shows higher income shares for the top 1%. The reason is that, unlike tax records, the information on owners’ income from national accounts (used in our social tables) does not permit us to disaggregate between the top 5% and the top 1%.

¹⁰² For the case of Germany, Dell, ‘Top incomes in Germany’, p. 382, estimated that by 1936 wages only represented a maximum of 20% of incomes in the top fractile. Likewise, for the UK, Atkinson, ‘Distribution’, p. 110, found that in 1937 investment income made up 60% of total income for the top 1%. On the other hand (as mentioned in the text at n. 60, and in n. 78), there is evidence that the proportion of workers receiving property incomes during this period was also small.

¹⁰³ Prados de la Escosura, ‘Inequality’, p. 290.

Figure 4. Trends in 'inequality forces' (owners, skill, and gender ratios) in Germany and Britain, 1900–50

[Colour figure can be viewed at wileyonlinelibrary.com]

Notes: Solid lines (represented on the left y-axes) show annual development of different 'inequality forces'. Dashed lines (represented on the right y-axes) show annual trends in total inequality. Total inequality is measured by Gini coefficients. The respective inequality forces are measured as owners, skill, and gender ratios. Final ratios are computed as the weighted average of the ratios in the three main sectors (agriculture, industry, and services).

Sources: Social tables described in section II.

first mechanism, the owners ratio, is defined as the ratio between the earnings of owners and the earnings of all workers (including salaried and wage earners). This indicator captures to what extent the income of the highest part of the distribution is diverging from the rest, denoting changes in inequality between proprietors and workers. Next, the skill ratio is defined as the ratio between earnings of salaried workers and earnings of wage workers and reports income differentials by work status. To the extent that the increase in skill ratio signals increasing

differences within the group of workers, its increase also contributes to the increase in inequality.¹⁰⁴ The last force, the gender ratio, is defined as the ratio between male and female earnings. This ratio indicates gender pay inequality and its increase also contributes to rising inequalities within the group of workers, thus to a rise in overall inequality. A careful study of the evolution of these ratios together with the evolution of Gini coefficients helps us to understand inequality changes within the two countries.

Before the First World War, Germany experienced a mild decrease in inequality, linked to the decrease in the owner and skill ratios. In Britain, stable trends in inequality appear to be associated with the drop in work status and gender inequalities, which offset the increase in the owners ratio. This process of equalization continued in Britain until the end of the First World War, but it was disrupted in Germany.

During the First World War, the Gini coefficient in Germany increased from 40 to 52 and is associated with an increase in the owners ratio, with proprietors earning on average up to six times more than workers. Gender and skill differences also grew, with earnings of salaried employees being a factor of 1.5 higher than those of wage-earners, and with males earning 1.7 times more than their female counterparts at the end of the conflict. The opposite is observed in Britain, where at the end of the Great War the Gini coefficient was 8 percentage points lower compared with the situation before the start of the conflict, due to a dramatic fall in the owners ratio and the reduction in skill and gender inequalities. At the end of the war, however, both skill and gender ratios remained higher than in Germany. British proprietors now received on average 3.5 times more than workers, compared to 5.5 in 1911. This is in line with the literature that points to the lower power of British owners to make profits from the war compared to their German counterparts.¹⁰⁵ Moreover, the reduction in pay inequalities in Britain corresponds with the emergence of national pay bargaining across British industry and the improvement in the position of unskilled workers during the First World War.¹⁰⁶ In Germany, the extension of collective bargaining agreements only started after the revolution of 1918.¹⁰⁷

Trends reversed between the end of the First World War and the Great Depression. In Germany, the owners ratio fell from 6.2 in 1918 to 1.8 in 1930, due to the loss of rents during the hyperinflation years and the Great Depression.¹⁰⁸ Together with the narrowing skill and gender differences, this resulted in a decrease in inequality of more than 20 Gini percentage points. Wage compression manifested itself in the second half of the First World War and in 1919 as a result of the demand for a more egalitarian income distribution, the

¹⁰⁴ The rise in the skill ratio does not necessarily have to imply an increase in total equality as long as the proportion of salaried workers within the labour force is increasing. However, as shown in online app. tab. S2.4, proportions of salaried workers in Germany and Britain did not show significant increases until 1939.

¹⁰⁵ See Turner, *Businessmen*, pp. 33–4; Winter, 'Some paradoxes', p. 170. A similar conclusion is obtained by Procopovitch, 'Distribution', p. 75, who states that 'before the war the incomes of the wealthiest few in England were somewhat higher than in Germany, but whilst in Germany they have increased considerably during the war, in England . . . they have declined'.

¹⁰⁶ Crafts et al., *Work*, p. 55; Hart and Mackay, 'Engineering', p. 38; Reid, 'Impact', p. 228; Routh, *Occupation*, p. 132.

¹⁰⁷ Bresciani-Turroni, *Economics*, p. 301; Bry, *Wages*, p. 41; Feldman, *Great disorder*, p. 107.

¹⁰⁸ Balderston, 'Origins', p. 500; Dell, 'Top incomes in Germany', p. 413.

rapid unionization of unskilled labour, and the extension of the system of collective agreements.¹⁰⁹

During the interwar recession inequality increased in Britain by 7 percentage points, returning to prewar levels. The rise occurred in a context of an increasing owners ratio, when employers claimed back what they had lost during the war¹¹⁰ and resisted the control of wages as trade unions weakened.¹¹¹ Indeed, the reduction of wages was conceived as the only way to decrease production costs as a part of deflationary policies to restore the gold standard.¹¹² Moreover, skill ratios increased due to the major downward drift of manual workers' earnings, as unemployment was much greater among the unskilled and wages were more affected by cyclical fluctuations than salaries were.¹¹³

From the Great Depression until the end of the Second World War, inequality in Germany tended to increase, although it did not reach the levels that were attained in the First World War. We observe that between the census benchmark years of 1933 (coinciding with the rise of Nazi Germany) and 1939, the rise in inequality took place in the context of an increasing owners ratio and the stagnation of the skill and gender ratios. This is a reflection of the soaring profits linked to rearmament policies,¹¹⁴ together with the tighter regulation and lower bargaining power of labour unions.¹¹⁵ In Britain, a slight decrease in inequality between the Great Depression and the Second World War was driven by a fall in the owners' income and skill ratios, within a context of increasing average earnings across sectors and work status.¹¹⁶

In the trans-Second World War period, from 1939 to 1950, Germany experienced a slight increase in inequality relative to the previous period. The increase in the owners ratio was partially offset by the fall in gender and skill ratios. This was apparently associated with the shrinking earnings advantages in the service sector, in particular for salaried workers.¹¹⁷ Similarly, in Britain, despite the increase in the owners ratio and the stagnation of gender inequalities, the fall in inequality can be partially linked to the increase in nominal earnings for all classes, the increasing number of workers in relatively high-wage industries, and the levelling of earnings across work status and gender.¹¹⁸

In summary, before 1933 and after 1939, variations in the relationship between property and labour incomes, as well as variations in labour earnings, drove changes in inequality in Germany. Between 1933 and 1939, differences between owners and labour earnings led to changes in the income distribution. In Britain, earnings dispersion among workers appears to have been the main driver of changes in inequality before the First World War and after 1939. However, from the First World War to the outbreak of the Second World War, differences between

¹⁰⁹ See Bry, *Wages*, p. 88; Holtfrerich, *German inflation*, p. 234.

¹¹⁰ Reid, 'Impact', p. 230.

¹¹¹ Thane, "'Welfare state'", p. 186.

¹¹² Eichengreen and Temin, 'Gold standard', p. 192.

¹¹³ See Routh, *Occupation*, pp. 124–32; Turner, 'Trade unions', p. 228.

¹¹⁴ Dell, 'Top incomes', p. 416.

¹¹⁵ Bry, *Wages*, p. 45; James, *German slump*, p. 367.

¹¹⁶ See Knowles and Roberston, 'Differences', p. 111. See also online app. figs. S1.5 and S1.7.

¹¹⁷ See Hohls, 'Sectoral structure', p. 51. See also online app. fig. S1.6.

¹¹⁸ Gazeley, 'Levelling', p. 178; Turner, 'Trade unions', p. 227.

proprietors and workers, as well as changes in earnings dispersion, caused variations in inequality.

IV. Income growth distribution in Germany and Britain, 1900–50

How did inequality develop for specific groups during particular sub-periods? To obtain a broader understanding of the effect of inequality movements on segments of the workforce, we have estimated so-called growth incidence curves (GICs). GICs, first introduced by Ravallion and Chen,¹¹⁹ display compound growth rates in average incomes for particular percentiles of the distribution between two benchmark years.¹²⁰ In this sense, GICs show us how periods of economic expansion or economic downturn affect different parts of the distribution. An upward trend indicates that the highest part of the distribution benefited relatively more during a specific period, suggesting an increase in inequality. A downward trend would suggest the reverse.

Figure 5 shows GICs for Germany and Britain between 1900 and 1950. The y-axes show average annual compound growth rates in real incomes (expressed in percentages) between two benchmark years. The British series were deflated with the CPI (1913 = 100) provided by Feinstein, and for Germany we used the GNP deflators (1913/1914 = 100) provided by Ritschl and Spoerer, and Spoerer and Streb.¹²¹ The x-axes plot fractiles of the respective national income distributions.¹²² Although we cannot follow individual occupations throughout time, we observe that, in general, occupational groups placed in particular fractiles of the distribution remain in place in benchmark years.¹²³ According to the occupational classification by fractiles, we distinguish five different classes: a 'low' class (the bottom 20 per cent) formed by wage-earners in agriculture and domestic services; an 'upper-low' (from P20 to P50) mainly formed by female wage-earners in industry and services as well as salaried females and male wage-earners in manufacturing industries (for example, paper, textiles, and food); a 'lower-middle' class (P50–P70) including female wage-earners in transport, public administration, and professions, as well as salaried females and male wage-earners in war-related heavy industries (such as metals and chemicals) and services; a 'higher-middle' group (P70–90) formed by salaried males in war-related industries, as well as salaried males and females, together with male wage-earners in transport, public

¹¹⁹ Ravallion and Chen, 'Measuring'.

¹²⁰ Given the lack of historical data on income distribution, GICs are usually calculated for modern periods when individual data from household surveys are available. Interestingly, our social tables also permit the estimation of historical GICs, as they offer an acceptable level of disaggregation.

¹²¹ Feinstein, *National income*, tab. 61; Ritschl and Spoerer, 'Das Bruttosozialprodukt', tab. A1; Spoerer and Streb, *Neue deutsche Wirtschaftsgeschichte*, p. 37.

¹²² The GICs introduced by Ravallion and Chen, 'Measuring', show the growth rate of income for a particular percentile (for example, the 5th or the 99th percentile of the distribution) between two years. However, here we compare the average income growth for the same fractile group (for example, the bottom 5%) between two particular dates. This allows us to capture distributional changes by group.

¹²³ It is worth noting that these are anonymous GICs, so in theory we are not able to capture social mobility derived from the fact that, for example, an individual in the bottom 5% moves to the upper fractile at the end of the period. What we are capturing instead is the income growth at different fractiles of the distribution. However, when looking at occupations (by work status and gender) belonging to different fractiles, we observe that in general the ranking remains.

Figure 5. *Growth incidence curves in Germany and Britain, 1900–50*
 [Colour figure can be viewed at wileyonlinelibrary.com]

Notes: The y-axes show average annual compound growth rates of real incomes (expressed in %) at different fractiles of the distribution (drawn on the X-axes) between two benchmark years.

GICs with solid lines correspond to Germany, those with dashed lines to Britain. The straight dashed and dotted lines show overall average annual growth rates of real incomes in Germany and Britain respectively.

Sources: See section II.

administration, and professions; and finally a ‘top-income’ class (the upper 10 per cent) formed by owners in agriculture as well as proprietors in industry and trade.

In addition to the total period (1900–50), we distinguish between five different sub-periods. The first is from the first census year in the respective countries to the year before the First World War. The second is from 1913 to the end of the conflict. The third is from 1918 to the Great Depression. The fourth is from 1929 to the outbreak of the Second World War, and the last covers the period from 1939 to 1950.

Before the First World War, both German and British citizens on average experienced low growth rates in real incomes. In Germany the upper-low and

lower-middle classes benefited relatively more due to increasing earnings for both male and female workers in industry. In Britain, higher gains by the bottom 20 per cent appear to be linked to the rise in the remuneration of domestic servants as a market response to increasing demand and diminishing supply.¹²⁴

As with inequality trends, the opposite GICs can be found during the First World War. Both countries exhibited negative growth rates in average real incomes, but with contrasting distributions. In Germany the top-income classes did better than the bottom 90 per cent. This seems to be the result of the enormous growth in business profits in war-related industries.¹²⁵ Unlike in Britain, excess profits were subjected to mild taxation.¹²⁶ In this sense, negative gains (below the average) for the upper 10 per cent in Britain appear to be linked to industrialists' subservience to government control of profits.¹²⁷ The relatively higher gains within the bottom 90 per cent can be related to the sustained rise in average annual earnings, both wages and salaries, including females.¹²⁸

Between the end of the conflict and the Great Depression, most classes in Britain experienced low or negative growth rates in real incomes. At the same time, the top 5 per cent (including proprietors in industry and trade) exhibited positive gains above the average, and were less affected by the economic downturn. This occurred in a context of increasing unemployment, the weakening bargaining position of trade unions, and the downward flexibility of wages in accordance with the dictates of the gold standard.¹²⁹ In Germany, the top-income and middle-high classes seem to have been worst affected during the interwar recession years. High positive gains in the low and middle parts of the distribution during the Weimar Republic seem to be the result of the higher bargaining power of labour unions (now embracing unskilled workers and women) compared to employers in collective labour agreements where government arbitration usually tipped in favour of labour unions.¹³⁰ The fall in business profits might have been due to the increasing labour costs and the loss of rents in the years of hyperinflation and during the Great Depression.¹³¹

From 1929 to the outbreak of the Second World War, Britain showed much lower growth rates in average real incomes than Germany, where the highest 10 per cent attained real income growth rates of 6 per cent annually. During this period, the benefits linked to rearmament went to the upper class of proprietors, and major gains were also received by those in public administration. The scope for improvement among the low and middle classes was almost non-existent due to the austerity policies introduced by Chancellor Brüning from 1930,¹³² and then to the dissolution of labour unions and the setting of maximum wages when

¹²⁴ According to Feinstein, 'New estimates', p. 614.

¹²⁵ Bresciani-Turroni, *Economics*, p. 28; Holtfrerich, *German inflation*, p. 229.

¹²⁶ Balderston, 'War finance', p. 230; Ferguson, *Pity of war*, p. 320; Kocka, *Facing total war*, p. 23.

¹²⁷ Winter, 'Public health', p. 170; Winter and Prost, *Great War*, p. 118; Wrigley, *David Lloyd George*, p. 112.

¹²⁸ Aldcroft, *Inter-war economy*, p. 354; Gazeley, 'Manual work', p. 73.

¹²⁹ Broadberry, 'Aggregate supply', p. 472; Eichengreen and Temin, 'Gold standard', p. 192; Feinstein, Temin, and Toniolo, *World economy*, p. 40.

¹³⁰ Ferguson, 'Constraints', p. 654; Fisher and Hornstein, 'Role', p. 108; Holtfrerich, *German inflation*, p. 22; Ritschl and Straumann, 'Business cycles', p. 172.

¹³¹ Balderston, 'War finance', p. 500; Dell, 'Top incomes', pp. 416–17; Holtfrerich, *German inflation*, p. 270.

¹³² Feinstein et al., *World economy*, p. 40; Temin, *Lessons*, pp. 62–3; Galofré-Vilà, Meissner, McKee, and Stuckler, 'Austerity', p. 10.

Hitler assumed power.¹³³ In Britain benefits appear to have been more evenly distributed between the upper class of proprietors and the low-middle classes formed by salaried workers and wage-earners in industry. In this respect, there is evidence that despite the high pools of unemployment, both institutional changes and labour demand effects resulted in a lower fall in wages in Britain, as well as a reduction in pay inequalities, especially in those industries crucial for rearmament and the war effort.¹³⁴

Finally, between 1939 and 1950, Germany exhibited lower growth rates in average real incomes than Britain, where gains were more equally distributed. In Germany, negative gains registered among the bottom 20 per cent and P70–P90 seem to reflect the fact that women were discouraged from working,¹³⁵ as well as the diminishing advantages of the service sector.¹³⁶ In Britain all workers seemed to benefit equally from growth in a context that saw increased earnings for all classes, together with a reduction in skill premiums and gender pay inequalities.¹³⁷

Taking the period as a whole, we observe that in both countries the major winners of the total economic expansion experienced between 1900 and 1950 were the upper-low and lower-middle classes. However, benefits linked to industrial expansion during the First World War and the Second World War were concentrated among the upper classes in Germany, while in Britain benefits were more evenly distributed among the working classes. The opposite happened during the interwar period. Results appear to be linked to political factors such as changes in the power of owners and labour unions.

V. Conclusion

In this article, we aimed to contribute to the literature by providing annual data on income inequality in Britain and Germany during the first half of the twentieth century. We identified the forces that explain changes in inequality in these two countries, exploring the whole range of the distribution. With respect to our first aim, we obtained direct estimates of inequality for Germany and Britain on an annual basis. Evidence from these two countries suggests that the drop in inequality was neither steady nor similar across European countries. Moreover, Britain and Germany's respective Gini coefficients show contrasting trends that are line with the idea of inequality cycles proposed by Milanovic and demonstrated for the case of Spain by Prados de la Escosura.¹³⁸ The fall in inequality in Germany was interrupted during the First World War and the Nazi period, while in Britain the reversal occurred between the end of the First World War and the Great Depression. The long-term evolution of inequality in Germany and Britain is not dissimilar to that presented by Piketty and associates on the basis of the evolution of top incomes shares in Germany and the UK.¹³⁹ However, our results represent changes in the

¹³³ Bry, *Wages*, pp. 233–54; Fisher and Hornstein, 'Role', p. 108.

¹³⁴ Aldcroft, *Inter-war economy*, p. 356; Gazeley, 'Levelling', p. 175.

¹³⁵ Mason, 'Women'; Ritschl and Straumann, 'Business cycles', p. 173.

¹³⁶ Hohls, 'Sectoral structure', p. 51.

¹³⁷ Gazeley, 'Levelling', p. 197; Haddy and Currell, 'British inter-industrial earnings', p. 108.

¹³⁸ Milanovic, *Global inequality*; Prados de la Escosura, 'Inequality'.

¹³⁹ Piketty, *Capital*.

total income distribution, because, using social tables, we capture in tandem the differences between owners and workers and the dispersion in labour earnings.

With respect to our second aim, detailed social tables allow us to identify the forces behind changes in inequality as well as income growth rates in different parts of the distribution. Results suggest that before 1933 and from 1939 onwards, variations in the relationship between property and labour incomes, as well as variations in labour earnings, drove changes in inequality in Germany. During the Nazi period differences between owners and labour earnings were the only determinant of changes in inequality, as the abolition of trade unions and the setting of maximum wages precluded the dispersion of labour earnings. In Britain, the dispersion of earnings among workers appears to have been the main driver of changes in inequality before the First World War and after 1939, when the reduction of skill premiums and gender pay inequalities offset the increase in the owners' ratio. However, from the First World War to the outbreak of the Second World War, differences between proprietors and workers, as well as changes in labour earnings dispersion, caused variations in inequality.

Our conjectures, which are in line with the work of Piketty, point primarily at political and institutional factors as crucial drivers of inequality trends over the first half of the twentieth century.¹⁴⁰ During the two world wars, benefits linked to industrial expansion were concentrated in the upper classes in Germany, while in Britain benefits were more evenly distributed among the middle and lower classes, probably due to the greater bargaining power of British labour unions. During the interwar period, high unemployment and deflationary policies seem to have severely weakened the power of labour unions in Britain. In Germany, however, labour unions, frequently supported by government arbitration, increased their bargaining power during the hyperinflation years and thereafter.

We believe that our reconstruction of social tables reveals a rich picture of the evolution of income inequality in Europe by providing annual data that cover the whole range of the distribution, rather than focusing only on specific sections of the population. This has enabled us to achieve a deeper understanding of the potential drivers of relative income movements in the period 1900–50.

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¹⁴⁰ Ibid.

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

S1. Complementary figures

S2. Complementary tables

S3. Additional information on sources and data