

TESTING MARX: CAPITAL ACCUMULATION, INCOME INEQUALITY, AND SOCIALISM IN LATE NINETEENTH-CENTURY GERMANY

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Abstract—We study the dynamics of capital accumulation, income inequality, capital concentration, and voting up to 1914. Based on new panel data for Prussian regions, we reevaluate the famous revisionism debate between orthodox Marxists and their critics. We show that changes in capital accumulation led to a rise in the capital share and income inequality, as predicted by orthodox Marxists. But against their predictions, this neither led to further capital concentration nor more votes for the socialists. Instead, trade unions and strike activity limited income inequality and fostered political support for socialism, as argued by the revisionists.

I. Introduction

WHAT can we learn from Marx and his followers about inequality? The current debate about inequality is frequently refers to ideas about capitalist dynamics that were first formulated by Karl Marx and orthodox Marxists. These ideas were especially influential in Germany before 1914. There, leaders of the labor movement based their analyses and actions on the writings of Marx, and the main labor party (SPD) was among the largest and arguably the most influential Marxist parties in the world. In this paper, we ask, with the benefit of hindsight, which predictions of orthodox Marxism were born out in the data of 19th-century Germany. We do so by drawing on a wealth of historical statistics and modern econometrics.

Our focus is on the effects of a continued accumulation of industrial capital, considered by Karl Marx and orthodox Marxists such as Karl Kautsky to be the defining feature of capitalism. We look at the decades between the foundation of the German Empire and World War I, arguably the heyday of German industrial capitalism and orthodox Marxism alike. To test for causal effects of capital accumulation, we exploit the spatial diffusion of industrialization over time across Prussia. This allows us to test key predictions of orthodox Marxism on the effects of capital accumulation, namely on income inequality, capital concentration, and po-

litical support for socialism. However, these effects were disputed at the time even within the socialist movement. The so-called revisionists heavily attacked the orthodox Marxists arguing that, with the help of trade unions, capitalism could be changed for the benefit of workers. We test their competing predictions and investigate how trade unions and labor conflict turned out to be related to income inequality and political support for socialism.

In accordance with orthodox Marxists, we find that capital accumulation increased income inequality and the capital share. However, we cannot confirm a positive effect either on capital concentration or on votes for the socialists. Instead, we find support for claims made by the revisionists on the key role of trade unions. Our evidence suggests that the activity of trade unions was positively related to political support for socialism. Finally, we show that successful strikes were associated with a reduction in the capital share, in top income shares, and even in absolute top incomes.

For our analysis, we compile new panel data on capital accumulation, income inequality, capital share, capital concentration, and socialism across 28 districts and 544 counties within Prussia between 1874 and 1913. We use regional wealth and income tax statistics to estimate capital accumulation and top income shares, respectively. We compute regional capital shares by combining tax statistics with additional data sources on retained earnings and self-employment. Based on the firm census, we calculate average firm size to measure capital concentration. We use vote shares in general elections, strike activity, and membership in trade unions to capture regional support for socialism.

To causally identify the effect of capital accumulation on income inequality, capital share, capital concentration, and socialism, we exploit the convergence process with higher growth rates in regions that were initially less industrialized. We follow Fernihough and O'Rourke (2021) and use the distance of a county's centroid to carboniferous strata, that is, strata in which coal can be found, to instrument growth in industrial capital accumulation. To rule out concerns about a potentially weak instrument, we demonstrate our instruments' validity by implementing two recommendations by Andrews et al. (2019). First, we implement the weak instrument confidence intervals. Second, we report the F -statistics for the case of clustered standard errors by Olea and Pflueger (2013). Both corroborate the strength of our instrument. For potential violations of the exclusion restriction, we use the method by Conley et al. (2012), which allows for direct effects of the instrument on the dependent variable. These results lend credence to our empirical strategy.

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Our analysis can be read as a contribution to the history of economic thought that uses econometric methods to test claims made by economists of the past. In particular, we investigate the famous revisionism debate between orthodox Marxists and their critics during the decades preceding World War I. Arguably, the debate on the observed increase in inequality during Germany's industrialization and their political repercussions shaped all later discussions about income inequality in capitalist economies. This influence extended to the work of Kuznets (1955), who predicted, in response to orthodox Marxism, that inequality would first rise with economic development and then fall. At the center of the revisionism debate was the orthodox Marxist prediction that capitalist development would necessarily lead to more inequality, growing economic concentration, social and political conflict, and ultimately to socialism.

Based on the writings of Karl Kautsky, the leading theoretical Marxist of the Second International (Gronow, 2016), we formulate three hypotheses that formed the core of this debate. First, capital accumulation leads to a rising share of capital in total income and growing income inequality. Second, capital accumulation implies a growing concentration of capital in a few hands. Third, rising inequality strengthens political support for the radical left due to a growing mass of impoverished workers. The revisionists around Eduard Bernstein questioned these claims. One of their major arguments revolved around the role of trade unions, which Bernstein (1899) regarded as a key institution to improve the position of the working class. Hence, we also test their counter-hypothesis: that strikes can reduce inequality and that trade union activity can foster the political success of the SPD. Both sides of the debate grounded their arguments in statistical evidence from the German statistical office and other contemporary official statistics. Using the same sources but relying on modern statistical techniques, we reevaluate this debate. It may be argued that by using this approach, we ignore several aspects of Marx's writings deemed crucial by the Marxist literature, such as the labor theory of value. More generally, we treat Marxist ideas as generally falsifiable hypotheses (in the spirit of Popper 2011), which can be questioned. But our aim is to test the contemporary interpretation of Marx by orthodox Marxists such as Karl Kautsky, who indeed considered Marx's work as a body of empirically testable theories (Kautsky, 1899a, 1901), and to test the counterarguments of the Revisionists. As the debaters did, we focus on the evidence for Germany before 1914.

Our findings add to the literature on the determinants of changes in inequality, which is still in disagreement over the relative importance of market forces versus institutions. We show that capital accumulation per se had a causal effect on inequality. Next, by documenting the negative association between successful strikes and inequality, we connect to two recent studies demonstrating the inequality-moderating role of unions (Farber et al., 2021) and worker power (Stansbury & Summers, 2020) as well as to the emerging historical inequality literature that argues for an inequality-

increasing effect of regressive fiscal institutions between circa 1300 and 1850 (Alfani, 2021).¹

Our new regional inequality panel expands the international data landscape to analyze inequality using regional or cross-country panels. Our inequality series is most closely related to the body of research following Piketty (2003) using income tax statistics to measure the concentration of income within the top-most part of the distribution for one country.² Prior to our study, long-run regional inequality series existed only for U.S. states covering the period from 1917 to the present (Frank et al., 2015). Germany has income tax statistics going back to the nineteenth century—in contrast to most other countries, which introduced modern income tax systems at the beginning of the twentieth century (e.g., the United States in 1913)—offering the unique possibility of producing series covering the era of industrialization. Our series from 1874 to 1913 connects to the growing number of historical inequality studies investigating the development of inequality in premodern times. Several historical inequality studies for Europe and the United States have shown that inequality had been rising before industrialization.³ In line with the regional wealth inequality estimates by Alfani et al. (2022), we document higher inequality in urban than in rural regions in the nineteenth century.⁴

Research has long been interested in changes that took place during industrialization and their impact on income inequality, from increasing inequality in the first phase of the classic Lewis model, during the “Engels’ pause” or along the Kuznets curve to constant or declining inequality in later phases of development (Lewis, 1954; Allen, 2009; Kuznets, 1955). Galor and Moav (2004) suggest a theory of long-run development, in which the transition from physical to human capital accumulation changes the relation between economic growth and inequality.⁵ We add to this literature the causal effect of capital accumulation on different inequality measures and the inequality-moderating role of strikes. Our results lead us to rethink the notion of an “ownership society” (Piketty, 2020, p. 194) as a dominant feature of the period before World War I. Instead, our evidence

¹ Another strand of literature emphasizes the role of technological change in pushing up inequality by creating an increased demand for skilled workers (Acemoglu & Autor, 2011; Goldin & Katz, 2008; Goldin et al., 2020). Rising capital shares and evidence of rising income inequality also inspired a number of books critically assessing the future of capitalism, for example, Corneo (2018) and Milanovic (2019).

² These long-run country series are available from the World Inequality Database (wid.world).

³ For example, Lindert and Williamson (2016) document increasing income inequality in American colonies between 1774 and 1860. Alfani (2021, p. 3) provides a comprehensive overview of this development and concludes that “in the period ca. 1300–1800, inequality of both income and wealth grew monotonically almost everywhere in Europe, with the exception of the century-long phase of inequality decline triggered by the Black Death of 1347–52.”

⁴ For estimates of regional land inequality in Germany in the nineteenth century, see Wegge (2021) and Cinnirella and Hornung (2016).

⁵ Empirical investigations of whether industrialization was skill enhancing are a related line of research; see, for instance, recent contributions by Lafortune et al. (2019) and De Pleijt et al. (2020).

underscores the increasing role of workers' bargaining power, which was institutionalized through unions, in raising wages and counteracting inequality.

Our paper is organized as follows. Section II introduces the main variables of our regional panel for the period 1874 to 1913. In section III, we sketch the revisionism debate between orthodox Marxists and revisionists that forms the historical context of our data and analysis. Based on this, we formulate several testable hypotheses. In section IV, we present our main results on the causal effect of capital accumulation on income inequality, concentration and socialism, and the role of trade unions. We conclude in section V with a reevaluation of the revisionism debate and place our findings in a broader context.

II. Income Inequality, Concentration, and Socialism in Nineteenth Century Germany

The German Empire was characterized by a dynamically growing economy and increasing social and political tensions. Between 1850 and 1910, Germany went from a backward economy to Europe's industrial powerhouse. Real GDP per capita roughly doubled between 1871 and 1913 (Pfister, 2020). This rapid industrialization was accompanied by increasing income inequality (Bartels, 2019). With industrialization, the political landscape in Germany changed fundamentally. Socialism became a rising force in Germany as in other parts of Europe in the second half of the nineteenth century. Despite attempts to repress the socialist movement with antisocialist laws (*Sozialistengesetze*) (1878–1890), the socialists became the strongest party in Germany in the first decade of the twentieth century. While these aggregate developments are well documented in economic history, we highlight the remarkable variation across Prussian regions, particularly between rural and industrialized districts and counties. Our main concepts, measures, time periods, and regional coverage are summarized in appendix table A1. In the following, we describe our data sources and the construction of our main measures and present the trends in capital accumulation, income inequality, capital share, capital concentration, and socialism. We analyze the period after the foundation of the German Empire in 1871. Our panel begins in 1874 because income taxation was extended to all parts of Prussia, including larger cities in 1874 (see appendix section C.1 for more details). Appendix table D1 presents summary statistics for our main variables.

A. Capital Accumulation

According to Kautsky (1892), the main driver of capitalist development is industrial capital accumulation. We measure capital accumulation using business assets (noncorporate firms) recorded in wealth tax data for the period 1895 to 1911. Unfortunately, wealth tax data do not allow us to further break down financial assets, which include, on the one hand, shares in corporations, and, on

the other hand, cash, all forms of interest and noninterest-bearing financial assets, the net present value of annuities, appanage, and retirement contracts. By restricting our capital accumulation measure to noncorporate business assets, we might underestimate capital accumulation, particularly in the heavy industries with a significant degree of incorporation (Feldenkirchen, 1979). Yet, contrasting the change in business assets with the change in capital invested in limited liability corporations (GmbHs) reveals a positive correlation (see appendix figure D1). That is, districts with high corporate capital growth also experienced high noncorporate capital growth. This holds independent of their degree of industrialization.

Figure 1a displays capital accumulation between 1895 and 1911. Capital accumulation in rural and mixed districts started at rather low levels of about 500 RM per capita, on average, in 1895, but then rose quickly. In contrast, in industrial districts, capital started at high levels of about 1,100 RM, on average, but increased only moderately.

B. Income Inequality

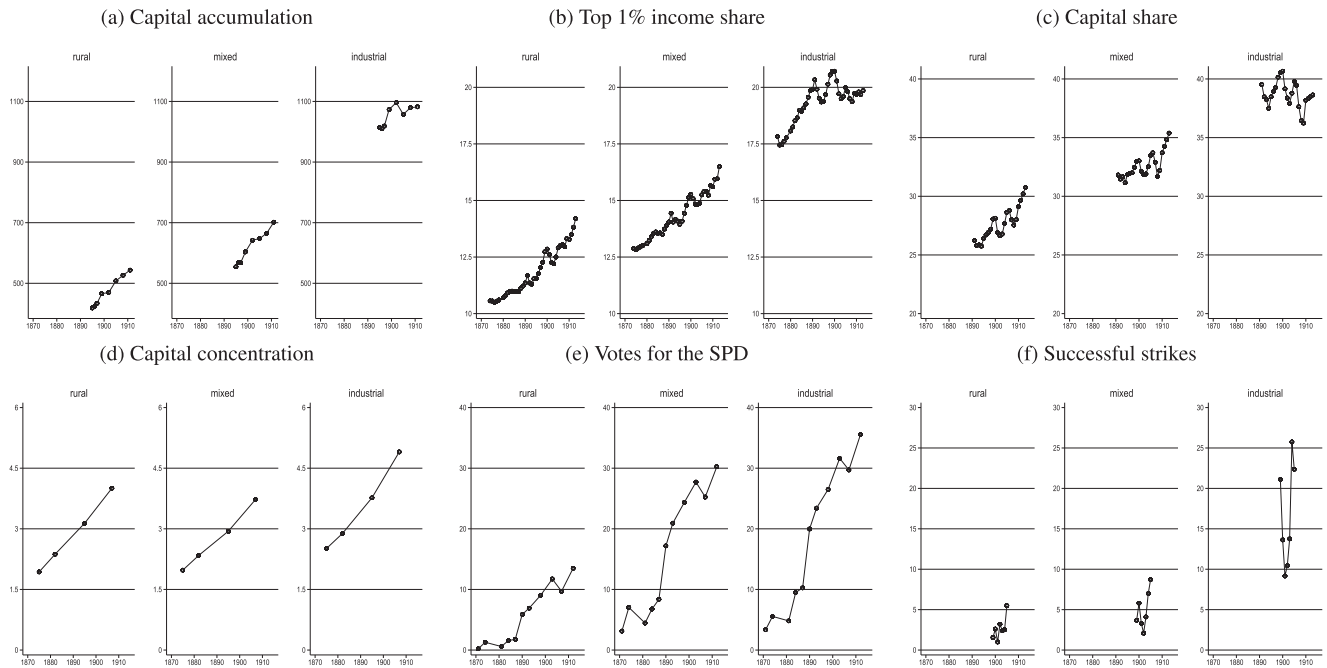
We measure income inequality by the share of total income accruing to a particular fraction of the population, such as the top 5%, the top 1%, or the bottom 95%. The choice of top income shares as our inequality measure is predetermined by the high quality of income tax data in Prussia, providing detailed information on the income distribution of taxpayers (in contrast to the poor quality or lack of annual wage and poverty statistics at the time). The Prussian statistical office annually published tabulations of the number of taxpayers per income bracket, often listing more than 100 income brackets and also differentiating between rural (*Land*) and urban (*Städte*) municipalities within each district.⁶ We digitized these fine-grained statistics on the district level and constructed 28 harmoniously defined administrative districts in Prussia between 1874 and 1913.⁷ By combining the income distribution in rural and urban municipalities in each district, which has been recorded since 1891, with census data on the rural and urban population within each county, we can estimate inequality measures for 544 counties in Prussia between 1891 and 1913. The share of the population included in income tax statistics varies both across districts and over time (see appendix figure C2).⁸ The richer the district, the higher the share of taxpayers. For example, the share of taxpayers increased from 12% in 1891 to 27% in the rural district of Königsberg/Gumbinnen and from 33% in 1891 to 60% in 1913 in industrial Brandenburg (including Berlin). Given that the top 5% of the income

⁶See appendix figure A1 for an example of the historical income tax statistics for tax years 1900 and 1901.

⁷See appendix B for more details on the geographical units.

⁸In Prussia, income taxation for top income earners was introduced in 1851 and extended to the entire population in 1874. See appendix C.1 and Spoerer (2004) for details on Prussian income tax regimes in the nineteenth century.

FIGURE 1.—MAIN VARIABLES BY DISTRICT TYPE, 1874–1913



The graphs show capital accumulation (a), top 1% income share (b), capital share (c), capital concentration (d), votes for the SPD (e) by district type and number of successful strikes (f). Capital accumulation is in RM per capita; top 1% income share, capital share, and union membership is in percent. Capital concentration is average workers per firm. Successful strikes is annual aggregate. Districts with more than 50% employment in agriculture in 1882 are classified as rural (left panel), districts with between 40% and 50% as mixed (middle panel), and districts with less than 40% as industrial (right panel). The categorization of each district is listed in appendix B. Main variables by county and constituency type are displayed in appendix figures D7 and D8, respectively. Source: See appendix A.

distribution is consistently captured over time and across districts/counties, we can compute the income share of the top 5% and of smaller groups at the top. Estimation procedures for top income shares on the district, constituency, and county-level are described in appendix section C.2.

Between 1874 and 1913, income inequality increased in both rural and industrial districts. Figure 1b displays the evolution of the top 1% income share in rural, mixed, and industrial districts.⁹ We categorize districts according to their share of agricultural employment in 1882. Rural districts were mostly located in the east of Prussia (today's Poland and Russia), while industrial districts were mostly located in the center and west of Prussia, including the districts of Düsseldorf, the Ruhr area, Cologne, Aachen, and Wiesbaden in the west, but also Berlin and Brandenburg in the center. Two differences between rural and industrial districts should be noted. First, income inequality in industrial districts was substantially higher than in rural districts. Second, the timing of the inequality increase diverges. In industrial districts, the top 1% income share increased from about 17% in the 1870s to more than 20% in 1900, and then fluctuated around this elevated level up to 1913. In contrast, rural and mixed districts saw a relatively steady increase up to 1913.

Income inequality in Prussia's industrial districts was comparable to that in other countries like France, the United Kingdom, and Sweden, where the top 1% held around 20%

of total income on the eve of World War I and the United States with a top 1% share of about 18% of total income (see <https://wid.world/>). However, income inequality in Prussia as a whole was low in international comparison because of the more equal income distribution in rural districts. This finding corroborates Alfani et al. (2022) and Wegge (2021), who find that wealth inequality in Germany was comparably low by the mid-nineteenth century.

Many of the previous studies analyzing inequality for the nineteenth century such as Cinnirella and Hornung (2016) and Ziblatt (2008) focus on land inequality.¹⁰ However, our results presented in appendix figure D3 show that land inequality is not a reliable proxy for income inequality during this period: Our top 1% income share negatively correlates with land inequality computed by Cinnirella and Hornung (2016) in 1882 and also with the land share of large landholdings. While land was extremely concentrated in East Prussia, top incomes of East Prussia's landowning elite (the supposedly wealthy Prussian Junkers) were comparably low in comparison to lower incomes in East Prussia and in comparison to top incomes of the industrial elite in the west of Prussia. At the same time, land was less concentrated in the west of Prussia and, hence, the measure of landholdings inequality was low. Similarly, Becker and Hornung (2020)

¹⁰Cinnirella and Hornung (2016) measure concentration of landownership as the ratio of landholdings larger than 300 Prussian Morgen (circa 75 hectares) over the total number of landholdings per county. Ziblatt (2008) calculates a Gini coefficient to describe the distribution of landownership across different bins.

⁹Appendix figure D2 displays the development of the top 1% income share separately for each district.

find that inequality measured with the voting weights in the Prussian three-class franchise and land inequality were negatively correlated. Our results provide a new and different perspective on inequality during the period of industrialization, highlighting the more important role of industrial incomes of the entrepreneurial elite from increasingly large firms in the west and center relative to agricultural incomes of the aristocratic, landowning elite in the east.

C. Capital Share

We calculate the capital share from the income side. Capital income is the sum of interest, distributed profits (dividends), undistributed profits (retained earnings), and capital gains. Our main data source is income tax statistics on capital income from interest and distributed profits, which we supplement with undistributed profits, self-employment capital income, and government's capital income from additional data sources. Income tax statistics represent the most accurate data source for aggregate income during the German Empire, which is also underscored by the fact that other pre-1913 German national income series are based on the same income tax data, for example, Hoffmann and Müller (1959).¹¹ We describe the construction of our capital share measure in appendix C.5.

Between 1891 and 1913, the capital share increased in rural and mixed districts and fluctuated at an elevated level in industrial districts, as shown in figure 1c. As noted for income inequality, capital share levels are substantially higher in industrial districts than in rural districts. We also see that the capital share increased in the more rural districts up to 1913 but stagnated after 1900 in the more advanced districts, closely resembling our findings for the share of top incomes. Appendix figure D4 compares our capital share for Prussia as a whole to the capital share for the entire German Empire as estimated by Bengtsson and Waldenström (2018) and Pfister (2020) and shows that our estimate documents the same trend over time, but on a slightly lower level.

D. Capital Concentration

Our measure of capital concentration is constructed using several firm censuses. These data are available for 1875, 1882, 1895, and 1907. We divide the number of employees by the number of firms in each district and county. Between 1875 and 1907, capital concentration increased sharply in both rural and industrial districts, as displayed in figure 1d. This universal trend is in contrast to the diverse trends documented for income inequality and capital shares across district types.¹² The level of capital concentration was higher

in industrial districts. Note that these statistics were blamed for painting a nostalgic picture of the German economy based on small workshops, where each small workshop was counted separately even within one firm, understating increasing capital concentration among big businesses in Germany (Tooze, 2007).¹³ Hence, our measure of capital concentration must be conceived as a lower bound.

E. Socialism

To capture regional support for socialism, we use vote shares for the socialist party, membership in unions, and strike activity. We use general elections for the national parliament (Reichstag), as the electoral laws of states, such as the three-class franchise in Prussia, were often much less democratic.¹⁴ The Reichstag elections were held directly in single-member constituencies with representatives elected by a majority, following the principle of "one man, one vote." Suffrage covered basically all men above the age of 25, excluding those under tutelage, in bankruptcy, or on welfare. Although the German Empire was a monarchy, elections were much more than just tests of opinion. The Reichstag could propose laws or refuse to agree to laws proposed by the executive, and, most importantly, the executive required parliamentary support, for example, to pass trade policy and the budget (but not for military spending).¹⁵ Reichstag elections were held in 229 Prussian constituencies in 1871, 1874, 1877, 1878, 1881, 1884, 1887, 1890, 1893, 1898, 1903, 1907, and 1912, all of which we include depending on the availability of our other variables. The Sozialdemokratische Partei Deutschlands (SPD) and its predecessors were the only political representative of socialism in Germany.¹⁶

Between 1871 and 1912, political support for the socialists exploded, as can be seen from figure 1e. Their vote share started to increase in the 1880s, in spite of the antisocialist law.¹⁷ After the abolition of this law in 1890 and the

sure because only a negligible share of firms was incorporated, so several districts have fewer than ten corporations in total and the introduction of limited liability companies (GmbHs) in 1906 causes a serious break in the series (see appendix section C.6).

¹³Tooze (2007, p. 59) concludes: "The entire repertoire of Imperial statistics was thus moulded around the interests of German business. Inquiries to which business objected were boycotted." This changed only with the outbreak of World War I.

¹⁴Becker and Hornung (2020) analyze the political economy of Prussia's three-class franchise.

¹⁵However, the Reichstag did not have the power to elect the chancellor or his fellow ministers, who were chosen directly by the emperor. The emperor also had the right to dissolve the parliament and could call for new elections at any time.

¹⁶In 1863, Ferdinand Lassalle founded the first socialist mass party in Germany, the Allgemeine Deutsche Arbeiterverein (ADAV). In 1869, the Sozialdemokratische Arbeiterpartei (SDAP) led by August Bebel and Wilhelm Liebknecht emerged, with a more radical orientation that was strongly influenced by Marx and Engels. In 1875, both parties merged and formed the Sozialistische Arbeiterpartei Deutschland (SAP). In 1890, the party was renamed the Sozialdemokratische Partei Deutschlands (SPD).

¹⁷The rising success of socialist parties and trade unions led to increased suppression in the form of Bismarck's antisocialist law

¹¹Pfister (2020) is a recent contribution estimating a national income series, 1851 to 1913, from the income side based on factor incomes. He focuses on improving the estimate of agricultural incomes in national income and also draws on Prussian tax data.

¹²We also construct a measure of profit concentration using corporate tax statistics available since 1891. We do not make further use of this mea-

publication of the “Erfurter Programm” in 1891, the vote share increased rapidly, particularly in industrial districts. Their rise was interrupted only by the election of 1907, when nationalist agitation in the context of Germany’s colonial policy created a temporary backlash against the socialists. In rural districts, the average SPD vote share increased from near zero to almost 15% in 1912. In industrial districts, the average SPD vote share increased from below 10% to above 30%. The SPD became the strongest party in the Reichstag in terms of vote share in 1890, even before the end of the antisocialist law, and the strongest party in terms of MPs in 1912.

We also analyze union membership and strikes to directly capture socialist activity. In the wake of new trade laws of 1869, a growing number of trade unions had been formed in Germany. They quickly improved their organization and managed to mobilize an increasing part of the industrial workforce. After the end of the antisocialist laws in 1890, unions were allowed to resume their activities. We digitized union membership data on a county level from 1896 to 1906, as well as a previously unused source that lists every single strike by sector and location for every year between 1899 and 1905.¹⁸ We georeferenced these entries to construct a county $\times$ industry data set, covering 21 sectors and 544 counties (hence over 10,000 observations). Appendix figure D5 shows the average number of strikes per 100 workers across counties by sector. Most sectors saw, on average, two to six strikes per 100 workers per year. Between 1896 and 1906, union membership steadily and sharply increased, while (successful) strikes show a volatile but overall rising trend between 1899 and 1905 (figure 1f and appendix figure D6).

III. Orthodox Marxism and the Revisionism Debate

The relationships among capital accumulation, capital share, concentration, income inequality, and socialism were hotly debated at the time. While the socialists gained dramatically in the polls, internal struggles emerged within the socialist movement between the orthodox Marxists on one side and the more pragmatic reform-oriented activists on the other. The former had their stronghold within the main party organization, whereas the latter dominated the trade unions. The “Erfurter Programm” from 1891¹⁹ was an effort to guide the party after the abolition of the antisocialist laws. The program was largely based on earlier drafts written by Karl Kautsky and Eduard Bernstein, with the former contributing the theoretical foundations and long-run strategy, and the latter contributing the short-term tactical objectives. The theo-

retical part was influenced by the writings of Karl Marx and Friedrich Engels and took its starting point in a sharp critique of rising inequality and capital concentration.

The “Erfurter Programm” and Kautsky’s interpretation of Marx in *Karl Marx’ oekonomische Lehren* (Kautsky, 1886) are significant as they represent more broadly what would later be called “orthodox Marxism” and would characterize the Second International (1889–1916). In particular, Kautsky’s commentary on the Erfurter Programm, published in 1892 (Kautsky, 1892), was widely circulated and read well beyond Germany. We cannot even scratch the surface of Marx’s writings and the exegesis of his works by Marxists and non-Marxists. Therefore, we focus on key aspects of orthodox Marxism as formulated by Kautsky (1886, 1892) and on the critique thereof formulated by the revisionists around Bernstein (1899). At the center of orthodox Marxism lies a notion of historical materialism, in which economic conditions determine the cultural and political structure of society in a way that can be empirically tested (“scientific Marxism”). The main predictions of Kautsky’s historical materialism are that capitalist development will inevitably lead to growing economic, social, and political conflict and ultimately to socialism. Let us formulate three predictions from orthodox Marxism and a counterposition from the revisionists that can be confronted with empirical evidence:

Capital accumulation increases the capital share and income inequality. In his commentary on the Erfurter Programm, Kautsky (1892) argues that the main force of capitalist development is the accumulation of industrial capital. Further, he argues that with capital accumulation, the rate of profit will tend to decline, but the volume of capital will increase faster (Kautsky, 1892). Hence, with capital accumulation, the share of capital in income will increase, while income from labor will tend to decline, leading to growing inequality (Kautsky, 1892). This is derived from his (simplified) reading of Marx’s writing on capital accumulation. Consider Marx’s famous “general law of capitalist accumulation”: “It follows therefore that in proportion as capital accumulates, the situation of the worker [...] must grow worse. ... The [general law] necessitates an accumulation of misery equivalent to the accumulation of capital” (Marx, 1867, p. 675). On the next pages Marx, refers to the English income tax statistics for the years 1853 to 1864 to illustrate this.²⁰ He shows that incomes from taxable profits have increased much more than total taxable incomes, suggesting a rising capital share and growing income inequality. Summarizing Kautsky’s orthodox reading, we can distinguish two parts of a prediction: (1a) that capital accumulation leads to a rising share of capital in total income and (1b) that capital accumulation leads to an increase in income inequality.

(Sozialistengesetze) (1878–1890), which banned the socialist party and trade unions. However, individual supporters could still run for parliament and be elected to office. On the political economy of the antisocialist law, see Kersting (2023).

¹⁸The statistical office collected data on this disaggregated level only for these years.

¹⁹For an English translation, see SPD (1984).

²⁰Note that we always refer to the German edition of Marx in Marx-Engels-Werke (MEW). In accepted English translations, chapter 23 of the German text corresponds to chapter 25.

Capital accumulation leads to more capital concentration. Kautsky (1892) argues that capitalist production has the tendency to concentrate all capital into fewer and fewer hands, and ultimately to become the private property of a single person or corporation. This process of capital concentration is sometimes called “centralization.” Kautsky derived this from his reading of Marx (1867), who again used the English income tax statistics to show that for the years 1864 and 1865, taxable incomes from profits were highly concentrated and increasingly so. Marx stated that “with the development of the capitalist mode of production, there is an increase in the minimum amount of individual capital necessary to carry on a business under its normal conditions... Centralization would reach its extreme limit if all the individual capitals... were fused into a single capital” (Marx, 1867, p. 656). On closer inspection, we can split this prediction into two parts: (2a) the prediction of increasing capital concentration, and (2b) the prediction that capital accumulation will cause more capital concentration.

Capital accumulation fosters political support for socialism. Kautsky (1892) and again Kautsky (1899a) argues that capital accumulation must lead to growing misery of the working class, that is, an increase in absolute poverty, alongside the concentration of capital, which will inevitably result in a political regime change toward socialism. He argues repeatedly that capitalism cannot be reformed but must be abolished in a socialist revolution: “The less bearable the existing mode of production becomes... the more numerous will the members of non-proletarian classes flock to the social democrats and follow hand in hand with the irresistibly advancing proletariat his lead to victory and triumph” (Kautsky, 1892, p. 262). Clearly, this leaves little room for the organization of the workers, for example, in trade unions, in order to improve their economic status. Kautsky’s hypothesis was rooted in his reading of Marx: “Along with the constantly diminishing number of the magnates of capital... grows the mass of misery...; but with this too grows the revolt of the working class” (Marx, 1867). This leads to the prediction that capital accumulation leads to growing political support for socialism (3).

In the years following the “Erfurter Programm,” several members of the SPD started to question whether Marxism could provide viable guidance for the party. The most vocal proponent of this critique was Eduard Bernstein. The dispute was mainly about the “empirical validity of the economic laws of capitalist development and the Marxist prognosis about the increasing centralisation of capital and the growing proletarianisation of... the population” (Gronow, 2016, p. 36).

Bernstein challenged all major predictions of orthodox Marxism and did so on the basis of recent statistical evidence. The debate started in 1896 with an exchange between Ernest Belfort Bax and Eduard Bernstein in the weekly *Die Neue Zeit*, the leading journal of theoretical Marxism at the

time, founded and edited by Kautsky (Tudor & Tudor, 1988). In 1898, Bernstein formulated a summary of his positions, which culminated in his statement, “I frankly admit that I have extraordinarily little feeling for, or interest in, what is usually termed ‘the final goal of socialism.’ This goal, whatever it may be, is nothing to me; but the movement is everything.” (cited after Tudor & Tudor 1988, p. 19). This sparked a heated debate involving Bax, Alexander Parvus, Rosa Luxemburg, and Georgi Plekhanov arguing against Bernstein, but also Konrad Schmidt in his support (Tudor & Tudor, 1988). It was only at the party conference in Stuttgart in 1898 that Kautsky joined the debate with a sharp rebuttal of Bernstein, which was widely accepted as the official position of the SPD. In the following years, Bernstein and Kautsky clarified their positions in two books (Bernstein 1899; Kautsky 1899a), which will be our focus. So what exactly was Bernstein’s revisionism, and how did Kautsky respond?

On the most general level, Bernstein questioned the Marxist prediction that capitalism would necessarily lead to ever-increasing inequality, capital concentration (“centralization”), and political revolution. To start with the first prediction, Bernstein (1899) provided evidence from English, French, Prussian, and Saxon income statistics for various years in an attempt to show that the number of middle to high-income taxpayers had increased, and more generally that capital accumulation was not necessarily associated with any dramatic increase in income inequality or polarization into a few rich and many poor. Instead, he argued that there was evidence of a growing middle class and an increasingly differentiated society (Bernstein, 1899). Moreover, Bernstein doubted that there was evidence of a rising capital share, but could not show this. In his reply, Kautsky (1899a) showed that Bernstein had used the data selectively and provided a comparison for the years 1876 and 1890 as an example demonstrating that income inequality had indeed increased.

Next, Bernstein (1899) challenged the prediction of an ever-increasing concentration of capital, using statistical evidence from the occupation and firm census of 1882 and 1895. He showed that the large majority of employees were still working in small and medium-sized enterprises. While Bernstein conceded that factories tended to be increasing in size, he argued that this was sector-specific and countered with the spread of capital ownership in joint stock companies. In his reply, Kautsky clarified that the question of capital concentration was crucial for his concept of orthodox Marxism: “The concentration of capital sets the historical task: the introduction of a socialist social order. It produces the forces to accomplish this task, the proletarians, and it creates the means of doing so: social production” (Kautsky 1899a, p. 54, translation from Gronow, 2016). In his reply to Bernstein, Kautsky revised the statistical evidence and highlighted that employment in small enterprises actually decreased in relative terms. Kautsky also discussed the evidence from income tax statistics to argue that incomes in

the highest tax brackets had increased most strongly between 1876 and 1890. Overall, he concluded, “If ever a theory was splendidly confirmed, it was the theory by Marx in the data from the German occupation and industry census” (Kautsky 1899a, p. 68, own translation).

Finally, Bernstein questioned the prediction that capitalist development would lead to the immiseration of the working class and foster ever-growing political support for socialism among workers. Given the (in his view) weak evidence for other Marxist predictions, and instead evidence for a broadening middle class, the SPD should not rely on any imminent collapse of capitalism, but rather on the role of trade unions, cooperatives, and pragmatic work in parliament to improve the political and economic conditions for the working classes (Bernstein, 1899). In fact, he argued the SPD could only succeed in the polls if it changed into a democratic party working for social reforms (Gronow, 2016). The trade unions take center stage in this, as the “democratic element in industry” (Bernstein, 1899, p. 121). In contrast to Kautsky (1892), who claimed that neither strikes nor any other organized activity of workers could ever change the course of capitalist development, Bernstein argued that trade unions could effectively reallocate profits to wages and hence improve the conditions of workers (Bernstein, 1899). In particular, Bernstein considered strikes to be an effective weapon for workers to improve their position (see especially Bernstein, 1906).

In his response, Kautsky had to modify his earlier statements about a deterministic path toward socialism (see, for example, Kautsky, 1892). He stressed that it would be impossible to “statistically calculate when society has become ripe for socialist production. This production will not merely be a product of economic development, but also of the class struggles arising from this development” (Kautsky, 1899b, translation from Gronow, 2016, p. 51). With reference to earlier arguments by Rosa Luxemburg, Kautsky restated the Marxist concept of immiseration to mean not physical but social misery, that is, “the discrepancy between cultural needs and the means of a wage worker to satisfy them” (Kautsky 1899a, own translation). And while socialism would not be an automatic outcome of economic development, he pointed to the very remarkable political success of socialism over the last few decades, particularly of the SPD in recent years (Kautsky, 1899a). Regarding the role of trade unions, Kautsky (1899a) argued that they derived their influence not from their organization but only from the underlying economic process (of capital accumulation). He reformulated this in Kautsky (1909), stressing again the primacy of the party over trade union activities.

This was in stark contrast to the position of Bernstein (1899, 1906) and trade union leaders such as Carl Legien who considered the trade unions as the key agents of social progress and political success (Legien, 1910). Hence, while Kautsky (and the SPD establishment) interpreted any electoral success as a sign of growing inequality and class struggle, Bernstein argued that the party could only win votes

through pragmatic work for better living conditions. We can thus formulate a fourth hypothesis to capture the essence of Bernstein’s revisionism:

Trade unions can change capitalism to benefit workers. Their activity can limit inequality and foster political support for the SPD. Bernstein argued that activities of trade unions (such as strikes) can effectively improve the position of workers and limit income inequality (4a). He and his followers maintained that (4b) the struggle of trade unions for better working conditions rather than growing “misery” would foster political support for the SPD.

To summarize, while orthodox Marxists argued for the existence of general laws of capitalist development, the Revisionists contested this and argued for the agency of workers via trade unions and institutional change. We illustrate their hypotheses in figure 2. We first show the orthodox Marxist prediction that capital accumulation will increase inequality, concentration, and ultimately support for socialism. We test for a causal effect of capital accumulation using an IV strategy based on carboniferous strata. Next, we show the Revisionist position: institutions such as trade unions can modify the effects of capital accumulation and foster support for socialism in their own right. We cannot test for this causally but will provide supportive evidence.

In the next section, we present our empirical strategy and findings to shed light on this debate. We are of course aware that these data do not cover all aspects of the debate, nor do they allow us to test “Marxism” in general. But our analysis provides new evidence on core arguments of orthodox Marxism that were discussed in the period before 1914 and are still influential today.

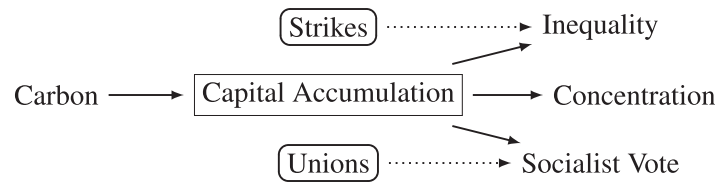
IV. Testing Marx

Our aim in this section is to provide systematic evidence in favor of or against orthodox Marxist predictions and Bernstein’s Revisionism in the context of nineteenth-century Germany. To this end, we interpret the predictions as empirically testable (and of course refutable) hypotheses. We first focus on the effects of capital accumulation on the share of capital, income inequality, capital concentration, and votes for the SPD, thus testing the Marxist predictions illustrated in figure 2 by solid arrows. Second, we investigate whether trade unions and strike activity mitigated inequality and increased support for socialism, depicted in figure 2 by dotted arrows.

A. Testing Orthodox Marxist Predictions

To provide causal evidence on Marxist hypotheses 1 to 3, we exploit the spatial diffusion of industrialization. Industrialization first took off in European cities that were close to carboniferous strata (Fernihough & O’Rourke, 2021). During the first phase of the industrialization, proximity to coal deposits was crucial for running steam engines. Technology

FIGURE 2.—ILLUSTRATION OF HYPOTHESES 1 TO 4



The figure illustrates the four hypotheses in the paper and their relationship. Solid arrows indicate hypothesized causal effects, and dotted arrows indicate hypothesized relations without claiming causality. The orthodox Marxist hypotheses 1 to 3 are shown in the three solid arrows from capital accumulation to various outcomes. We also show how we use carboniferous strata ("carbon") to instrument for capital accumulation. Hypotheses 4a and 4b as stated by the Revisionists are shown in the two dotted arrows, originating from strikes and unions, respectively.

diffusion in general, as well as increasing electrification and falling transport costs in particular, contributed to the spread of industrialization across regions and initiated a process of industrial capital convergence.²¹ Data for capital accumulation exist since 1895, which we can use to show that initially, more rural regions saw higher rates of capital accumulation between 1895 and 1910. In contrast, capital accumulation slowed down in regions with a higher level of industrial capital after 1895. Figure 3a illustrates the strong negative relationship between the initial level of industrial capital in 1895 and capital accumulation between 1895 and 1910 with a large and highly significant OLS coefficient of -1.78 (SE: 0.08) (without further controls).

To establish causality in this convergence process, we use an instrumental variable approach. We follow Ferniough and O'Rourke (2021) and use distance from a county's centroid to carboniferous strata that is, strata in which coal can be found, to instrument growth in industrial capital accumulation. To test the strength of our instrument, we plot the distance to carboniferous strata against capital accumulation between 1895 and 1910. Figure 3b shows a clear positive correlation: the larger the distance to carboniferous strata, the higher the capital accumulation between 1895 and 1910.

The necessary exclusion restriction for this instrument is that distance to carboniferous strata affects the growth in our dependent variables only through growth in capital accumulation. Given that carboniferous strata are of little use except to the coal industry and, thus, to industrialization as shown for European regions in Ferniough and O'Rourke (2021), this assumption seems plausible. We will test for this assumption.

We estimate the following equation by 2SLS:

$$\text{First stage : } \Delta CA_c = \beta \times \text{DistCarb}_c + X'_c \times \gamma + u_c, \quad (1)$$

$$\text{Second stage : } \Delta y_c = \beta \times \widehat{\Delta CA}_c + X'_c \times \gamma + \varepsilon_c. \quad (2)$$

In the first stage, we regress capital accumulation between 1895 and 1910, ΔCA in county c , on the distance to carboniferous strata, DistCarb (in km) for county c . X'_c denotes a vector of control variables including initial population, the share of urban population in 1895, and population growth

²¹On the role of different power sources in the spatial distribution of economic activity across Germany, see Gutberlet (2014).

from 1895 to 1910. For the second stage, we use the predicted capital accumulation as explanatory variable for the change in our outcome variables, top 1% share, capital share, firm size, and support for socialism.

A potential concern for our estimation is the weak instruments problem. A weak first stage could lead to unreliable IV estimates. To address this, we follow recent recommendations by Andrews et al. (2019) and the implementation by Enikolopov et al. (2020). As suggested there, we use a test for weak instruments for the case of clustered standard errors by Olea and Pflueger (2013). The resulting effective F -statistic in table 1 is around 11. This is below the threshold of 15 in Olea and Pflueger (2013) for the case of 20% potential bias and a 5% significance. However, it is still above 10, the relevant rule-of-thumb threshold for the case of clustered standard errors according to Andrews et al. (2019). Following Andrews et al. (2019) and Enikolopov et al. (2020), we report the weak-instrument robust confidence intervals for our main coefficient. The intervals exclude zero in all cases.

Another important concern lies in violations of the exclusion restriction. Here, we use the methodology pioneered by Conley et al. (2012), which explicitly tests the violation of the exclusion restriction by allowing for direct effects of the instrument on the dependent variable. Appendix figure D9 shows that our results are robust to this test, especially for the effect of capital accumulation on the capital share.

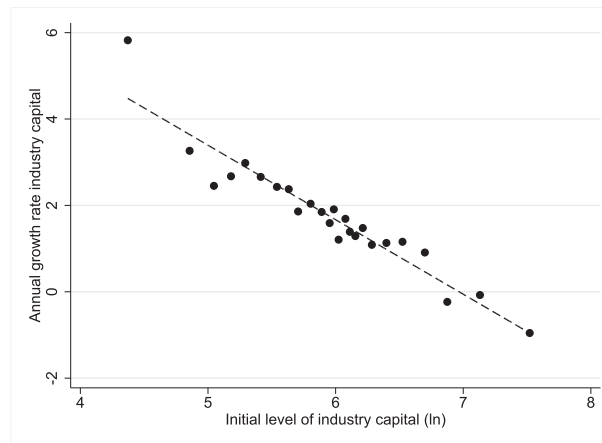
B. Testing Hypothesis 1 (H1): Capital Accumulation Increases Capital Share and Inequality

We first consider the orthodox Marxist hypothesis that rising capital accumulation will positively affect the capital share and the top 1% income share (our income inequality measure). Results from the 2SLS estimation using the IV of equation (2) are found in Table 1, columns 1 and 2. Those from the OLS estimation are shown in columns 3 and 4.²² Results for the capital share (hypothesis 1a) are reported in panel 1 and results for the top 1% share in panel 2

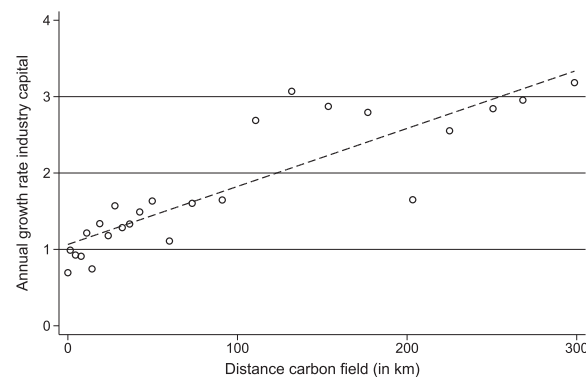
²²We present the reduced-form effects and the first stage in appendix table D2. Moreover, appendix figure D10 provides binned scatter plots for hypotheses 1 to 3 that show the relation between capital accumulation and various dependent variables after controlling for residuals from the first stage of our IV approach, following Cattaneo et al. (2022).

FIGURE 3.—CAPITAL ACCUMULATION CONVERGENCE, 1895–1910

(a) Capital Accumulation Convergence



(b) First Stage: Carboniferous Strata and Growth in Capital Accumulation



Panel a plots the relationship between initial level of industrial capital accumulation as of 1895 (in logs) and the annual growth rate for the same variable between 1895 and 1910. Each bin represents on average 22 counties. The coefficient for the initial level of industrial capital accumulation in an OLS regression (without further controls) is -1.78 (SE 0.08). Panel b plots the relationship between distance to carboniferous strata (in km) and the annual growth rate in industrial capital accumulation between 1895 and 1910. Each bin represents on average 22 counties. The coefficient for the initial level of industrial capital accumulation in an OLS regression (without further controls) is 0.0076 (SE: 0.0008).

Source: See appendix A.

(hypothesis 1b). Both provide clear support for the hypothesis. The coefficients from the IV estimation indicate that a 1 percentage point increase in the annual capital accumulation share increases the capital share by 0.9 pp and the top 1% share by 0.7 pp. Expressed differently, a 1 standard deviation increase in capital accumulation can explain roughly 70% of a standard deviation increase of the change in the top 1% income share and more than 75% of a standard deviation increase of the change in the capital share.²³ Note that the coefficients remain of similar size once we control for population growth in column 2, a potentially important confounder. The results presented provide evidence that capital accumulation increased the capital share and income inequality. This is clearly in line with the reasoning of orthodox Marxism and against the claims made by revisionists.

²³For this, we multiply the effect from column 1 with the standard deviation (1.82) and divide this by the variation in the change in the capital share (2.42) and the top 1% income share (1.67), respectively: $(0.91 \times 1.82)/2.42 = 0.68$ and $(0.70 \times 1.82)/1.67 = 0.76$.

C. Testing Hypothesis 2 (H2): Capital Accumulation Leads to More Capital Concentration

We now turn to the Marxist prediction that rising capital accumulation will increase capital concentration. We measure capital concentration by the number of employees per firm (firm size). We have already shown evidence that capital concentration measured by firm size sharply increased in rural, mixed, and industrial districts alike between 1875 and 1907. We also noted that this measure is likely to represent a lower bound. Overall, these trends lend credence to the orthodox prediction of increasing capital concentration (hypothesis 2a).

Results for hypothesis 2b, that capital accumulation increases capital concentration, are displayed in panel 3 of table 1. Trends presented in figure 1 suggest that accumulation became decoupled from concentration in the late 1890s, particularly in industrial districts: While capital concentration continued to increase, capital accumulation hovered at an elevated level in mixed and industrial districts. All

TABLE 1.—REGRESSION RESULTS FOR OLS AND IV, HYPOTHESES 1 AND 2

	IV		OLS	
	(1)	(2)	(3)	(4)
Panel 1: Δ Capital Share, 1895–1907 (in pp)				
Δ CA	0.909** (0.397)	0.847** (0.384)	0.752*** (0.173)	0.746*** (0.189)
Weak IV 95% CI	0.684; 1.186	0.607; 1.117		
Mean dep. var.	0.39	0.39	0.39	0.39
Controls		✓		✓
F-statistic	10.810	12.259		
Observations	544	544	544	544
Panel 2: Δ Top 1% Income Share, 1895–1910 (in pp)				
Δ CA	0.697** (0.339)	0.781** (0.363)	0.348** (0.142)	0.326** (0.143)
Weak IV 95% CI	0.508; 0.956	0.415; 0.835		
Mean dep. var.	0.93	0.93	0.93	0.93
Panel 3: Δ Firm Size, 1895–1907 (in logs)				
Δ CA	−0.022 (0.014)	−0.015 (0.013)	−0.004 (0.006)	−0.000 (0.006)
Weak IV 95% CI	−0.040; −0.006	−.033; 0.001		
Mean dep. var.	0.19	0.19	0.19	0.19

Unit of analysis: county (panels 1–3). Standard errors clustered on the district level reported in parentheses. * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$. For convenience, we report the effective F -statistics and number of observations only in panel 1. In all specifications, we control for population (in logs) as of 1895. In columns 2 and 4, we additionally control for population growth (1895–1910) and the share of urban population in 1895. Appendix figure D10 shows binscatters for H1 to H3.

estimators show a negative coefficient. The insignificant negative sign speaks against the orthodox prediction of a strong positive effect of accumulation on concentration.

D. Testing Hypothesis 3: (H3) Capital Accumulation Fosters Political Support for Socialism

Next, we examine the economic drivers of support for socialism. Orthodox Marxists predicted that rising accumulation and also the immiseration of workers would strengthen political support for socialism. Is there evidence for a growing immiseration of workers in late nineteenth-century Germany? Wage data show the opposite (and we are not the first to point this out; see for example, Allen, 2009, on the United Kingdom). Detailed wage data on day laborers from Becker et al. (2014) show that wages increased even for these precariously employed workers. On average, between 1892 and 1901, wages increased by 22% for rural day laborers and by 16% for urban day laborers. Different estimations of real wages in Germany over this period point in the same direction (Ritter & Tenfelde, 1992). Our average income measure based on income tax statistics also documents an upward trend (see appendix figure C3). Given the increase in wages (across regions) and the simultaneous surge in votes for the SPD (see figure 1e), we have to reject the first part of the political hypothesis put forward by the orthodox Marxists: There is no evidence for a growing immiseration of workers and, hence, nothing to suggest a deterministic path toward socialism.

Still, the rise of the socialist party might be related to increasing capital accumulation, provided that the increase in wages was smaller than for capital accumulation and

provided that voters responded to this with more support for the SPD. The SPD vote share increased from less than 10% in the 1870s to more than 30% in mixed and industrial districts in 1912 (see figure 1e). As described in section III, the SPD considered the increasing capital accumulation to be a major economic problem. Therefore, in their famous revolutionary “Erfurter Programm” from 1891, they called for, among other things, the abolition of private property, better protection for workers, and a more progressive tax system. Does our IV strategy provide evidence that voters reacted to increases in capital accumulation by voting more for the socialist party? The results in columns 1 and 2 of table 2 for our IV estimation suggest that this was not the case. The coefficient in columns 1 and 2 is negative and statistically significant. Thus, we have to reject the orthodox hypothesis according to which growing capital accumulation leads to rising support for socialism.²⁴ But why did the SPD gain so strongly?

E. Testing the Revisionists’ Counterarguments (H4)

Bernstein (1899) emphasized the importance of trade unions and their activities in improving political and eco-

²⁴Exploiting the end of the antisocialist law in Germany in 1890 is another approach to investigate this hypothesis. If the orthodox were right, the end of the antisocialist law should have had no differential effect on votes for the socialist party. Because capital accumulation is only observed since 1895 and county data are available starting in 1891, we use the district as unit of analysis and rely on inequality as an independent variable here. Our variable of interest is the interaction between the top 1% share and a dummy variable for the end of the antisocialist law. Evidence in favor of the orthodox camp would be an insignificant interaction. The results in table D3 speak strongly against the orthodox claim, as the interaction term is highly significant.

TABLE 2.—REGRESSION RESULTS FOR OLS AND IV, HYPOTHESES 3 AND 4B

	IV			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Vote Share SPD, 1893–1912 (in pp)						
Δ CA	−8.662*** (3.038)	−8.305*** (3.019)	−7.430** (2.912)	−1.653 (1.232)	−1.543 (1.396)	−1.173 (1.300)
Δ % Union, 1896–1906 (in pp)			1.723*** (0.636)			2.332*** (0.644)
Mean dep. var.	8.04	8.04	8.04	8.04	8.04	8.04
F-stat	10.92	12.44	11.46			
Further controls		✓	✓		✓	✓
Observations	229	229	229	229	229	229
R-squared				0.04	0.07	0.13

Unit of analysis: constituency. Dep. var.: Change vote share SPD (in pp). Standard errors clustered on the district-level reported in parentheses. * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$. In all specifications, we control for population (in logs) as of 1895. In columns 2 and 4, we control in addition for population growth and the share of urban population.

Sources: See appendix A.

nomic conditions for the working classes. Historians of the German Empire highlight the increasing role of trade unions and their strike activity for wage growth and reduced income inequality during this period (Kaelble & Volkmann, 1986). As illustrated in figure 2, we distinguish two aspects here. First, we ask whether there is evidence that strikes improved the position of workers and thus reduced income inequality (or redistributed income between rich and poor, respectively capital and labor) in support of hypothesis H4a. And second, do we see a positive correlation between union activity and votes for the SPD, supporting hypothesis H4b? We treat these ideas as counterarguments to the Marxist hypotheses and therefore test them together with their Marxist counterparts. However, we cannot provide causal evidence in these cases, so our results need to be interpreted with caution.

Testing H4a: Strikes and inequality. To what extent did strikes contribute to a redistribution of income from the top (capitalists) to the bottom (workers) of the income distribution and, thereby, moderate income inequality (H4a)? To investigate this empirically, we use our county panel for the period 1899 to 1905, for which we have yearly strike data. We estimate a two-way fixed-effects model

$$y_{dt} = \beta \times \text{strikes}_{dt} + Z'_{dt}\gamma + \alpha_d + \tau_t + \epsilon_{dt}, \quad (3)$$

where y_{dt} are various indicators for the distribution of income in year t and county d . The variable strikes_{dt} denotes strikes as the main explanatory variable from a Revisionist perspective. In all cases, α_d captures county fixed effects, and τ_t captures time fixed effects.²⁵ Z_{dt} is a vector of control variables including firm size, agricultural employment, urban population, income per capita, union members, and turnout. We cluster standard errors at the next level of aggregation, that is, at the district-level. Obviously not all strikes should have mattered equally, only those that succeeded.

²⁵The inclusion of time effects will, for example, take the business cycle into account, which is particularly important when investigating strikes, because unions increasingly organized strikes during periods of economic upswing, when their chances of success were higher (Kaelble & Volkmann, 1986).

Strikes were categorized as successful if employers met the strikers' demands, and higher wages represented the most common demand.²⁶ While strikes are hardly exogenous, we can more plausibly assume this for factors leading to the success of a strike, controlling for the total number of strikes in a year and county as well as county and year effects. Note that we do not instrument capital accumulation in this setting because our coal IV is suited for long-run changes and has limited explanatory power for annual variations.

Table 3 shows results for equation (3) with four different income inequality measures as outcome variable. We always consider the association with successful strikes conditional on total strikes, and next check whether this is robust to the inclusion of capital accumulation. According to column 1, a 10% increase in the number of successful strikes is associated with a reduction of the top 1% income share by about 1.4 pp (column 1) and a rise of the bottom 95% income share by about 2 pp (column 3). These are sizeable magnitudes given that on average, the top percentile received 12% of total income and the bottom 95% received 76%. Apparently, the greater the number of successful strikes, the more income was redistributed from top-income earners to the middle and bottom of the distribution. What is more, the top 1% even seem to have lost in absolute terms (column 5). In contrast to the relevance of successful strikes, the occurrence of a strike per se (successful or not) shows no significant association with income inequality.²⁷

Once we control for capital accumulation (columns 2, 4, 6, and 8) we still find a strong negative association between successful strikes and inequality and a strong, positive association between capital accumulation and inequality (as shown in table 1, panels 1 and 2). The coefficient on successful strikes is slightly reduced when also controlling for capital accumulation, but it remains statistically significant

²⁶For example, in 1899, 40% of the strikes were for higher wages and 13% for lower working hours (Kaiserliches Statistisches Amt, 1900).

²⁷As a robustness check, we exclude Berlin from the regression analysis. Every fourth strike and almost one-third of all successful strikes between 1899 and 1905 occurred in the city of Berlin. Hence, we might be concerned that the extensive strike activity in Berlin drives our results. Our results remain qualitatively and quantitatively unchanged when excluding Berlin (see appendix table D4).

TABLE 3.—COUNTY-YEAR INCOME INEQUALITY AND STRIKES, 1899–1905, HYPOTHESIS 4A

	Top 1% Share		Bott. 95% Share		Top 1% Mean Income		Capital Share	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Successful Strikes	−0.144*** (0.043)	−0.091** (0.033)	0.190*** (0.056)	0.116*** (0.041)	−0.013*** (0.004)	−0.007** (0.003)	−0.199** (0.090)	−0.088 (0.064)
Strikes	−0.000 (0.036)	0.016 (0.030)	−0.005 (0.041)	−0.027 (0.035)	0.000 (0.004)	0.002 (0.003)	−0.049 (0.059)	−0.016 (0.043)
Capital Accumulation		3.158*** (0.608)		−4.446*** (0.810)		0.362*** (0.060)		6.629*** (1.255)
Year FE & County FE & Further Controls	✓	✓	✓	✓	✓	✓	✓	✓
R-squared Within	0.40	0.53	0.36	0.53	0.43	0.57	0.39	0.55
R-squared Overall	0.36	0.60	0.48	0.71	0.47	0.75	0.19	0.41
Observations	3,808	3,808	3,808	3,808	3,808	3,808	3,808	3,808
Mean Outcome	12.41	12.41	75.86	75.86	9.41	9.41	28.93	28.93
SD Outcome	3.67	3.67	5.08	5.08	.41	.41	6.54	6.54

The unit of observation is the county. Number of successful strikes, top 1% mean income and capital accumulation are in logs. Further controls include urban population share, capital concentration, agricultural employment share. Standard errors clustered on the district-level displayed in parentheses. * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

for our inequality outcomes—the 1% income share, bottom 95% income share, and mean income of the top 1%. A 1% increase in capital accumulation from one year to the next is associated with a 3 percentage point increase in the top 1% share (column 2) and a 4 percentage point reduction of the bottom 95% share (column 4). Comparing the magnitude of the coefficients of successful strikes and capital accumulation—in the spirit of a horse race between the orthodox Marxists and the Revisionists—suggests that numerous successful strikes were needed to offset the inequality increasing effect of capital accumulation.²⁸ While the evidence for strikes is not causal, it lends strong support to the Revisionist perspective that strikes can be an effective antidote against rising inequality.

We also explore heterogeneous effects across industries and find that the top income reduction associated with successful strikes was particularly pronounced in construction and mining (see appendix tables D5–D6). These findings are in line with historical reports on union activity in these sectors (Schneider, 1989).²⁹

However, any such redistributive effect might have been temporary. Once we include time lags we find that the relation with strikes was present for one more year but then faded (see appendix table D7). This suggests that in the absence of institutionalized wage setting between employers and employees—general wage negotiations were to come with the Stinnes-Legien Agreement in November 1918—

new strikes were needed to reduce top incomes and increase the relative income of the workers.

We need to be careful with the interpretation of these results for various reasons. A recent literature in econometrics has raised concerns about two-way fixed effect (TWFE) specifications. For example, de Chaisemartin and D'Haultfœuille (2020), Callaway and Sant'Anna (2021), and Goodman-Bacon (2021) have shown that the underlying estimator is a weighted average of all possible two-group/two-period difference-in-difference (DD) estimators. If average treatment effects vary over time or across regions, already-treated units act as controls and changes in their outcomes are subtracted, which may result in a negative estimate even if all average treatment effects are positive. The literature to date has focused mainly on providing alternative estimators for binary treatment and staggered adoption, leaving the development of heterogeneity-robust estimators for more complicated designs for future research (de Chaisemartin & D'Haultfœuille, 2022). For example, de Chaisemartin and D'Haultfœuille (2020) propose a DD estimator comparing the outcome evolution among the switchers, the groups whose treatment changes between $t - 1$ and t , to the evolution among control groups whose treatment remains constant. In our setting, treatment is nonbinary and counties almost never experience the same number of successful strikes in two consecutive years.³⁰ To address concerns about the potential bias of TWFE estimators, we provide additional evidence in appendix tables D8 and D9, where we split our sample into two-period samples (e.g., 1899–1900, 1900–1901 and so on and restrict observations to counties that experienced no strikes in the first year and focus on the key sectors construction and mining. Some counties experience a strike in the second year (moving into treatment), while most of the counties experience no strikes

²⁸Dividing the capital accumulation coefficient by the successful strike coefficient ($3.158/0.091=34.7$) suggests that it would need 35% more successful strikes to compensate for a 1% increase in capital accumulation. Capital accumulation indeed increased quite continuously by about 1% annually on average across counties. Yet, the number of strikes was volatile. Strikes strongly increased in 1902, 1903, and 1904 (indeed in the magnitude of 30% to 70%, on average) but declined in 1900, 1901, and 1905.

²⁹Another potential concern is that higher productivity in larger firms could be the underlying driver of more strike activity. However, historical evidence suggests that workers in the largest firms in Germany were less organized (Schneider, 1989). This is also in line with evidence from the United States for the same period, according to which there is a hump-shaped relationship between firm size and labor conflict (Schmick, 2018).

³⁰Note also that our setting is neither a staggered adoption design, where groups can switch in but not out of treatment, nor can we estimate group-time average treatment effects in an event study design with leads and lags (Callaway & Sant'Anna, 2021) given that strikes happen in all years of our seven-year period including the first year.

in the second year and remain in the control group. Overall, this exercise reveals coefficients of the same sign and of similar magnitude for all three outcomes as in our baseline estimation in table 3, but less precisely estimated, likely due to the smaller number of observations.

Testing H4b: Trade unions and SPD votes. Political support for the socialist party grew at a fast pace starting in the mid-1880s in all regions, while capital accumulation stayed at an elevated level in industrial regions, where support for the socialist party was particularly pronounced (see figure 1). Accordingly, we did not find support for Marxist hypothesis (H3), which predicted that economic factors would determine political outcomes. Yet the share of trade union members in the population increased rapidly from about 0.2% to 0.3% in the 1890s to more than 1% in 1907, even reaching 6% to 10% in industrial centers (see appendix figure D6). With this increased share of union membership, the influence of trade unions within the socialist movement grew.³¹ Although the orthodox Marxists still had their stronghold within the party, a more pragmatic, reform-oriented strategy slowly started to become the dominant position within the SPD. Did the reformist strategy of strengthening the position of workers through strikes and unionization mobilize workers to vote for the socialists?

We add the change in union membership to our regression in table 2, columns 3 and 6, using our data on votes and union membership at the constituency-level. This reveals a highly significant and positive coefficient. A 1 pp increase in union members is associated with a 1.7 pp increase in SPD votes (column 3). Clearly, we cannot interpret this as a causal effect, but the association lends support to the hypothesis that pragmatic policies and active voter mobilization through the unions may have attracted more votes than capital accumulation per se.

Overall, we find quite strong support for the Revisionist hypotheses. Strikes seem to have been an effective tool to redistribute income to the workers. The agency of trade unions mattered for the success of the SPD rather than the law-like effects of capital accumulation.

V. Conclusion

The German Empire in the late nineteenth century provides us with a case study on the dynamics of capital accumulation, income inequality, concentration, and socialism. We compiled new panel data for Prussian districts, constituencies, and counties to shed new light on the forces that drive distributive dynamics and political consequences. Our results clearly indicate that both economic forces and institutions shaped the distribution of income in the decades before World War I. Specifically, we document a causal effect of

capital accumulation on the capital share and top 1% income share. Moreover, we find suggestive evidence that labor conflict limited the increase in income inequality. Apparently, the Belle Epoque was not solely an “ownership society” as described by Piketty (2020). While, without any doubt, income inequality reached its peak during this era, the opposition from the left became stronger and its influence was visible and effective.

We focused our analysis on the Revisionism debate between orthodox Marxists and their critics in the German Empire before 1914. We summarize our main results with an overall assessment of this debate.

With regard to the first hypothesis on the effect of capital accumulation on the capital share and income inequality, the orthodox Marxists around Kautsky were correct. For Imperial Germany before 1914, we have strong evidence that capital accumulation causally led to a growing share of capital in income and contributed to income inequality, as first predicted by Karl Marx and believed by his followers, but contested by their critics. Next, the evidence is mixed about the role of concentration within the process of capital accumulation. The orthodox Marxists were right in their prediction that capital concentration was rising steeply. However, they were mistaken in their conviction that this “centralization” of capital was causally driven by capital accumulation. Given the weight that Kautsky (1899a) placed on this question, this finding is significant. Let us turn to the third orthodox Marxist hypothesis regarding the relationship between capital accumulation and support for socialism. This was always related to the claim that capital accumulation would lead to an immiseration of the working class, which would fuel the political struggle. Our findings speak against this. Real wages started to increase significantly in the 1890s. We also do not find evidence that capital accumulation strengthened political support for socialism through any other channel.

This leads us to the Revisionist counterhypothesis. The revisionists rightfully stressed the role of labor conflict in limiting income inequality. We found support for the claim that successful strikes helped to redistribute income, albeit only temporarily. What is more, the Revisionist strategy of strengthening the trade unions seems to have been a building block for the political success of the SPD.

Crucially, the possibility of institutional change that could limit inequality and let workers benefit from industrial growth was not part of the Marxist predictions. This speaks to the bemoaned dilemma of social democratic socialism: “Socialism cannot be achieved without participation in democratic institutions, but participation erodes the will for socialism” (Przeworski & Sprague, 1986, p. 2). Our paper also illustrates why theories seeking “general laws of capitalism” are bound to fail unless they place historical factors such as institutional and technological change at the center stage (Acemoglu & Robinson, 2015). From yet another angle, one can interpret our study as a case of how economic theory itself—in the form of Marxist thinking—can

³¹This is epitomized by the Mannheim agreement of 1906 between the SPD and trade unions that established their strategic role for the years to come (Nipperdey, 2013).

lead to policy responses that make a given economic model no longer a good fit to the data.³²

Finally, let us return to the present debate. Simultaneous increases of capital accumulation, income inequality, capital share, and capital concentration are observed today, just as they were back then. This might be surprising given the fundamental changes in technology and society over the last 150 years. Yet our results also point to the importance of institutions such as trade unions and strikes, which acted as factors offsetting the increase in inequality. Our evidence is from nineteenth-century Germany, a setting where these institutions were successful within a national framework, with growing political participation. Clearly, it has become more difficult to counter capital accumulation and maintain the bargaining power of workers today as shown, for example, by Stansbury and Summers (2020). This might be related to the global mobility of multinational firms and capital markets compared to the still very limited mobility of people. Interestingly, we did not find a relation between capital accumulation (or income inequality) and votes for the socialists before 1914. This is not only at odds with Marxist predictions but also against any simple neoclassical intuition, and frankly our own priors. However, it is informative with respect to recent evidence showing that there is little direct relation between income inequality and votes for the left (Gethin et al., 2022), while trade unions seem to matter for both the reduction of income dispersion (Farber et al., 2021) and the mobilization of votes for the left (Rennwald & Pontusson, 2021).

To conclude, our evidence on Germany before 1914 showed again that any quest for general laws of capitalist development must be elusive. We found that Marx and his orthodox followers were (partly) correct in their diagnosis in the wide-ranging effects of capital accumulation. However, they underestimated the scope for institutional adjustment within a capitalist society. Nevertheless, while Marx is long dead, his question about the long-run dynamics of capitalism will continue to haunt us.

³²We are grateful to an anonymous referee for highlighting this “post-modern” aspect of our analysis.

REFERENCES

- Acemoglu, D., and D. Autor, “Skills, Tasks and Technologies: Implications for Employment and Earnings” (pp. 1043–1171), in D. Card and O. Ashenfelter (eds.), *Handbook of Labor Economics* (Amsterdam: Elsevier, 2011).
- Acemoglu, D., and J. A. Robinson, “The Rise and Decline of General Laws of Capitalism,” *Journal of Economic Perspectives* 29:1 (2015), 3–28. 10.1257/jep.29.1.3
- Alfani, G., “Economic Inequality in Preindustrial Times: Europe and Beyond,” *Journal of Economic Literature* 59:1 (2021), 3–44. 10.1257/jel.20191449
- Alfani, G., V. Gierok, and F. Schaff, “Economic Inequality in Preindustrial Germany, ca. 1300–1850,” *Journal of Economic History* 82:1 (2022), 87–125. 10.1017/S0022050721000607
- Allen, R. C., “Engels’ Pause: Technical Change, Capital Accumulation, and Inequality in the British Industrial Revolution,” *Explorations in Economic History* 46:4 (2009), 418–435. 10.1016/j.eeh.2009.04.004
- Andrews, I., J. H. Stock, and L. Sun, “Weak Instruments in Instrumental Variables Regression: Theory and Practice,” *Annual Review of Economics* 11 (2019), 727–753. 10.1146/annurev-economics-080218-025643
- Bartels, C., “Top Incomes in Germany, 1871–2014,” *Journal of Economic History* 79:3 (2019), 669–707. 10.1017/S0022050719000378
- Becker, S., and E. Hornung, “The Political Economy of the Prussian Three-Class Franchise,” *Journal of Economic History* 80:4 (2020), 1143–1188. 10.1017/S0022050720000443
- Becker, S. O., F. Cinnirella, E. Hornung, and L. Woessmann, “iPEHD—the Ifo Prussian Economic History Database,” *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 47:2 (2014), 57–66. 10.1080/01615440.2013.852370
- Bengtsson, E., and D. Waldenström, “Capital Shares and Income Inequality: Evidence from the Long Run,” *Journal of Economic History* 78:3 (2018), 712–743. 10.1017/S0022050718000347
- Bernstein, E., *Die Voraussetzungen des Sozialismus und die Aufgaben der Sozialdemokratie* (Berlin: Dietz Verlag, 1899).
- , *Der Streik: Sein Wesen und sein Wirken* (Frankfurt am Main: Literarische Anstalt Rütten und Loening, 1906).
- Callaway, B., and P. H. Sant’Anna, “Difference-in-Differences with Multiple Time Periods,” *Journal of Econometrics* 225:2 (2021), 200–230. 10.1016/j.jeconom.2020.12.001
- Cattaneo, M. D., R. K. Crump, M. H. Farrell, and Y. Feng, “On binscatter” (2022). arXiv:1902.09608
- Cinnirella, F., and E. Hornung, “Landownership Concentration and the Expansion of Education,” *Journal of Development Economics* 121 (2016), 135–152. 10.1016/j.jdeveco.2016.03.001
- Conley, T. G., C. B. Hansen, and P. E. Rossi, “Plausibly Exogenous,” this REVIEW 94:1 (2012), 260–272.
- Corneo, G., *Is Capitalism Obsolete? A Journey through Alternative Economic Systems* (Cambridge, MA: Harvard University Press, 2018).
- de Chaisemartin, C., and X. D’Haultfoeulle, “Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects,” *American Economic Review* 110:9 (2020), 2964–2996. 10.1257/aer.20181169
- , “Two-Way Fixed Effects and Differences-in-Differences with Heterogeneous Treatment Effects: A Survey,” NBER working paper 29691 (2022).
- De Pleijt, A., A. Nuvolari, and J. Weisdorf, “Human Capital Formation during the First Industrial Revolution: Evidence from the Use of Steam Engines,” *Journal of the European Economic Association* 18:2 (2020), 829–889. 10.1093/jeaa/jvz006
- Enikolopov, R., A. Makarin, and M. Petrova, “Social Media and Protest Participation: Evidence from Russia,” *Econometrica* 88:4 (2020), 1479–1514. 10.3982/ECTA14281
- Farber, H. S., D. Herbst, I. Kuziemko, and S. Naidu, “Unions and Inequality over the Twentieth Century: New Evidence from Survey Data,” *Quarterly Journal of Economics* 136:3 (2021), 1325–1385. 10.1093/qje/qjab012
- Feldenkirchen, W., “Kapitalbeschaffung in der Eisen- und Stahlindustrie des Ruhrgebiets 1879–1914,” *Zeitschrift für Unternehmensgeschichte / Journal of Business History* 24:1 (1979), 39–81.
- Fernihough, A., and K. H. O’Rourke, “Coal and the European Industrial Revolution,” *Economic Journal* 131:635 (2021), 1135–1149. 10.1093/ej/ueaa117
- Frank, M., E. Sommeiller, M. Price, and E. Saez, “Frank-Sommeiller-Price Series for Top Income Shares by US States since 1917,” WID.world technical note series 2015/7 (2015).
- Galor, O., and O. Moav, “From Physical to Human Capital Accumulation: Inequality and the Process of Development,” *Review of Economic Studies* 71:4 (2004), 1001–1026. 10.1111/0034-6527.00312
- Gethin, A., C. Martinez-Toledano, and T. Piketty, “Brahmin Left versus Merchant Right: Changing Political Cleavages in 21 Western Democracies, 1948–2020,” *Quarterly Journal of Economics* 137 (2022), 1–48. 10.1093/qje/qjab036
- Goldin, C., and L. F. Katz, *The Race between Education and Technology* (Cambridge, MA: Harvard University Press, 2008).
- Goldin, C., L. F. Katz, and D. Autor, “Extending the Race between Education and Technology,” *AEA Papers and Proceedings* 110 (2020), 347–351. 10.1257/pandp.20201061
- Goodman-Bacon, A., “Difference-in-Differences with Variation in Treatment Timing,” *Journal of Econometrics* 225:2 (2021), 254–277. 10.1016/j.jeconom.2021.03.014

- Gronow, J., *On the Formation of Marxism: Karl Kautsky's Theory of Capitalism, the Marxism of the Second International and Karl Marx's Critique of Political Economy* (London: Haymarket Books, 2016).
- Gutberlet, T., "Mechanization and the Spatial Distribution of Industries in the German Empire, 1875 to 1907," *Economic History Review* 67:2 (2014), 463–491. 10.1111/1468-0289.12028
- Hoffmann, W., and J. Müller, *Das deutsche Volkseinkommen 1851–1957* (Heidelberg: J.C.B. Mohr, 1959).
- Kaelble, H., and H. Volkmann, "Streiks und Einkommensverteilung im späten Kaiserreich" (pp. 159–198), in J. Bergmann (ed.), *Arbeit, Mobilität, Partizipation, Protest. Gesellschaftlicher Wandel in Deutschland im 19. und 20. Jahrhundert* (Opladen: Westdeutscher Verlag, 1986).
- Kaiserliches Statistisches Amt, *Statistik des deutschen Reichs*, band 134 (Berlin: Puttkammer & Mühlbrecht, 1900).
- Kautsky, K., *Karl Marx' Ökonomische Lehren* (Berlin: Dietz Verlag, 1886).
- , *Das Erfurter Programm in seinem grundsätzlichen Theil* (Berlin: Dietz Verlag, 1892).
- , *Bernstein und das Sozialdemokratische Programm: Eine Antikritik* (Berlin: Dietz Verlag, 1899a).
- , "Bernsteins Streitschrift," *Vorwärts* 16:64 (1899b), 9–10.
- , "Problematischer gegen wissenschaftlichen Sozialismus," *Die neue Zeit: Wochenschrift der deutschen Sozialdemokratie* 2:38 (1901), 355–364.
- , *Der Weg zur Macht. Politische Betrachtungen über das Hineinwachsen in die Revolution* (Berlin: Buchhandlung Vorwärts, 1909).
- Kersting, F., "Welfare Reform and Repression in an Autocracy: Bismarck and the Socialists," CRC TRR 190 DP No. 448 (2023).
- Kuznets, S., "Economic Growth and Income Inequality," *American Economic Review* 45:1 (1955), 1–28.
- Lafortune, J., E. Lewis, and J. Tessada, "People and Machines: A Look at the Evolving Relationship between Capital and Skill in Manufacturing, 1860–1930, Using Immigration Shocks," this REVIEW 101:1 (2019), 30–43.
- Legien, C., *Sisyphusarbeit oder positive Erfolge? Beiträge zur Wertschätzung der Tätigkeit der deutschen Gewerkschaften* (Berlin: Generalkommission der Gewerkschaften Deutschlands, 1910).
- Lewis, W. A., "Economic Development with Unlimited Supplies of Labour," *Manchester School* 22:2 (1954), 139–191. 10.1111/j.1467-9957.1954.tb00021.x
- Lindert, P., and J. Williamson, *Unequal Gains: American Growth and Inequality since 1700* (Princeton: Princeton University Press, 2016).
- Marx, K., "Das Kapital. Kritik der Politischen Ökonomie. Erster Band," in *Karl Marx Friedrich Engels Werke (MEW)*, band 23 (Berlin: Dietz Verlag, 1867).
- Milanovic, B., *Capitalism, Alone: The Future of the System That Rules the World* (Cambridge, MA: Harvard University Press, 2019).
- Nipperdey, T., *Deutsche Geschichte 1866–1918: Zweiter Band: Machtstaat vor der Demokratie* (Munich: C. H. Beck, 2013).
- Olea, J. L. M., and C. Pflueger, "A Robust Test for Weak Instruments," *Journal of Business and Economic Statistics* 31:3 (2013), 358–369. 10.1080/00401706.2013.806694
- Pfister, U., "The Crafts–Harley View of German Industrialization: An Independent Estimate of the Income Side of Net National Product, 1851–1913," *European Review of Economic History* 24:3 (2020), 502–521. 10.1093/ereh/hez009
- Piketty, T., "Income Inequality in France, 1901–1998," *Journal of Political Economy* 111:5 (2003), 1004–1042. 10.1086/376955
- , *Capital and Ideology* (Cambridge, MA: Harvard University Press, 2020).
- Popper, K., *The Open Society and Its Enemies* (London: Routledge, 2011).
- Przeworski, A., and J. Sprague, *Paper Stones: A History of Electoral Socialism* (Chicago: University of Chicago Press, 1986).
- Rennwald, L., and J. Pontusson, "Paper Stones Revisited: Class Voting, Unionization and the Electoral Decline of the Mainstream Left," *Perspectives on Politics* 19:1 (2021), 36–54. 10.1017/S1537592720000067
- Ritter, G. A., and K. Tenfelde, *Arbeiter im Deutschen Kaiserreich, 1871 bis 1914* (Bonn: Dietz Verlag, 1992).
- Schmick, E., "Collective Action and the Origins of the American Labor Movement," *Journal of Economic History* 78:3 (2018), 744–784. 10.1017/S0022050718000360
- Schneider, M., *Kleine Geschichte der Gewerkschaften. Ihre Entwicklung in Deutschland von den Anfängen bis heute* (Berlin: Dietz, 1989).
- SPD, "Program of the Social Democratic Party of Germany (Erfurt Programme, 1891)" (pp. 97–101), in A. Hussain and K. Tribe (eds.), *Paths of Development in Capitalist Agriculture: Readings from German Social Democracy* (London: Macmillan, 1984).
- Spoerer, M., *Steuerlast, Steuerinzidenz und Steuerwettbewerb. Verteilungswirkungen der Besteuerung in Preußen und Württemberg (1815–1913)* (Berlin: Akademie-Verlag, 2004).
- Stansbury, A., and L. Summers, "The Declining Worker Power Hypothesis," *Brookings Papers on Economic Activity* 50:1 (2020), 1–96. 10.1353/eca.2020.0000
- Tooze, J. A., *Statistics and German State 1900–1945: The Making of Modern Economic Knowledge* (Cambridge: Cambridge University Press, 2007).
- Tudor, H., and J. M. Tudor, *Marxism and Social Democracy* (Cambridge: Cambridge University Press, 1988).
- Wegge, S., "Inheritance Institutions and Landholding Inequality in Nineteenth-Century Germany: Evidence from Hesse-Cassel Villages and Towns," *Journal of Economic History* 81:3 (2021), 909–942. 10.1017/S0022050721000358
- Ziblatt, D., "Does Landholding Inequality Block Democratization? A Test of the 'Bread and Democracy' Thesis and the Case of Prussia," *World Politics* 60:4 (2008), 610–641. 10.1353/wp.0.0021