The Making of the German Model of Industrial Relations*

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Abstract

This paper studies how collective bargaining institutions emerged from competition within the labor movement. We draw on newly assembled data on strikes, union membership, and bargaining agreements at the county-occupation level in Imperial Germany around 1900. Three rival factions competed for control of the labor movement: the social-democratic Free Trade Unions, the radical unions, and the moderate unions, divided over whether to confront employers, negotiate with them, or both. The Free Trade Unions struck more effectively than the radical unions and bargained far more than the moderate ones. Instrumenting Free Trade Union strength with distance to their headquarters, we show that stronger organization raised the likelihood that agreements emerged. Strike activity rose ahead of first agreements and fell thereafter. The effect is concentrated in multi-employer agreements with peace obligations, the bargaining form that later defined the German model. Organized employers played little part in this process. Durable bargaining institutions emerged where a movement could both sustain conflict and commit to settling it.

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1 Introduction

Groups seeking institutional change must organize to achieve it. But rival factions within a movement pursue different strategies, and labor movements are a leading case: they were divided over whether to confront employers, negotiate with them, or both. The relationship between employers and workers began in open conflict, with employers claiming sole authority over the workplace and workers able to threaten only to stop working. The first bargaining agreements broke with this order, and from them came the institutions that today shape wages and wage inequality across advanced economies (Jäger, Naidu, and Schoefer 2025). This paper asks which strategy prevailed within the labor movement, and how its dominance produced those first agreements.

Three strategies competed for dominance within the labor movement.[1] One combined strike capacity with bargaining ("social-democratic"); another favored autonomous local confrontation and mass mobilization, often oriented toward revolutionary transformation ("radical"); a third pursued gains through negotiation alone and avoided strikes as a bargaining instrument ("moderate"). Which would prevail was not obvious ex ante. Local confrontation could intensify pressure and commitment but made durable bargaining harder to sustain. Combining strike capacity with bargaining strengthened unions' ability to commit to agreements but could distance leaders from the rank and file (Olson 1965). The third approach avoided this trade-off by foregoing confrontation altogether, but at the cost of giving up a key source of bargaining leverage. Despite the importance of these trade-offs, we know little about how one strategy came to dominate within a country.

Identifying the underlying process is empirically challenging. Cross-country comparisons of union movements and industrial relations systems are often confounded by differences in political and economic institutions that shape both labor conflict and bargaining. A credible analysis therefore requires three things: first, a setting in which rival strategies coexist under common institutions at a moment when bargaining institutions are themselves are taking shape and their legal standing is still unsettled, so that their origins can be observed; second, micro-level data that make it possible to distinguish the rival strategies and trace where bargaining emerged; and third, variation in local union strength that is plausibly unrelated to local bargaining conditions.

This paper turns to Imperial Germany around 1900, when three rival approaches to labor mobilization coexisted under common institutional rules. As the labor movement evolved, the Free Trade Unions (the main social-democratic current) gained dominance over their rivals in both labor conflict and collective bargaining. The paper argues that they did so by combining two capacities that rivals lacked: the capacity to organize effective strikes and the capacity to negotiate and sustain bargaining agreements. Each

[1] For a comparative framework distinguishing strategic orientations within Western unions see Hyman (2001).

rival was thus outperformed on the very dimension that defined its approach: radical currents on collective action, Catholic and liberal unions on negotiated agreements. Causal evidence using an instrumental-variables approach confirms that stronger Free Trade Union organization drove the emergence of bargaining agreements. The Free Trade Unions did not replace conflict with compromise; they reorganized conflict in ways that made formal, enforceable bargaining arrangements more feasible, laying the foundations of one core pillar of the later German model of industrial relations (Jäger, Noy, and Schoefer 2022): coordinated collective bargaining, in which unions and employer associations negotiate binding multi-employer agreements at the sectoral or regional level.[2]

These dynamics played out during the 1890s and early 1900s, a critical juncture in the formation of German industrial relations (Boll 1992). After the repeal of the Anti-Socialist Law in 1890, which had effectively banned unions, and a sequence of costly strike defeats, union leaders and local activists experimented with alternative ways of organizing labor conflict under continued repression, employer opposition, and rapid industrial change. The social-democratic Free Trade Unions were the central actor in this process. Collective bargaining agreements were a genuine institutional novelty in this environment: labor relations were still dominated by the "Herr-im-Hause" (master-of-the-house) doctrine, under which employers claimed unilateral authority over the workplace and rejected any recognition of unions as bargaining counterparts (Ullmann 1977). The first systematic wave of such agreements, emerging in this period, thus represented the earliest sustained instances in which organized labor was recognized as a bargaining counterpart, against a backdrop of pervasive employer hostility.

The paper combines newly assembled micro-level data on labor conflict, union membership, and labor institutions in Imperial Germany. One key source is the administrative strike statistics from the *Statistik des Deutschen Reichs*, recording approximately 10,000 individual disputes between 1899 and 1905, which historians regard as the most comprehensive strike data available for German history (Volkmann 1978, p. 118). Each record includes the dispute's timing, location, occupation, demands, and outcome, as well as whether a union was involved. The strike records are combined with county-occupation data on union membership and with administrative records on the first wave of collective bargaining agreements, which report each agreement's location, coverage, duration, and negotiating parties. Combining these sources at the county-occupation level constitutes the paper's main data contribution and allows the analysis to trace how union strategies shaped both collective action and the emergence of bargaining institutions.

The empirical analysis proceeds in three parts. The first part documents descriptively the growing role of the Free Trade Unions in both conflict and bargaining. They appeared

[2] Early forms of worker codetermination, the second pillar of the German model, existed in Imperial Germany, but their spread remained limited in this period; therefore, this paper focuses on collective bargaining as the earlier and more contested institutional aspect.

as negotiating parties in roughly 50 percent of observed agreements, compared with around 1 percent each for Catholic and liberal unions. A comparison of disputes with and without union involvement, within the same local labor market using county-occupation-quarter fixed effects, shows a clear strike-capacity gap relative to localist currents. Conditional on a strike occurring, union-involved disputes mobilized about 67.8 more workers (sample mean: 66.1), were 9.6 percentage points more likely to articulate collective bargaining demands (baseline: 10 percent), and were 13 percentage points less likely to end in outright failure (baseline: 45.4 percent). They were also more likely to span multiple firms and locations, indicating a capacity for cross-workplace coordination that localist currents lacked. Although the union-involvement indicator does not directly distinguish among the three camps, the comparison effectively captures Free Trade Union involvement: the moderate Catholic and liberal unions were generally reluctant to strike, and the patterns hold when sectors and regions where these unions were strongest are excluded.

The second part turns from conflict to the emergence of bargaining agreements. Using county-occupation variation in bargaining outcomes, the analysis relates the emergence of agreements negotiated by the Free Trade Union to its pre-period strength (measured as union membership relative to employment), controlling for county and occupation fixed effects and local employment structure. A one-standard-deviation increase in Free Trade Union strength is associated with a 0.57 percentage point higher likelihood that an agreement emerges, relative to a baseline of 2.2 percent.

To address the concern that union strength may proxy for unobserved local conditions correlated with bargaining, the paper complements this approach with an instrumental-variables strategy based on proximity to occupation-specific Free Trade Union headquarters during the unions' formative reorganization in the early 1890s. Headquarters locations were shaped by repression under the Anti-Socialist Laws and by legal uncertainty arising from cross-state differences in enforcement, and are plausibly unrelated to subsequent local labor market conditions. A series of placebo and robustness tests rules out the leading alternatives: the instrument does not capture pre-existing labor-movement geography or idiosyncratic conditions in the headquarters cities themselves, does not predict subsequent occupation-specific employment growth, and is robust to recentering against a county's generic proximity to plausible organizing centers (Borusyak and Hull 2023). The instrumental-variable estimate is larger than the baseline association, consistent with Free Trade Union organization mattering especially for the first emergence of bargaining in settings where unions would not otherwise have established a strong presence.

The third part examines more closely how the Free Trade Unions facilitated bargaining and what kinds of agreements emerged. Strike activity by the Free Trade Unions rises sharply in the periods leading up to the first agreement and falls thereafter, whereas non-union strikes display no comparable pattern. This timing is consistent with the view that the Free Trade Unions use their capacity for collective action not as an alternative

to bargaining, but as a means of bringing bargaining about. Turning to the agreements themselves, the association between Free Trade Union strength and agreement formation is concentrated in broader and more enforceable forms, measured as fixed-term contracts with peace obligations and agreements extending beyond a single firm. Given their uncertain legal status, agreements depend on the unions' own capacity to uphold them, and the patterns suggest that the Free Trade Unions negotiate the agreements that place the greatest demands on this capacity. The association with an organized employer counterpart is insignificant, and systematic anti-union employer organization intensified later. Both indicate that centralized employers played little role in the formative phase of the German model.

The paper speaks to four strands of literature. First, it contributes to the political economy of labor market institutions and unions. Recent work in this area has turned attention to the internal politics and organization of unions alongside the more established study of external influence on wages and politics; see the recent overviews by Kaplan and Naidu (2025) and Jäger, Naidu, and Schoefer (2025). A closely related paper is Pêcheu, Jäger, and Breda (2024), which studies French workplace elections and shows that radical unions strike more but sign fewer bargaining agreements than reformist unions, consistent with long-standing ideological divisions within the labor movement. This paper contributes historical micro-level evidence on how coordinated collective bargaining emerged in Germany through the differential success of rival strategies within the labor movement. Related historical work documents particular institutional components and trajectories, for example, mediation institutions in Sweden (Enflo and Karlsson 2019) or the role of social-democratic organization in reducing strike activity (Molinder, Karlsson, and Enflo 2022), but less is known about how the broader bargaining settlement took shape during its formative years through this between-movement competition. By tracing the rise of the Free Trade Unions and linking it to the emergence of bargaining institutions within a common institutional setting, the paper also complements comparative accounts that emphasize repression, war, or political realignment as the key turning points (Meisenzahl 2015; Friedman 1988).

Second, the paper speaks to the collective-action literature. Classic work shows that organization shapes whether and how collective action unfolds (Olson 1965; Tilly 1978). A large empirical literature documents how protest and strikes diffuse across places and groups through learning, imitation, and solidarity (Conell and Cohn 1995; Biggs 2005; Leon-Ablan, Aidt, and Satchell 2022; García-Jimeno, Iglesias, and Yildirim 2022). A recurring limitation is that organizational form is often difficult to observe empirically; Cantoni et al. (2024, p. 532), in their synthesis, emphasize the lack of evidence on how organizational structure shapes protest dynamics. The paper contributes by distinguishing disputes that involved the centralized Free Trade Unions from those that remained purely local within a common institutional environment, allowing a direct comparison of how

organizational involvement maps into collective action.

Third, the paper contributes to work that views institutions as endogenous responses to conflict and collective action. Much of this literature studies institutional change from above, focusing on elite responses to unrest and on political reforms such as democratization as commitment devices (Acemoglu and Robinson 2000; Aidt and Franck 2015; Krieger 2024). This paper complements this literature by studying institutional change from below. The results suggest that the strategies of social movements can shape which institutions emerge. The three-way competition the paper studies was a common feature of Western labor movements, and the micro-level approach developed here offers a way to study how such competition shaped institutional outcomes in other settings. By examining the emergence of collective bargaining agreements, the paper extends the endogenous-institutions perspective from the political-reform setting to industrial relations.

Finally, the paper adds to the literature on the German model of industrial relations. The standard account treats the Stinnes-Legien Agreement of 1918 as the model's origin: faced with the threat of revolution, employers and social-democratic unions agreed on a framework that subsequent legislation codified (Winkler 1984; Feldman 1997; Silvia 2013). We complement this historical literature in three ways. First, this paper adds micro-level evidence from the years around 1900, documenting that one of the model's defining bargaining forms (multi-employer agreements with peace obligations) already took shape in the early twentieth century, well before 1918. Second, the growing dominance of the Free Trade Unions in collective bargaining that we document is consistent with, and helps make sense of, why Carl Legien, a representative of this centralized wing rather than a more radical alternative, came to sign the 1918 agreement. Third, the emergence of this bargaining form did not depend on centralized employer organization, which in fact opposed it. This stands in contrast to later accounts, in which employer coordination is treated as a defining input to the German model after World War II (Hassel 1999).

The remainder of the paper proceeds as follows. Section 2 provides historical background. Section 3 describes the data. Section 4 analyzes collective action and bargaining across strategies. Section 5 studies the emergence of collective bargaining agreements. Section 6 examines the role of strike activity in that process and examines heterogeneity in agreement types and employers. Section 7 concludes.

2 Strategic divisions in the German labor movement

This section sets out the historical background of the analysis. After describing the legal environment and the development of the German labor movement, we introduce the three competing strategic approaches (radical, social-democratic, and moderate) that shaped how the wings in the labor movement used strikes and collective bargaining agreements.

Institutional environment Imperial Germany industrialized rapidly in the decades after unification, with employment in industry roughly doubling between 1871 and 1913 and an increasingly urban working class concentrated in sectors such as mining, metalworking, and textiles. The legal framework for labor conflict in this new industrial economy was established by the 1869 Industrial Code (*Gewerbeordnung*), which introduced freedom of association and legally permitted strikes for the first time (Boll 1992, p. 241–242). Enforcement, however, remained firmly employer-friendly. Restrictions on picketing protected non-striking workers, legal uncertainty over whether unions counted as political associations enabled further restrictions, and participation in labor conflict exposed workers to dismissal, blacklisting, and legal sanctions throughout the period. Within this framework, workers had a formal right to strike but faced substantial individual risks in exercising it.

The legal standing of collective bargaining agreements was more uncertain than that of strikes, and remained contested throughout the period studied here. Practice ran ahead of the law: parties concluded agreements well before legislation or the courts had settled what such agreements were (Ullmann 1977, p. 104). The central unresolved question was whether agreements were enforceable contracts or merely understandings among coalitions; the associated liability questions remained undetermined until 1914 (Ullmann 1977, p. 113). The Imperial Court (*Reichsgericht*) took the restrictive view, treating agreements as coalitions and hence as non-binding - a position that was nonetheless a minority view (Rudischhauser 2017, p. 760).

However, enforceability still advanced, less through statute than through judicial practice. The local industrial courts (*Gewerbegerichte*) sought to bring about and stabilize agreements through conciliation and arbitration, which the legislature encouraged by making attendance before them compulsory. It was along this route that agreements became the German norm (Rudischhauser 2017, p. 825). A clear divergence was visible between a substantive law that remained unsettled and the procedural practice of the *Gewerbegerichte*, which gave agreements practical force. For the agreements studied here, which were concluded before this process had matured, enforceability remained uncertain.

The German labor movement: Expansion and competition Within this institutional framework, Germany experienced its first major strike wave in the early 1870s. These conflicts were predominantly local and displayed little coordination beyond the immediate workplace or town (Machtan 1983, p. 30). Local organization without union involvement became even more pronounced under the Anti-Socialist Laws (1878–1890), which outlawed unions and prohibited the coordination of unions across regions (Schneider 1994, p. 18–19). During this period, workers organized primarily in occupational associations and coordinated at the local level. Until 1890, there were few signs of a united social-democratic labor movement.

After the repeal of the Anti-Socialist Laws in 1890, unions were reconstituted, which allowed for more strategic options for the labor movement. The social-democratic Free Trade Unions (*Freie Gewerkschaften*), coordinated through the *Generalkommission*, were subsequently founded and expanded rapidly. Membership rose from roughly 200,000 workers in 1890 to nearly three million by 1913, exceeding that of the socialist party. Strike activity also increased sharply, rising from around 200 strikes per year between 1890 and 1894 to 1,600 strikes per year between 1900 and 1904 (Boll 1992).

In this environment, labor conflict became a central strategic problem within the labor movement: unsuccessful or poorly coordinated strikes imposed high economic and organizational costs. Many unions had this experience in the early 1890s, which led to an initial decline in membership and depleted funds. Beyond more general ideological divisions[3], these experiences led to debates over strategy within the labor movement (Boll 1992, p. 36–39).

This produced a fundamental divide within the labor movement (Schönhoven 1980). One camp (the "radicals") aimed for broader political and economic change through local uprisings and revolutionary momentum; they were partially organized in the localist movement, which also included a syndicalist wing (Fricke 1976). A second camp, the "social democrats", organized primarily in the Free Trade Unions, sought to secure economic gains through coordinated collective action and bargaining. The liberal Hirsch-Duncker unions and the Christian unions (the "moderates") pursued improvements through negotiation alone.[4] While reliable membership data on the localists remains scarce (by definition), the moderates remained smaller than the Free Trade Unions and were unevenly concentrated across regions and sectors (Fricke 1976). The Free Trade Unions had more than 80% of all reported members in the 1900s (Schönhoven 1981, p. 183). These three camps differed not only in their broad aims but in how they used the two main instruments available to the labor movement: strikes and collective bargaining agreements. The remainder of this section takes each in turn, with Table 1 providing an overview.

Use of strikes Advocates of the radical approach argued that strike decisions should remain with local workers, who were best placed to judge timing and conditions and who should retain autonomy over collective action. The social-democratic approach instead emphasized the need to coordinate conflict across workplaces, conserve scarce resources, and avoid confrontations unlikely to succeed. The social-democratic unions did not reject strikes as such, but viewed them as an instrument that should be authorized, coordinated,

[3] On the Marxist and strategic underpinnings of these disputes, see Schönhoven (1980) and Schorske (1955). See Bartels, Kersting, and Wolf (2025) on the revisionist debate, another key Marxist controversy of the era.

[4] The other wings of the labor movement viewed the moderate approach as a strategy promoted by employers to weaken class conflict (Fricke 1976, p. 1058).

Table 1: Strategic currents in the German labor movement, c. 1900

	Radical	**Social-democratic (Free Trade Unions)**	**Moderate (Catholic & liberal)**
Goal	Revolutionary transformation	Gains within the existing order	Social peace and cooperation
Strikes	Local, autonomous; mass action	Coordinated; centrally authorized	Avoided
CBAs	Rejected	Embraced (after 1899)	Favored
Organization	Fragmented, local	Centralized, in part sectoral	Smaller, uneven

Notes: Summary of the three strategic currents along the dimensions discussed in this section. For further details and sources see the text.

and bounded in scope.[5] The moderate liberal and Christian unions, by contrast, aimed to avoid confrontation and stressed the common interests between employees and employers.[6]

This difference was reflected in organizational structure. The radical approach favored fragmented occupational unions, whereas the Free Trade Unions promoted broader industrial organization, consolidating occupational unions into larger sectoral unions and thereby centralizing authority (Schönhoven 1980). In practice, the social-democratic approach used strike authority, in particular via financial support: leadership screened proposed strikes and withheld approval from those deemed too costly or unlikely to succeed.

The approaches also differed in the scope of strikes: The social-democratic approach explicitly rejected the idea that strikes should erupt simultaneously across sectors and major regions of the Empire, emphasizing sequencing and restraint instead (Braun 1908, p 54).[7] Noncompliance triggered organizational sanctions, including restrictions on participation

[5] Carl Legien, the head of the Free Trade Unions, expressed this orientation explicitly in 1903: the Free Trade Unions "do not bring about strikes, but seek to avoid them as far as possible, insofar as they can achieve their purpose in some other way. They probably achieve more through wage campaigns that do not lead to a work stoppage than through strikes" (Volkmann 1978, p. 148; own translation). Strikes were thus an instrument of last resort within a broader strategic toolkit oriented toward negotiated settlement.

[6] The founding conference of the Christian unions stated that "it must not be forgotten that workers and employers have common interests" and that "the entire activity of the trade unions should be infused and carried by a conciliatory spirit" (Fricke 1976, p. 1069; own translation). Part of the Christian labor movement opposed this view — notably miners, who left the organization to form a more confrontational alternative — but the moderate orientation remained dominant. The liberal *Hirsch-Duncker* unions similarly viewed strikes as an unsuitable strategy (Fricke 1976, p. 1063).

[7] A revealing example for the refusal to generate strike diffusion dynamics comes from the metalworking sector. The metalworkers' union published a weekly newspaper listing ongoing strikes, demonstrating its capacity to transmit information across locations. Rather than encouraging new strikes, this information was primarily used to discourage workers elsewhere from taking jobs where strikes were underway, thereby limiting strikebreaking and protecting union-supported conflicts. Although such information networks could in principle facilitate the diffusion of collective action (Zhang 2021), the union used them instead to contain conflict and support strikes it had already authorized.

in union assemblies and, in some cases, expulsion threats codified in union statutes, see, e.g., Generalkommission der Gewerkschaften Deutschlands (1892) and Verband der Buch- und Steindruckerei-Hilfsarbeiter und Arbeiterinnen Deutschlands (1905).

This disagreement came to a head in the *Massenstreik* debate following the Russian Revolution of 1905. Rosa Luxemburg (1906), the leading figure of the radical approach, argued that mass strikes could not be planned or administered ex ante but were historically generated processes through which economic and political struggles interacted and through which organization itself could emerge.[8] Leaders of the Free Trade Unions, most prominently Carl Legien (1904), rejected this strategy as reckless. The question was settled at the *Mannheimer Parteitag* of 1906, where the SPD formally acknowledged union autonomy over labor conflict, consolidating the social-democratic approach as the dominant position within the movement, which implied a separation of broader political and often narrower economic goals (Hyman 2001, p. 20).

A further problem cut across these strategic debates: the gains from strikes were fragile. As one contemporary account put it, workers who had won improved conditions "all too often found themselves deceived" (Braun 1908, p. 13-14, own translation): within weeks of a settlement, employers would reimpose wage cuts or longer hours, knowing that the union was exhausted from the strike and unable to respond. This fragility created pressure to complement strikes with more durable instruments.

Collective bargaining agreements The need to lock in gains formally drove interest in binding agreements. The social-democratic unions initially opposed collective bargaining agreements, and some local branches resisted them as insufficiently revolutionary. After extensive debate between 1896 and 1899, the unions reversed their position (Ullmann 1977, pp. 144–147). Legien (1899, p. 103) expressed the social-democratic orientation directly: "We, the unionized workers, do not wish for the so-called collapse [*Kladderadatsch*], nor to be forced to build new institutions on the ruins of society, whether better or worse than the present ones. We wish for a state of calm development."). From their perspective, agreements conserved strike funds, stabilized past gains, and strengthened unions as recognized bargaining counterparts (Ullmann 1977, p. 150). They explicitly treated collective bargaining as an alternative to a general strike (Ullmann 1977, p. 204).

The radical approach remained critical, viewing binding agreements and peace obligations not only as constraints on autonomous escalation but as a tacit acceptance of the existing order: to sign an agreement was to recognize employers as legitimate owners of the means of production (Ullmann 1977, pp. 193–214). The moderate liberal and Christian unions, by contrast, were clearly in favor of collective bargaining agreements and aimed to achieve them through restraint in the use of strikes.

On the other side of these agreements were, of course, employers. Employer organiza-

[8] For discussion of its reception within German Social Democracy, see Gaido (2008).

tion also shaped labor conflict, though it did not straightforwardly facilitate collective bargaining. Centralized employer associations emerged also as a defensive response to union growth, and their initial purpose was to coordinate lockouts, maintain blacklists, and resist union recognition rather than to reach agreements (Schönhoven 1981, p. 185).

Agreements were initially rare and confined to specific crafts and local labor markets, and they varied considerably in content and scope. Some were fixed-term and included peace obligations or explicit dispute procedures, while others were more informal and less binding. The rise of collective bargaining agreements, therefore, reflected a process of institutional experimentation rather than the immediate emergence of a settled bargaining regime.

Although the legal and political consolidation of collective bargaining came only after 1918, contemporaries understood the later settlement as a continuation of this earlier practice rather than a fundamental departure from it. Reflecting on the *Stinnes-Legien* Agreement, Legien himself stressed its continuity with earlier practice (Ullmann 1977, p. 205).

Summary Taken together, labor conflict in Imperial Germany was shaped by institutional uncertainty over the legal status of both strikes and collective agreements, and by a three-way divide within the labor movement over how to use these instruments. The empirical analysis first compares the three approaches descriptively in terms of their ability to sustain collective action and negotiate CBAs, and then provides causal evidence on the impact of social-democratic union strength on agreement formation. In the following, we describe the datasets underlying this analysis.

3 Data

The empirical analysis combines three datasets: strike-level administrative records on the conduct of labor conflict, county–occupation data on union membership, and administrative records on collective bargaining agreements. This section describes each source in turn.[9]

Strikes The strike data come from annual administrative strike statistics compiled by the Imperial Statistical Office. The records aimed to capture all labor disputes between workers and employers in industrial establishments, excluding agriculture and the public sector. A strike is defined as any collective cessation of work by multiple industrial workers (Kaiserliches Statistisches Amt 1900, p. 2). The unit of observation is a dispute event. For the years 1899–1905, the authorities collected exceptionally detailed event-level information. After 1905, the collection methodology changed and the published statistics no longer report the location and other event-level information required for a micro-level

[9] Appendix A provides a list with all sources.

analysis. The main analysis therefore focuses on 1899–1905. For each dispute, the data record start and end dates, location, and occupation.[10] Additional variables include the maximum number of workers on strike or affected, establishment size, the stated demands, and the outcome.

The strike record indicates whether a dispute received support from third parties or occupational associations[11]; it does not directly identify the supporting organization as a Free Trade Union. We use it as an event-level proxy for Free Trade Union involvement, an interpretation that follows Volkmann (1978, pp. 143–144), who argues the variable usefully distinguishes organizationally supported disputes from wildcat strikes. The proxy rests on the rival currents being unlikely to generate recorded third-party support: the Catholic and liberal unions were reluctant to strike (Fricke 1976), while the localist currents typically lacked the sustained organizational backing that police reports recorded as support. This mapping rests on this plausible assumption. The no-support group features spontaneous, self-directed disputes, i.e., the signature form of localist and radical action. Unrecorded union-supported strikes, if numerous, only blunt the contrast we estimate. Similarly, if some strikes recorded as supported were in fact backed by localist organizations rather than the Free Trade Unions, this misclassification would only attenuate the contrast we estimate.

One concern is that the information was initially recorded by local police authorities, often upon employer notification, which may raise issues of bias or incomplete reporting (Wendisch 1906, p. 20). The statistical office, however, retrospectively verified police reports and supplemented them using local newspapers when no official reports were filed (Kaiserliches Statistisches Amt 1900, p. 2). Historians emphasize that these records are unmatched for the period precisely because they were collected contemporaneously rather than reconstructed ex post (Tenfelde and Volkmann 1981, p. 290).

For the final dataset, all strikes are geolocated and occupation codes are harmonized to match the union and bargaining-agreement sources. The harmonization procedure is summarized in the section on combining sources below and documented in Appendix B. Descriptive statistics, including number of strikes by occupation and location, are reported in Appendix C.

Union membership A central variable is union membership in the Free Trade Union movement. While the unions began publishing aggregate membership statistics in the early 1890s, county-by-occupation membership is available only through the data collection efforts of Hirschfeld (1908). His compilation is based on official union reports supplemented by questionnaires sent directly to union organizations and provides membership counts at

[10] Appendix Figure A.1 shows an excerpt of the original source.

[11] The source wording is: "Dritte Personen oder Berufsvereinigungen wirkten auf den Ausbruch des Streiks hin (oder) und unterstützten den Streik."; own translation: "Third parties or occupational associations worked toward the outbreak of the strike or supported the strike."

the county–occupation level for the years 1896, 1903, and 1906.

This source is central to the analysis because it captures subnational variation in Free Trade Union strength during the early spread of collective bargaining. Union membership by occupation is related to employment measured in the occupational census. The merge follows the documentation in Hirschfeld (1908), who establishes correspondences between union categories and census occupations. Only in a small number of cases is it not possible to match union membership to census employment because of inconsistencies between the two sources (see for further details Appendix B). Appendix C provides corresponding descriptive statistics focusing on the union membership strength by occupation.

Collective bargaining agreements The primary source for collective bargaining agreements is the administrative series *Beiträge zur Arbeiterstatistik*, the first systematic collection of such agreements, which aims to cover all agreements in effect across the German Empire in the early 1900s, which allows the bargaining data to be linked to the strike and union measures.[12] The collection was based on questionnaires sent to the parties involved on both the employer and employee sides.[13]

For each agreement, the source records the covered locality, occupation, the worker-side and employer-side negotiating parties, and the start and end dates. The average agreement lasts approximately three years, and 22 percent of agreements do not report an end date. This distinction matters because peace obligations (*Friedenspflicht*) were typically tied to fixed-term agreements (Rudischhauser 2017, p. 24). In the main analysis, we focus on CBAs with a start between 1900 and 1905 covering more than 90% of all CBAs in the source. Further descriptive analysis in Appendix C includes further information, including on the frequency of CBAs by occupation.

Information on negotiating parties is especially valuable because it makes it possible to distinguish agreements negotiated by the different camps in the labor movement and employer bodies from those concluded at the firm level. Agreements involving the Free Trade Unions are identified by matching worker-side representatives to a comprehensive list of affiliated unions documented in Fricke (1976). Worker-side negotiators are then classified into mutually exclusive categories: Free Trade Unions, liberal unions, Catholic unions, multiple unions (i.e., any CBA that involved more than one union, including the Free Trade Unions), unclear classification, and several non-union categories such as groups of workers and employees' committees. Employer-side negotiators are classified into employer bargaining associations, guilds, single-firm employers, and other categories using Kessler (1907) as contemporary guidance.

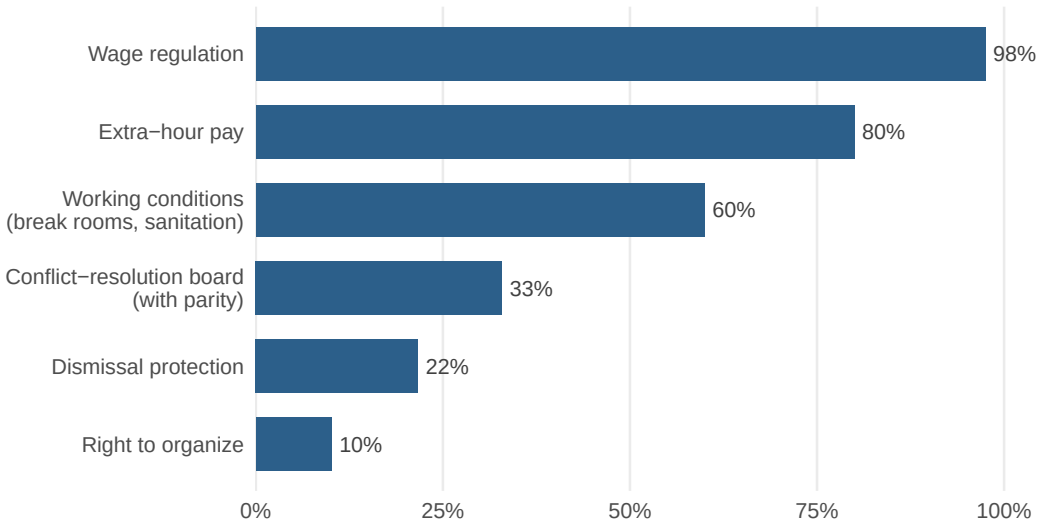
For a subset of agreements, the series reproduced the full text, allowing a closer

[12] Historical evidence suggests that some bargaining agreements existed during the 1890s, but the Free Trade Unions only began to promote them systematically after 1899.

[13] There were three CBAs negotiated by the Free Trade Unions that covered all of Imperial Germany, all in the printing industry, which we exclude from the analysis.

look at what these early agreements actually regulated. This detailed information is available for 120 agreements, drawn predominantly from the building and craft trades and concluded between 1900 and 1905. Figure 1 summarizes the provisions they contained. Almost all regulated wages (98 percent), and most specified overtime or extra-hour pay (80 percent). A smaller but substantial share addressed matters that went beyond pay and hours: working conditions such as break rooms and sanitary facilities (60 percent) and dismissal protection (22 percent). One feature is particularly relevant for the emergence of cooperation between workers and firms: A third of agreements established a parity conflict-resolution board, composed in equal parts of worker and employer representatives, to handle disputes arising under the agreement. Such bodies prefigure the joint arbitration and dispute-resolution institutions that would become an important aspect of the German model.

Figure 1: Content of CBAs



Notes: The figure reports the share of agreements containing each provision, based on the subset of 120 agreements for which the Kaiserliches Statistisches Amt (1906a) reproduce the full agreement text.

Combining strikes, union membership, and collective bargaining agreements The three sources are combined into a single dataset to enable joint analysis of strike activity, union strength, and bargaining outcomes. For this step, occupational classifications are harmonized across datasets. The sample is restricted to occupations in industry, as unions were not legally permitted in agriculture. The final dataset covers 43 occupations across 999 counties, defined using 1895 county boundaries. Union membership data and are available for 24 of the harmonized occupations in 1896. Additional details on the harmonization procedure, excluded occupations, and resulting sample coverage are provided in Appendix B.

4 The Free Trade Unions and their rivals in strikes and bargaining

This section presents descriptive evidence comparing the Free Trade Unions to rival approaches within the labor movement. The comparison proceeds in two steps. Section 4.1 examines strike activity. Section 4.2 turns to collective bargaining agreements.

4.1 Strikes

The share of recorded strikes involving unions rose from about 60 percent in 1899 to roughly 76 percent by 1905 (Appendix Figure D.1). Our observation period therefore coincides with an ongoing transition from predominantly local forms of labor organization toward more union-led collective action. Because this transition was incomplete, the data exhibit substantial variation in union organization that can be leveraged in the analysis of how union organized strikes differed. The remainder of this subsection addresses these questions directly.

Comparison of strike characteristics The analysis contrasts union, i.e., predominately Free Trade Union, and non-union, i.e., localist and radical, disputes with fixed effects regressions. The analysis is on the intensive margin: rather than asking whether unions caused strikes to occur, it asks how strikes differed when unions were involved.[14]

We estimate fixed-effects regressions of the form

$$Y_{icoq} = \beta \, \text{UnionStrike}_{icoq} + \alpha_{co} + \lambda_q + \varepsilon_{icoq}, \tag{1}$$

where i indexes disputes, c counties, o occupations, and q quarter-years. $\text{UnionStrike}_{icoq}$ equals one if the strike record indicates third-party or occupational-association support, which we use as a proxy for Free Trade Union involvement (see Section 3 for further details). County×occupation fixed effects (α_{co}) absorb time-invariant differences in local industrial structure and labor-market organization, while quarter-year fixed effects (λ_q) absorb shocks common across locations, including macroeconomic conditions and seasonality. Standard errors are clustered at the county level. We interpret β as a within-county-occupation comparison: how strike characteristics differ between disputes with and without union involvement, holding fixed persistent local occupational characteristics and common time shocks. Panel B of Table 2 imposes a stricter comparison by including county-occupation-quarter fixed effects, comparing union and non-union disputes occurring in the same

[14] The classification of a strike as union-involved does not necessarily imply that the union initiated the dispute. Unions may have lent support to strikes that were initiated locally by workers. Hence, the contrast between union and non-union strikes captures the effect of union involvement broadly, rather than union initiation specifically.

county-occupation in the same quarter. Variation then comes only from county-occupation-quarter cells with multiple disputes and within-cell variation in union involvement, which explains the smaller sample.

The estimates in Table 2 show systematic differences across five dimensions of collective action. Union-involved disputes mobilized more workers (about 61 additional strikers[15] on average in Panel A, nearly as large as the overall mean of 72 strikers per dispute), lasted longer (roughly 16 additional days, relative to a mean of 21), and saw higher workplace-level participation (about 3.4 percentage points higher striker-to-employment ratio, against a mean of 58 percent). They were also nearly twice as likely to articulate collective bargaining demands (a 7.5 percentage point higher probability, against a mean of 10.1 percent) and 8.4 percentage points more likely to avoid outright failure (against a mean of 56.7 percent). The stricter within-cell comparison in Panel B yields the same qualitative pattern for all five outcomes, with point estimates that are generally similar or slightly larger.[16]

While the results indicate strong differences between union-supported and local strikes, it could be still the case that the results mask the role of different strategies. A prime concern is that the indicator for third-party involvement could also capture disputes supported by Catholic or liberal unions rather than predominantly those by the Free Trade Unions. Historical evidence suggests this is unlikely to drive the results: both Catholic and liberal unions were generally skeptical of strikes and oriented toward social peace (see Section 2). Consistent with this interpretation, the results are quantitatively and qualitatively similar when excluding occupations in which liberal unions were comparatively strong following Fricke (1976, p. 1067) and dropping the major Catholic provinces (Appendix Table D.1). This additional evidence corroborates our interpretation, according to which we capture differences in strike characteristics between the Free Trade Unions and the localist/radical wing.

Coordination across workplaces A further dimension on which the labor-movement strategies differed in principle was the capacity to coordinate collective action across workplaces. Localist currents held views that labor disputes should remain locally initiated, but aimed for revolutionary contagion; the Free Trade Unions, by contrast, sought to coordinate action across workplaces within a common occupation. The strike data allow us to examine one observable manifestation of this capacity: deliberate, cross-workplace solidarity. For the years 1900 to 1905, the administrative records annotate interrelated

[15] Note that 'Strikers' refers to the maximum number of workers on strike on a given day during a dispute, not the total number of workers on strike over the duration.

[16] Alternative fixed-effects structures yield similar patterns (Appendix Table D.2). The same applies to additional clustering at the occupation level (Appendix Table D.3).

Table 2: Strike characteristics by union involvement

Dep. var.	Strikers (1)	Duration (2)	Participation (3)	Demand CBA (4)	No failure (5)
Panel A: County × occupation FE + quarter FE (full sample)					
Union strike (dummy)	60.902***	16.127***	3.372***	0.075***	0.084***
	(8.833)	(1.039)	(0.721)	(0.013)	(0.016)
Mean dep. var.	72.178	20.729	58.012	0.101	0.567
SD dep. var.	230.326	31.533	29.950	0.301	0.496
County × occupation FE	✓	✓	✓	✓	✓
Quarter FE	✓	✓	✓	✓	✓
R-squared	0.188	0.391	0.294	0.270	0.226
Observations	8190	8190	8190	7045	8190
Panel B: County × occupation × quarter FE (restricted sample)					
Union strike (dummy)	67.808***	10.895***	3.973***	0.096***	0.130***
	(11.638)	(1.027)	(1.113)	(0.012)	(0.028)
Mean dep. var.	66.143	14.322	58.997	0.099	0.556
SD dep. var.	254.950	22.621	29.789	0.299	0.497
County × occupation × quarter FE	✓	✓	✓	✓	✓
R-squared	0.204	0.428	0.328	0.304	0.321
Observations	2866	2866	2866	2467	2866

Notes: Each column reports a separate fixed-effects regression of the respective outcome on an indicator for union involvement. Panel A includes county-occupation and quarter-year fixed effects. Panel B includes county-occupation-quarter fixed effects and is estimated on the restricted sample of county-occupation-quarter cells with at least two disputes and within-cell variation in union involvement. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

disputes, identifying when a strike occurred in support of another ongoing conflict.[17] From these annotations, trigger strikes and corresponding solidarity or support strikes are identified. This measure captures self-declared solidarity strikes only, which by definition advance no demands of their own.

It is notable that sympathy-strike activity is almost entirely a feature of union organized labor conflict. Of 83 trigger-solidarity pairs, 70 involve unions on both sides. This concentration suggests that the capacity for cross-workplace coordination was not evenly distributed across the movement: despite the localist currents' principled commitment to autonomous local action and contagion, they rarely[18] supplied the coordination that solidarity strikes required.

The union-organized dyads also display a distinctive pattern of timing and geography. About a quarter of solidarity strikes began on the same day as the trigger, and half began within three weeks, which is consistent with active coordination rather than gradual diffusion. At the sectoral level, 91 percent of dyads (64 of 70) link disputes in the same disaggregated occupation.[19] Geographically, however, two-thirds span different counties. The Free Trade Unions thus coordinated collective action predominantly across places but within occupations, matching their organizational structure as sectoral unions with national reach.

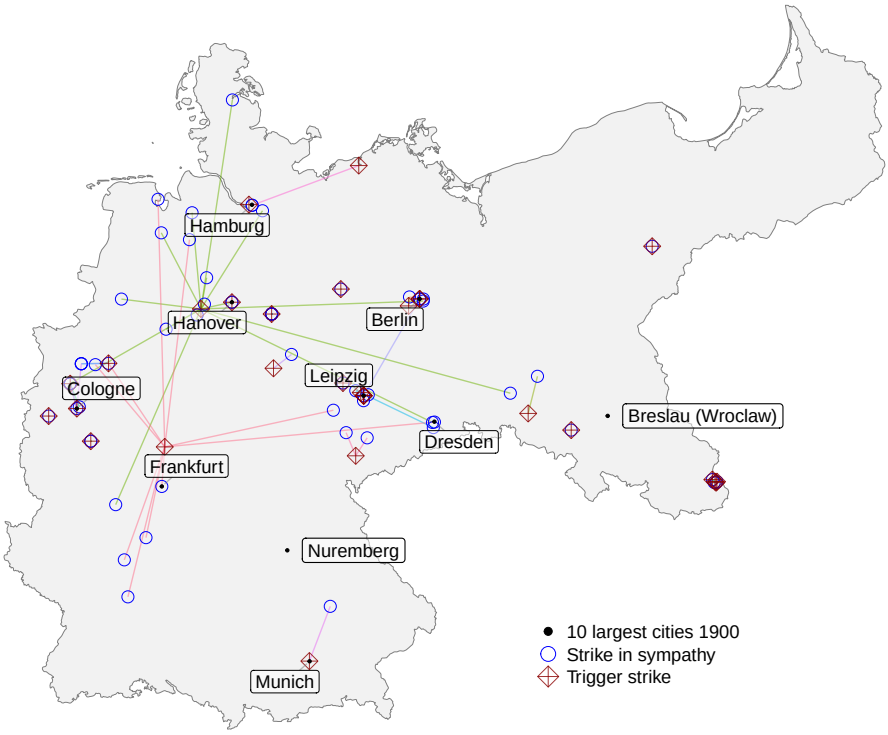
However, while the sympathy-strike annotations allow us to identify both trigger and support strikes directly, the resulting sample is small, comprising only 83 disputes. Moreover, the limited number of non-union sympathy strikes leaves little scope for comparison. Table 3 therefore provides an alternative measure of cross-workplace coordination based on the scope of individual disputes: whether a strike involved more than one firm and whether it extended across multiple locations. Comparing disputes within the same county, sector, and quarter, union-organized strikes were substantially more likely to encompass multiple firms: the estimated difference of about 16 to 20 percentage points is large relative to a sample mean of 27 percent (columns 1 and 2). Union strikes were also more likely to span multiple locations, an outcome rare overall but concentrated almost entirely in union disputes (columns 3 and 4). Both differences persist, only modestly attenuated, when conditioning on the size of the affected workforce (as a proxy for the firm size), indicating that the pattern does not simply reflect unions organizing larger workplaces, and they are, if anything, equally pronounced under the strictest comparison

[17] The administrative strike statistics annotate interrelated disputes directly, by indicating whether it supported another ongoing conflict, listing the corresponding reference number. The statistical office terms these *Sympathiestreiks* (strikes in sympathy) and distinguishes them from independent strikes on the grounds that they make no demands of their own but exist solely to "demonstrate solidarity and moral support" for workers elsewhere (Kaiserliches Statistisches Amt 1901, p. 6).

[18] Because non-union strikes do appear among the recorded solidarity strikes, their scarcity here reflects a genuine rarity rather than a limitation of the data.

[19] For example, in 1901 glassworkers at a bottle factory in Obernkirchen-Schauenstein, north of Hanover, went on strike for higher wages, triggering solidarity strikes across the German glass industry, coordinated by a branch of the Free Trade Unions, in Figure 2 shown in green.

Figure 2: Union trigger and support strikes, 1899-1905



Notes: The map shows trigger strikes (red diamonds with a cross), solidarity strikes (blue circles), and their links (grouped by color for same trigger strike) on a map labeled with major cities in Germany.

within county–sector–quarter cells (Panel B). Like the solidarity-strike evidence, these measures speak to organized, simultaneous coordination: a dispute recorded as a single multi-firm event is the signature of deliberate joint action, whereas diffusion would appear as separate, independent and lagged disputes.

Interpretation Taken together, the evidence on strikes reveals a consistent pattern: Free Trade Union-supported disputes were larger, longer, more participatory, more clearly oriented toward bargaining, more likely to avoid failure, and more capable of being coordinated across workplaces. The comparison with localist currents is particularly relevant here because the localists' defining commitment was to autonomous local action with the goal to achieve a revolutionary momentum. In practice, disputes organized along those lines were smaller, less sustained, less successful, and rarely linked across workplaces. The Free Trade Unions were the more effective mobilizers even on the very dimensions that localist and radical theory treated as its own.

Table 3: Strike coordination by union involvement

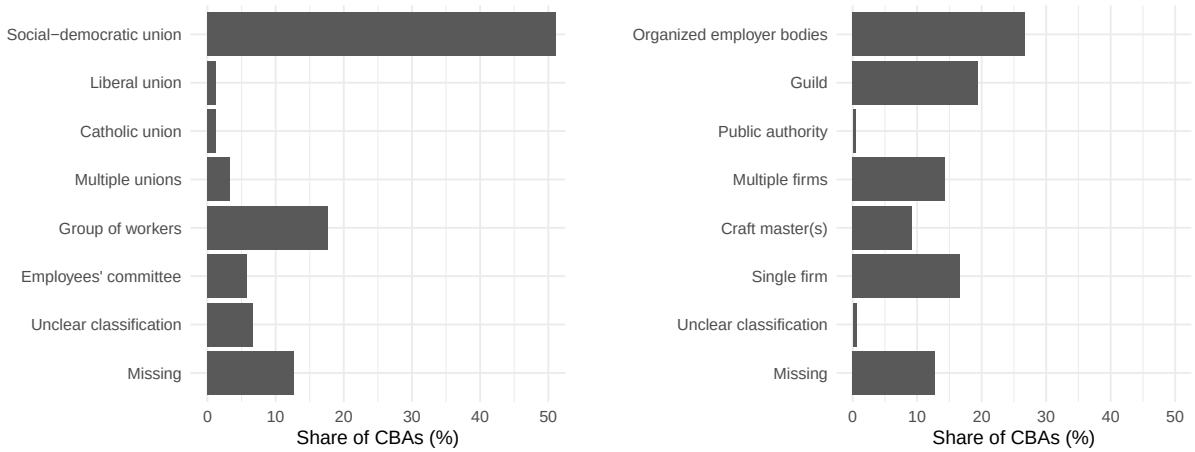
Dependent variable	Multiple firms		Multiple locations	
	(1)	(2)	(3)	(4)
Panel A: County × sector FE + quarter FE (full sample)				
Union strike (dummy)	0.212***	0.167***	0.018***	0.012***
	(0.015)	(0.016)	(0.004)	(0.003)
Mean dep. var.	0.267	0.267	0.028	0.028
SD dep. var.	0.442	0.442	0.164	0.164
Firm size control		✓		✓
R-squared	0.401	0.488	0.271	0.280
Observations	8189	8189	8334	8243
Panel B: County × sector × quarter FE (restricted sample)				
Union strike (dummy)	0.158***	0.124***	0.014***	0.009*
	(0.015)	(0.017)	(0.005)	(0.005)
Mean dep. var.	0.169	0.169	0.022	0.022
SD dep. var.	0.375	0.375	0.148	0.147
Firm size control		✓		✓
R-squared	0.419	0.499	0.384	0.394
Observations	2515	2515	2685	2570

Notes: Each column reports estimates from a separate fixed-effects regression of the outcome indicated in the column header on a dummy for union involvement. Panel A includes county–occupation and quarter-year fixed effects; Panel B includes county–occupation–quarter fixed effects, with the sample restricted to county–occupation–quarter cells containing at least two disputes and within-cell variation in union involvement. The 136 strikes with missing information on multiple firms also lack employment information; they are excluded from columns 1 and 2 throughout, so adding the firm size control leaves the sample unchanged. Columns 3 and 4 retain these strikes, so the control reduces the number of observations in column 4. Standard errors, clustered at the county level, are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels.

4.2 Collective bargaining agreements

Turning from strikes to bargaining, this section documents who negotiated collective bargaining agreements on both sides.

Figure 3: The Free Trade Unions in collective bargaining agreements



(a) Employee-side negotiators (b) Employer-side negotiators

Notes: Figure 3a reports the share of agreements in which the listed worker-side party negotiated the agreement. Figure 3b reports the corresponding shares for employer-side negotiators across all agreements. Figure C.3 restricts the sample to agreements involving the Free Trade Unions and reports the corresponding employer-side distribution. "Multiple" indicates that more than one body negotiated on that side. "Unclear classification" pools cases where the negotiator cannot be identified from the document; "Missing" indicates that the document contains no negotiator information.

Composition of negotiating parties Figures 3a and 3b document the composition of negotiating parties among the workers. The Free Trade Unions appear in more than half of agreements, far outpacing Catholic and liberal unions, each of which appear in only about 1% of cases (Figure 3a). This asymmetry is notable given the Catholic and liberal unions' orientation toward negotiation: in principle they opposed strikes as a bargaining instrument and pursued gains through negotiation alone, but in practice they rarely appeared as a negotiating party. A meaningful minority of agreements were negotiated directly by groups of workers or employees' committees rather than by any union. On the employer side, bargaining associations and guilds are the most common counterparts, alongside single firms and groups of firms (Figure 3b). Centralized employer associations were not among the negotiation partners.[20] Appendix Figure C.3 reports the

[20] These did not include the two major employer associations (*Centralverband Deutscher Industrieller* and *Bund der Industriellen*), which opposed bargaining agreements, but other smaller associations organized at the occupation level.

corresponding employer-side distribution for agreements involving the Free Trade Unions specifically, which is similar to the pattern in Figure 3b.

Interpretation The pattern in bargaining mirrors the one in strikes. Just as localist currents were outperformed on the dimensions of collective action they claimed as their own, Catholic and liberal unions were absent from the formal bargaining arena despite their stated orientation toward negotiation. The Free Trade Unions were the dominant party on both dimensions. This combination—effective in strikes and dominant in bargaining—is what the rest of the paper examines causally, linking Free Trade Union strength at the county-occupation level to the emergence of collective bargaining agreements.

5 Free Trade Unions and bargaining agreements

Building on the descriptive evidence that the Free Trade Unions were the dominant worker-side party in collective bargaining, this section asks whether stronger Free Trade Union organization raised the likelihood that bargaining agreements emerged at the county-occupation level. The main empirical challenge is that union presence and agreement formation may both respond to local economic conditions, political mobilization, and employer organization. To address this concern, the analysis first relates agreement outcomes to pre-period union strength while leveraging county and occupation fixed effects. An instrumental-variables strategy then isolates plausibly exogenous variation in Free Trade Union strength generated by the historical location of occupation-specific union headquarters.

5.1 Empirical approach

Baseline specification Our main outcome is a binary variable at the county–occupation level using the CBA statistics; it equals one if at least one collective bargaining agreement negotiated by the Free Trade Unions between 1900 and 1905 is observed in county c and occupation o. The baseline OLS specification relates CBA incidence to predetermined centralized union presence:

$$\mathrm{CBA}_{co} = \beta\,\mathrm{Union}_{co,1896} + \gamma\,\mathrm{Emp}_{co,1896} + \alpha_c + \delta_o + \varepsilon_{co}, \tag{2}$$

where $\mathrm{Union}_{co,1896}$ measures Free Trade Union presence in county c and occupation o in 1896, defined as membership divided by employment multiplied by 100 (as percentage). $\mathrm{Emp}_{co,1896}$ captures predetermined local employment in the same county–occupation cell. County fixed effects α_c absorb time-invariant county characteristics (e.g., urbanization, long-run political differences, and geography), and occupation fixed effects δ_o absorb national differences in bargaining propensities across occupations. Variation thus comes

from within-county differences across occupations and within-occupation differences across counties.

We cluster standard errors at the county level, the level at which our identifying variation is grouped: identification comes from comparing occupations within a county, and observations in the same county share local economic and political conditions. The relevant residual dependence is therefore spatial, as nearby counties resemble one another in their unobserved local conditions.

Instrumental variable OLS estimates may still reflect unobserved county–occupation factors correlated with both union presence and bargaining outcomes, such as political mobilization or occupation-specific growth. To address this concern, we instrument for union presence using the distance from county c's centroid to the city where the headquarters of the relevant union o are located (measured km, divided by 100) based on Schönhoven (1980) and Generalkommission der Gewerkschaften Deutschlands (1894):

$$\text{Union}_{co,1896} = \pi \text{DistHQ}_{co} + \theta \text{Emp}_{co,1896} + \alpha_c + \delta_o + u_{co}, \tag{3}$$

$$\text{CBA}_{co} = \beta^{IV} \widehat{\text{Union}}_{co,1896} + \gamma^{IV} \text{Emp}_{co,1896} + \alpha_c + \delta_o + \eta_{co}. \tag{4}$$

The instrument is defined only for occupations with union headquarters in 1894. The main specifications therefore report OLS and 2SLS results for this set of occupations; Appendix Table E.2 reports OLS results using all occupations.

The instrument exploits the historical placement of union headquarters during the reorganization and founding phase of the Free Trade Unions in the late 1880s and early 1890s (Schönhoven 1990, pp. 349–350). Many unions were newly created or rebuilt after more than a decade of repression under the Anti-Socialist Laws, when formal organization had been suppressed and local branches had to be reconstructed. Union leaders faced imperfect information about where durable strongholds could be sustained, so headquarters locations were not simply the relocation of long-established organizations to known centers of demand, and we formally test for this further below. Contemporary accounts emphasize that these choices were driven primarily by cross-state differences in the policing of association and coalition rights, which were handled particularly restrictively and with substantial discretion in Prussia and the Kingdom of Saxony (Legien 1899, p. 95); to evade state control, unions often placed headquarters outside these jurisdictions. During this formative phase, headquarters locations shaped the local reach of organizational resources and recruiters, generating proximity effects on union presence.

A concrete example comes from the 1891 founding congress of the metalworkers' union (Allgemeiner Deutscher Metallarbeiter-Kongress 1891), which illustrates both the relevance and the exclusion restriction of the headquarters-distance instrument. Delegates debated where to locate the seat, and took for granted that its placement would strengthen

organization in the host city: relocating to Hamburg, one argued, would revive the local organization there.[21] Board members would reside at the seat, concentrating the union's apparatus and activity nearby—and with it, membership. On the other hand, the choice among candidate cities turned on legal exposure rather than on local organizational strength or membership. Hamburg's association law was praised for its liberalism; Nuremberg was opposed because publicly soliciting strike funds was punishable there; Halle was rejected as more exposed to dissolution than Württemberg. Tellingly, Berlin—home to the largest concentration of metalworkers—was passed over, delegates reasoning that the seat could more easily be moved later from a minor location for the union like Stuttgart to Berlin than from Hamburg. The congress settled by vote on Stuttgart as the legally safest option (Allgemeiner Deutscher Metallarbeiter-Kongress 1891, pp.85-86). The same debate thus shows the seat strengthening local organization (relevance) while being placed on grounds unrelated to local union strength (the exclusion restriction).

Because our preferred specification includes county and occupation fixed effects, identification does not come from raw proximity to headquarters. The county fixed effects α_c absorb each county's general proximity to the set of headquarters cities.[22] The occupation fixed effects δ_o absorb the average accessibility of any given union's headquarters across counties. The identifying variation is therefore the residual interaction: whether county c is unusually close to the occupation's union headquarters, relative both to the county's general proximity to headquarters cities and to other counties' proximity to the same headquarters. Put differently, within a county, the instrument compares occupations whose unions happen to have headquarters nearby with those whose headquarters sit farther away.

The exclusion restriction is that, conditional on county and occupation fixed effects and county-level occupation employment shares, distance to the relevant headquarters affects agreement formation only through the local organizational presence of the Free Trade Unions. Headquarters had no formal bargaining authority at the local level; their influence operated through the recruitment, information flows, and organizational support that constitute that presence, of which 1896 membership share is the measured proxy. We therefore interpret β^{IV} as the effect of Free Trade Union organizational presence for the county-occupation cells whose presence responds to headquarters proximity.

[21] Source wording is: "Ebenfalls würde durch Verlegung des Sitzes nach Hamburg die dortige Organisation wieder gekräftigt." (Allgemeiner Deutscher Metallarbeiter-Kongress 1891, p.85).

[22] Appendix Section E.4 addresses the concern that distance proxies generic proximity to plausible organizing centers by implementing a recentered instrument following Borusyak and Hull (2023); because the relevant component is almost entirely county-specific, recentering is nearly equivalent to the county fixed effects and yields almost identical estimates. Only an occupation-specific pool of potential headquarters would generate larger within-county departures. However, such a set is hard to defend historically, so we retain the common pool.

Binary specification To express the magnitude on an interpretable scale and to characterize the cells driving identification, we also estimate a binary version of the specification. We replace continuous union strength with an indicator for any Free Trade Union presence and instrument it with an indicator for whether a county lies in the closest quartile of distance to the relevant headquarters. In this binary–binary design the second stage measures the effect of establishing union presence on agreement formation at the complier margin. We report the continuous specification as our primary estimate and use the binary version to interpret magnitude and identify the responsive cells.

Threats to identification Four threats to identification warrant investigation. First, the headquarters network may reflect earlier labor-movement infrastructure rather than decisions made during the reorganization of the Free Trade Unions. Second, counties near headquarters may differ systematically from surrounding areas in unobserved ways. Third, the results could be driven by a small number of exceptionally large or politically influential cities or by broader patterns of industrial concentration. Fourth, we also test whether the instrument predicts subsequent occupation-specific employment growth, which would indicate correlation with local economic trajectories. Section 5.3 addresses each of these.

5.2 Main results

OLS estimates Column 1 of Table 4 reports the baseline estimates. Free Trade Union strength in 1896 is a strong predictor of subsequent bargaining agreement incidence. A one-percentage-point increase in unionization raises the probability of observing any Free Trade Union agreement by 0.09 percentage points.[23] These effects are economically meaningful given that agreement incidence is low in the data. Union strength has a standard deviation of 6.2 percentage points in the county-occupation panel, so a one-standard-deviation increase in unionization raises the probability of observing any agreement by about 0.56 percentage points. Relative to the mean incidence of 2.3 percent, this is a sizable relative increase.

IV estimates Column 2 of Table 4 reports 2SLS estimates using distance to occupation-specific union headquarters as an instrument for union strength.[24] The first stage is strong: Kleibergen–Paap rk Wald F-statistics are over 40 across specifications, alleviating concerns about weak instruments. Anderson–Rubin F-statistics also reject the null of no effect under weak-instrument robust inference.

The IV estimates confirm the OLS results and imply substantially larger effects. The point estimate is stable whether or not predetermined occupation employment is included

[23] The results are similar when extending the sample to all occupations (Appendix Table E.2).
[24] Appendix Tables E.3 and E.4 report the first stage and reduced form, respectively.

Table 4: Free Trade Unions and collective bargaining agreements

Dep. var: FTU CBA (dummy)	(1) OLS	(2) 2SLS	(3) 2SLS	(4) 2SLS (binary)
Union share, 1896	0.0009***	0.0192***	0.0196***	
	(0.0002)	(0.0041)	(0.0041)	
Union presence, 1896				0.5680***
				(0.1412)
Mean dep. var.	0.022	0.022	0.022	0.022
Kleibergen–Paap F		42.71	43.33	29.67
Anderson–Rubin F		37.94	39.43	36.38
Employment control	✓	✓		✓
Observations	22,052	22,052	22,052	22,052

Notes: Unit of observation is a county-occupation cell. The dependent variable equals one if at least one Free Trade Union agreement is observed. Column 1 reports OLS estimates. Column 2 reports 2SLS estimates instrumenting union share with distance to the occupation-specific union headquarters. Column 3 uses a recentered version of this instrument. All specifications include county and occupation fixed effects. Columns 1, 2, and 4 control for predetermined occupation employment. Standard errors are clustered at the county level. KP rk F denotes the Kleibergen–Paap weak-instrument statistic; AR F denotes the Anderson–Rubin statistic. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

as a control (Table 4, columns 2 and 3), indicating the result does not depend on this adjustment. In the binary specification, instrumented union presence raises the probability of agreement formation by 56.8 percentage points at the complier margin (Table 4, column 4).

The IV estimates exceed OLS for two reasons. First, the instrument identifies a local average treatment effect for the cells whose union presence responds to headquarters proximity, and these need not resemble the average cell. Second, classical measurement error in the 1896 membership measure, which predates the 1900–1905 outcome window, attenuates OLS toward zero. The complier margin is itself an extensive-margin one: The instrument primarily shifts whether a union established a local presence at all rather than membership density (Appendix Table E.5). For the extensive margin, we would expect a large effect, since union presence is key for a Free Trade Union agreement. The responsive cells are concentrated in mid-to-larger occupation-county cells and comprise a modest share of the sample (Appendix Table E.6).

5.3 Threats to identification and robustness

The validity of the IV depends on the headquarters-distance measure capturing variation in Free Trade Union organization rather than other factors. Four concerns are addressed

in turn: that the instrument may proxy for pre-existing strength of the labor movement, that counties near headquarters may differ systematically in unobserved ways, that a small number of exceptional cities may drive the results, and that broader patterns of industrial concentration may confound the effect.

Pre-existing labor movement strength Appendix Tables E.7 and E.8 assess whether the headquarters-distance instrument captures pre-existing strength of the labor movement rather than variation in Free Trade Union organization. A first concern is that the headquarters network may reflect earlier labor-movement infrastructure rather than the specific organizational decisions made during the Free Trade Unions' reorganization in the early 1890s. As a placebo test, Appendix Table E.7 re-estimates the first stage of the IV specification using distance to occupation-specific union newspaper headquarter cities in the 1870s based on Knaack and Schröder (1981) instead of the union-headquarters instrument used in the main analysis. On the restricted sample of occupations with newspaper headquarters, the first stage turns insignificant (F-statistic of 1.32). This indicates that the main instrument captures variation specific to the organizational network that emerged after the Anti-Socialist Laws, rather than pre-existing labor-movement geography.

A related concern is that distance to headquarters may correlate with persistent local propensities toward labor conflict more broadly. Appendix Table E.8 examines the relationship between distance to the relevant union headquarters and strike activity from Machtan (1983) in the early 1870s, a period predating both the organizational expansion of the Free Trade Unions and the headquarters network exploited in the main analysis. Distance to later headquarters is uncorrelated with strike incidence between 1871 and 1874. While these regressions are necessarily estimated on a reduced set of occupations because of data availability, the absence of any systematic relationship suggests that the instrument does not proxy for persistent local propensities toward labor conflict.

Donut tests around headquarters cities Counties hosting union headquarters may differ systematically from surrounding areas for example in industrial structure, political mobilization, or administrative capacity and such differences could mechanically generate a relationship between headquarters proximity and bargaining outcomes. The IV specification is therefore re-estimated excluding counties located within 10 km and 15 km of each headquarters city. The estimated effects remain similar in magnitude (Appendix Table E.9, columns 1 and 2), though the first stage is weaker at the 15 km radius, indicating that the results are not driven by idiosyncratic conditions in and around headquarters cities.

Excluding prominent headquarters locations A related concern is that a small number of exceptionally large or politically influential cities may disproportionately drive

the results. Hamburg and Berlin were major industrial centers and central nodes of the union movement. Re-estimating the models excluding occupations whose headquarters were located in either city yields similar estimates (Appendix Table E.9, columns 3 and 4), indicating that the findings are not driven by a small set of nationally dominant headquarters.

Concentration in major labor markets A further check restricts the sample to major labor markets within each occupation. Specifically, the sample is limited to counties that are either in the top decile of national employment within an occupation or directly adjacent to such counties. This restriction focuses the analysis on locations operating in more comparable, highly industrialized labor markets and thereby reduces variation in industrial environment. The estimated effects remain stable under this restriction (Appendix Table E.9, column 5), suggesting that the main results reflect differences in union organization within broadly similar industrial contexts.

Leave-one-occupation-out The estimated effects of union strength on agreement incidence remain stable across omissions (Appendix Figure E.3). This is reassuring because certain occupations with well-documented bargaining traditions might otherwise be suspected of driving the findings.

Occupation-specific employment growth A remaining concern is that headquarters proximity might be correlated with occupation-specific local economic conditions (e.g., shifts in labor demand) that could affect bargaining independently of union organization. We test this directly by relating the instrument to subsequent growth in occupation-specific employment shares at the county level between 1895 and 1907. If distance to headquarters were capturing local economic trajectories, it would predict this growth. Table E.10 shows that it does not: the coefficient on distance is small, statistically insignificant, and stable across specifications, whether or not county fixed effects and employment controls are included. This indicates that the headquarters-distance instrument is not proxying for differential occupation-specific economic development, supporting the exclusion restriction against the most direct version of the county-by-occupation confound.[25]

Timing of the outcome The source records agreements by their reported start year. Still, there is a risk of duration bias, under which longer agreements are mechanically over-represented in a cross-sectional window. As a direct check, restricting the outcome to agreements with start dates in 1903–1905 leaves the estimates retaining their sign and

[25] As a complementary check, we add employment growth as a further control to the main specification in Appendix Table E.11. The estimate is essentially unchanged (0.019 with and without the control), confirming that the result does not operate through differential occupation-specific employment growth.

significance (Appendix Table E.12), with the magnitude scaling proportionally with the lower incidence in the narrower window.

Summary Taken together, the IV and the robustness checks rule out several substantive alternatives. The first is generic proximity: the worry that distance to headquarters captures nearness to a labor-movement political center rather than to a specific occupation's headquarters. This is inconsistent with the inclusion of county fixed effects, which absorb generic proximity to the headquarters network, and is confirmed by the stability of the estimates under recentering (Appendix E.13). The second is pre-existing infrastructure: the possibility that headquarters locations reflect earlier labor-movement geography rather than decisions made during the reorganization. This is inconsistent with the insignificant results from the placebo-instrument specification, which substitutes 1870s newspaper headquarters for the union headquarters (Appendix Table E.7), and with the absence of any relationship between distance to later headquarters and pre-period (1871-1874) strike activity, reported as a placebo outcome (Appendix Table E.8). The third is local idiosyncrasy: the concern that headquarters cities and their surroundings differ from the rest of the country in ways that drive agreement formation. This is inconsistent with the donut-exclusion results and with the stability of estimates when Berlin and Hamburg are excluded (Appendix Table E.9). The fourth is differential economic development: the possibility that headquarters proximity proxies for occupation-specific local growth or structural change. This is inconsistent with the absence of any relationship between distance to headquarters and subsequent occupation-specific employment-share growth between 1895 and 1907 (Appendix Table E.10).

What remains is the possibility that an unobserved county-occupation factor—correlated with occupation-specific headquarters locations under the specific conditions of the early 1890s, uncorrelated with pre-existing labor-movement geography and pre-existing strike activity, not predictive of subsequent occupation-specific employment growth, not concentrated in or near the headquarters cities themselves, and not peculiar to a single occupation—generates the observed pattern. The analysis cannot rule out every such possibility, but the chain of tests considerably constrains the space of remaining concerns.

6 How the Free Trade Unions facilitated bargaining

The previous section showed that stronger Free Trade Union strength raised the likelihood that collective bargaining agreements emerged, but not how the unions brought them about. This section turns to the mechanism. Section 6.1 examines the timing of union-organized conflict around the first agreement, asking whether unions used strikes as a route to bargaining rather than an alternative to it. Section 6.2 examines which agreements the effect was concentrated in, and thus what the unions' organizational capacity produced.

6.1 Strike dynamics around first observed agreements

How did the Free Trade Unions use their capacity for collective action to secure collective bargaining agreements? This section examines how strike activity evolved around the first observed agreement in a county-occupation cell. Because the timing of agreements is endogenous to local bargaining conditions, the event-study coefficients should be interpreted as describing the pattern of strike activity around observed agreements rather than as causal effects. The exercise does not claim that the observed rise in union-organized strike activity caused the subsequent agreement, nor that the agreement caused the subsequent decline. The aim is more modest: to document whether strike activity systematically shifted around the emergence of formal bargaining, and to test whether any such pattern differs by whether strikes were union-organized.

Approach The analysis combines strike-level records with information on agreement start dates to estimate an event-time specification around the first observed agreement in each county-occupation cell[26]. The unit of observation is a county-occupation-week cell, and the outcome indicates whether at least one strike occurs in a given cell-week. Focusing on first agreements avoids overlapping event windows and keeps the interpretation centered on the initial emergence of contractual bargaining in a local labor market.

Our baseline specification is

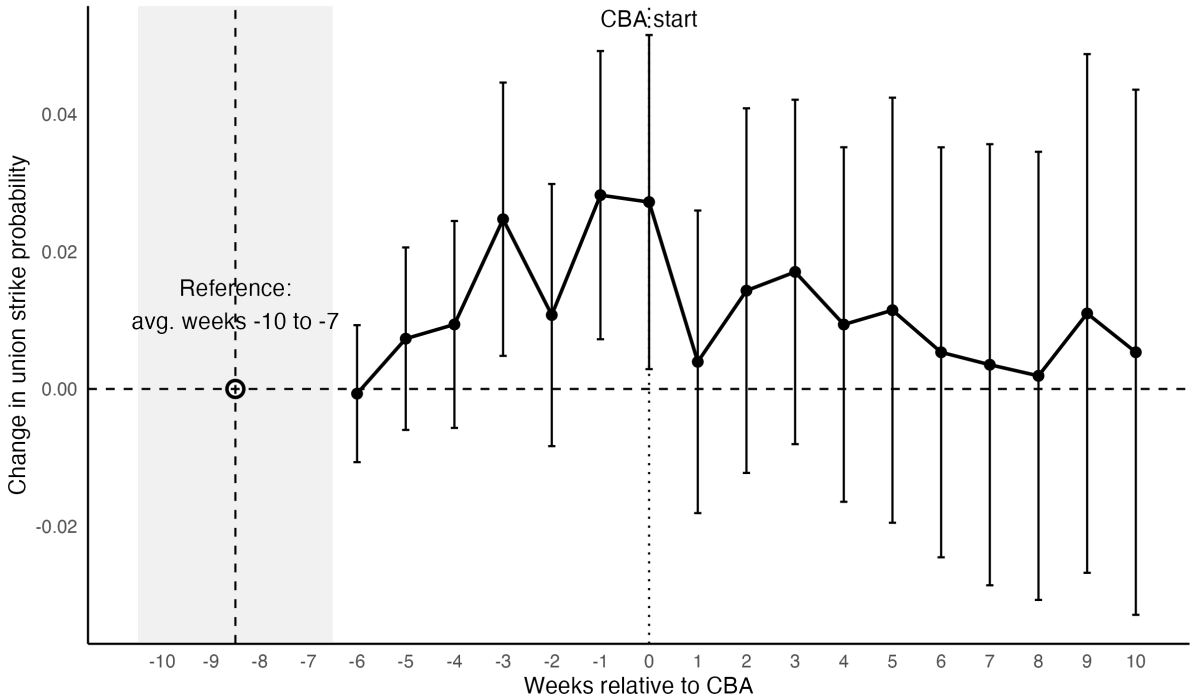
$$y_{cot} = \sum_{j=-K}^{H} \gamma_j D_{cot}^j + \alpha_{co} + \delta_{month(t)} + \pi_{year(t)} + \varepsilon_{cot}, \tag{5}$$

where c indexes counties, o occupations, and t calendar weeks. The outcome y_{cot} equals one if at least one union-organized strike occurs in county c, occupation o, and week t. The binary variables D_{cot}^j indicate event time relative to the start of the first observed agreement in that county-occupation cell, with j indexing weeks within the event window. The coefficients γ_j measure the change in strike probability at event time j relative to the pre-agreement reference period. County-occupation fixed effects α_{co} absorb time-invariant differences across local labor markets, while calendar month fixed effects $\delta_{\text{month}(t)}$ and calendar year fixed effects $\pi_{\text{year}(t)}$ capture seasonal fluctuations and aggregate annual shocks. Standard errors are clustered at the county-occupation level.

Coefficients are estimated relative to the omitted reference period of strike incidence in weeks -10 to -7 prior to the agreement, so coefficients γ_j capture the deviation in strike probability from the pre-agreement baseline. Using a multi-week reference period avoids reliance on a single week, which may be sensitive to volatility in weekly strike occurrence. The main analysis focuses on union-organized strikes; results for non-union strikes are

[26] Agreements concluded by other parties do not define events in the baseline specification. In 91 percent of event cells, the first union-negotiated agreement is also the first agreement of any kind.

Figure 4: Event-study results: Union strikes around agreements



Notes: The figure reports event-study estimates of the probability that a union strike occurs in a county-occupation cell relative to the start of the first observed collective bargaining agreement (equation 5). The horizontal axis shows weeks relative to the start of a CBA ($j = 0$). Coefficients are relative to the average strike incidence in weeks -10 to -7. Error bars represent 95% confidence intervals based on standard errors clustered at the county-occupation level.

reported as a placebo in the appendix, since non-union strikes should not exhibit the same strategic behavior in the weeks before a union-negotiated agreement.

Results Figure 4 plots the estimated coefficients for union-organized strikes. Strike activity rises in the weeks leading up to the first observed agreement and declines thereafter. The increase is concentrated in the final weeks before the agreement, consistent with union-organized conflict intensifying during the final bargaining phase. The pattern is more pronounced for offensive strikes[27] specifically, with a significant increase in strike probability in the week preceding the agreement and in the week of the agreement's start date (Appendix Figure F.1b). This is consistent with unions exercising greater control over the timing of offensive strikes.

[27] The Imperial Statistical Office distinguished offensive strikes (*Angriffsstreiks*), initiated by workers to press new demands, from defensive strikes (*Abwehrstreiks*), which responded to employer-imposed worsening of conditions or lockouts.

Non-union strikes and bargaining To assess whether this pattern is specific to organized union conflict, Appendix Figure F.1a repeats the analysis for non-union strikes. Because the event is by construction an agreement negotiated by a centralized union, non-union strikes should not exhibit the same strategic timing in the weeks before it and can therefore serve as a placebo check. Non-union strikes display no comparable increase around agreement start dates. This contrast is consistent with the interpretation that the pre-agreement rise reflects organized bargaining pressure rather than a general increase in local labor unrest.

A complementary check asks whether a comparable pattern exists *within* the non-union sphere: if the pre-agreement rise reflects strategic coordination of conflict and bargaining, it should appear only where an organization capable of such coordination was present. We therefore re-estimate the event study for non-union strikes around the first agreement not negotiated by a centralized union—agreements concluded by local groups of workers or without an identifiable union counterpart, our proxy for localist bargaining. Two findings emerge. First, such agreements are rare, indicating that dispute resolution outside the union movement rarely took contractual form. Second, non-union strike activity shows no systematic increase ahead of these agreements (Appendix Figure F.2). The coordinated strike-then-bargain sequence is thus specific to the centralized unions.

Summary These event-time results complement the main results from the previous section. The event-time pattern adds descriptive evidence on timing: first agreements often emerged after a period of intensified union-organized conflict—a pattern that is harder to reconcile with the view that the Free Trade Unions pursued bargaining as an alternative to conflict than with the view that they used organized conflict as a means of bringing bargaining about.

6.2 Heterogeneity across agreement types and employer settings

A natural question is what kinds of agreements the Free Trade Unions produced in this environment of uncertain legal enforceability. Given this uncertain legal status, an agreement's features likely depended substantially on the parties' own capacity to uphold it. Table 5 therefore distinguishes four types of agreements: those with peace obligations, those with broader local coverage, those confined to a single firm, and those negotiated against employer bargaining associations. We estimate the same instrumental-variable specification as in our main results, varying only the dependent variable; OLS estimates, which show the same pattern across agreement types, are reported in Appendix Table F.1.

Peace obligations The relationship is especially pronounced for agreements with peace obligations (column 1), which were typically tied to fixed-term agreements (Rudischhauser

Table 5: Heterogeneity by agreement type and employer setting

Dep. var.: FTU CBA (dummy)	peace obligation (1)	local coverage (2)	one firm coverage (3)	employer bargaining association (4)
Union share	0.0171***	0.0163***	0.0025*	0.0024
	(0.0039)	(0.0037)	(0.0014)	(0.0022)
Mean dep. var.	0.018	0.019	0.004	0.007
SD dep. var.	0.132	0.136	0.060	0.081
Kleibergen–Paap F	42.71	42.71	42.71	42.71
Anderson–Rubin F	30.30	31.25	3.53	1.20
Control	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓
County FE	✓	✓	✓	✓
Observations	22052	22052	22052	22052

Notes: Unit of observation is a county-occupation pair. Each column reports 2SLS estimates in which Union share is instrumented with distance to the occupation-specific union headquarters, as in Table 4. The dependent variable is a binary indicator equal to one if at least one Free Trade Union agreement of the specified type is observed between 1900 and 1905. Column 1 considers agreements with a peace obligation. Column 2 considers agreements with broader local coverage. Column 3 considers agreements confined to a single firm. Column 4 considers agreements negotiated against an employer bargaining association. Union share denotes Free Trade Union membership as a percentage of employment in 1896. All specifications include county and occupation fixed effects and control for predetermined county-level occupation employment. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

2017, p. 24). These were the most demanding agreements from an organizational standpoint: a peace obligation required the union not only to secure a settlement but to hold its own members to it for the agreement's duration. The Free Trade Unions were thus most strongly associated with the agreements that placed the greatest demands on union organization.

Coverage beyond the firm A similar contrast emerges between broader local agreements and agreements confined to a single firm (columns 2 and 3). Stronger Free Trade Union organization is clearly associated with agreements extending beyond the individual firm, while the firm-level coefficient is smaller, more imprecise, and not statistically distinguishable from zero. The association is thus concentrated in agreements requiring coordination beyond the single firm.

Employer-side organization The association between agreement formation and an organized employer counterpart is not significant (column 4): few of the early agreements

were concluded with organized employers and the estimate is only weakly identified, the OLS in Appendix Table F.1 confirms the pattern (employer bargaining association only weakly significant at the 5% level, see column 4). This fits accounts emphasizing that employer associations emerged to resist union recognition rather than to facilitate it (Schönhoven 1981, p. 180), and the later timing of systematic anti-union organization after the 1904 Crimmitschau strike (Ullmann 1981, p. 194-195). Column 4 captures the counterparty in concluded agreements rather than employer centralization directly, but both patterns point the same way: in the pre-war period, centralized employers were largely not yet part of the emerging bargaining system.

Summary Taken together, the heterogeneity results point to a consistent pattern. Free Trade Union strength is most strongly associated with the agreements that were broader in scope and more binding in character; the associations are weaker and not statistically distinguishable from zero for firm-level agreements. The pattern is consistent with the Free Trade Unions supplying the organizational capacity to make demanding agreements hold. What is more, unions are associated with the kinds of bargaining arrangements that later became central to the German model of industrial relations.

7 Conclusion

This paper has examined how the social-democratic strategy, embodied in the Free Trade Unions, contributed to the first systematic push toward collective bargaining in Germany. Four pieces of evidence underpin the argument. First, disputes supported by the Free Trade Unions were larger, longer, and less likely to fail than disputes organized locally, and they displayed a distinctive capacity to coordinate collective action across workplaces. Second, stronger Free Trade Union organization in the years preceding the systematic recording of bargaining raised the likelihood that agreements emerged. Third, the temporal pattern of strike activity around the first observed agreements points to intensified union-organized conflict in the final weeks before a settlement. Fourth, this relationship was concentrated in binding and broad agreements. Centralized employers were largely not yet part of this emerging bargaining system: few early agreements were concluded with organized employers.

Taken together, these findings describe a specific institutional pathway. The Free Trade Unions were able to sustain collective action at scale and translate that pressure into formal bargaining in ways that rival approaches within the labor movement did not. Radical currents were committed to autonomous local mobilization but were outperformed on the very dimensions of collective action their approach prioritized. Catholic and liberal unions were oriented toward negotiation but rarely appeared as bargaining parties. What set the Free Trade Unions apart was not an absence of conflict but the ability to organize

conflict in ways that supported durable agreements.

In the German case, the processes documented here help explain two features that would later define the country's industrial-relations system. First, the Free Trade Unions' dominance within the labor movement helps explain why Carl Legien, their leader, emerged as the union signatory of the Stinnes-Legien Agreement of 1918, which established collective bargaining as a central pillar of modern German industrial relations. Second, the Free Trade Unions' strength lay in producing broader and more enforceable agreements, foreshadowing the orientation toward sectoral and multi-firm bargaining that remains a defining feature of the German model today (Jäger, Noy, and Schoefer 2022). Both features have roots in the process analyzed in this paper.

More broadly, within the labor movement, different approaches produced varying capacities to sustain and direct conflict, and it was the approach combining organized pressure with the ability to commit to and uphold agreements that helped institutionalize bargaining. Strategic divisions within a labor movement can therefore shape whether conflict remains episodic or becomes embedded in bargaining institutions.

The strategic divisions documented here were not unique to Germany. Around 1900, labor movements across the Western world were divided among broadly similar currents – a social-democratic mainstream, a radical or syndicalist wing, and confessional or liberal moderates – yet these movements gave rise to markedly different bargaining institutions. Why similar starting points produced such different systems is an open question. The micro-level approach developed here offers one way to study how within-movement competition, in interaction with employers and the state, shaped institutional outcomes across countries.

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- 1903: Kaiserliches Statistisches Amt (1904)
- 1904: Kaiserliches Statistisches Amt (1905)
- 1905: Kaiserliches Statistisches Amt (1906c)

Collective bargaining agreements

- List of CBAs: Kaiserliches Statistisches Amt (1906b)
- CBAs with content: Kaiserliches Statistisches Amt (1906a)

Free Trade Unions

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- Headquaters in 1894: Generalkommission der Gewerkschaften Deutschlands (1894) and Schönhoven (1980)
- Headquaters in 1877: Knaack and Schröder (1981)

Occupation census

- 1895: Kaiserliches Statistisches Amt (1898)
- 1907: Kaiserliches Statistisches Amt (1910)

Figure A.1: Excerpt from the administrative strike records, original source

II. 46 — 1. Die einzelnen Streikfälle des Jahres 1903

Laufende Nummer	Bezeichnung des Betriebes / Ort des Streiks	Beginn des Streiks	Beendigung des Streiks	Dauer (in Tagen) des Streiks	Die betroffenen Betriebe: Zahl der vom Streik betroffenen Betriebe	Die betroffenen Betriebe: Zahl der durch den Streik zu völligem Stillstand gebrachten Betriebe	Bei Ausbruch des Streiks waren Arbeiter beschäftigt: in den betroffenen Betrieben überhaupt: Gesamtzahl	in den betroffenen Betrieben überhaupt: Personen unter 21 Jahren	in den innerhalb dieser Betriebe ausschließlich vom Streik ergriffenen Beschäftigungsarten: überhaupt	darunter Personen unter 21 Jahren	Beschäftigungsart	Höchstzahl der während der Dauer des Streiks gleichzeitig streikenden Personen: überhaupt	darunter Personen unter 21 Jahren	Von den Streikenden waren: zur sofortigen Arbeitsniederlegung berechtigt	darunter Personen unter 21 Jahren	kontraktbrüchig	darunter Personen unter 21 Jahren	Höchstzahl der am Streik nicht beteiligten, aber infolge desselben gezwungen feiernden Arbeiter	Die: den Arbeitslohn und zwar: Aufrechterhaltung der bisherigen (Zeit- und Akkord-) Löhne	Erhöhung der bisherigen (Zeit- und Akkord-) Löhne	Bezahlung bezw. höhere Bezahlung für Überstunden ꝛc.	Besondere Bezahlung von Nebenarbeiten ꝛc.	Sonstiges
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
691	Plattenarbeiter in Gelsenkirchen	3. 9.	12. 9.	9	4	3	26	—	—	—	—	25	—	8	—	17	—	—	—	1	—	—	1
692	Bauunternehmung in Aplerbeck	7. 9.	9. 9.	2	1	—	15	1	9	—	Maurer	7	—	—	—	7	—	—	—	1	—	—	—
693	Maler in Wiemelhausen	23. 9.	24. 9.	1	1	—	28	2	—	—	—	11	2	11	2	—	—	2	—	1	—	—	—
694	Maurer in Hagen	7. 10.	8. 10.	1	1	1	15	—	—	—	—	6	—	6	—	—	—	—	—	1	—	—	—
695	Drahtzieher in Werne	15. 10.	14. 1. 04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
696	Bauunternehmung in Hagen	19. 10.	21. 10.	2	1	1	64	—	48	—	Maurer, Handlanger	48	—	48	—	—	—	—	—	—	—	—	1
697	Bauunternehmung in Hagen	26. 10.	28. 10.	2	1	1	64	—	—	—	—	64	—	64	—	—	—	—	—	—	—	—	1
698	Steinkohlenbergbau in Linden	5. 11.	6. 11.	1	1	—	1 900	459	—	—	—	181	5	—	—	181	5	—	—	—	—	—	—
699	Bauunternehmung in Hagen	16. 11.	17. 11.	1	1	1	71	—	—	—	—	55	—	55	—	—	—	—	—	—	—	—	—
700	Bauunternehmung in Dortmund	20. 11.	25. 11.	5	1	—	37	10	29	9	Maurer	24	9	24	9	—	—	—	—	—	—	—	—
701	Eisengießerei in Dortmund	14. 12.	14. 12.	0	1	—	29	12	12	5	Former	9	3	2	—	7	3	—	—	1	—	—	—
	Reg.-Bez. Kassel																						
702	Schuhfabrik in Hessisch-Oldendorf	24. 11. 02	5. 1.	42	1	—	110	16	—	—	—	31	5	31	5	—	—	—	—	1	—	—	—
703	Malereigewerbe in Kassel	16. 3.	25. 4.	40	62	40	456	78	402	76	Maler, Weißbinder,	402	76	374	66	28	10	—	—	1	1	1	—

Notes: This figure shows an excerpt from the data source of labour strikes, the administrative strike statistics of 1903. It shows the following information on strikes: the location and occupation (column 2), the start and end dates (columns 3–4), and the strike's duration in days (column 5). It also includes the number of firms affected and the total number of firms in the occupation (columns 6–7). Data on the number and type of workers employed is listed in columns 8–12, while columns 13–18 show the number of workers on strike simultaneously. Additionally, column 19 details the number of workers forced to cease work. Lastly, columns 20–24 outline some of the demands made during the strike, specifically those related to wages. Each row corresponds to an individual strike.

Figure A.2: Example for the newspaper from the metal workers, original source

Zur Beachtung.

Zuzug ist fernzuhalten:

von Eisfeuren nach **München** (Roth) Str.;

von Drehern nach **München** (Roth) Str., nach **Sorau** (Niederlausitzer Maschinenbau A.-G.), nach **Nürnberg** (Braun) Str.;

von Emaillewaarenarbeitern nach **Duisburg** (W. Buller, Blechwaarenfabrik u. Emaillirwerk) M.;

von Fellenhauern nach **Hamburg** (Firma Walter) R.

von Klaschnern (Klempnern) nach **Brandenburg**, nach **Düsseldorf** (Wortmann & Elbers) Str., nach **Duisburg** (W. Buller, Blechwaarenfabrik u. Emaillirwerk) M., nach **Görlitz** L., nach **Halle**, nach **Lüneburg**, nach **Nürnberg** (Bing) M., nach **Solingen**, nach **Stettin** L.;

von Formern und Gießereiarbeitern nach **Bischofswerda** (F. A. Grose) R., nach **Darmstadt** (Luther Aktiengesellschaft) D., nach **Durlach**, nach **Eberswalde** (Budde u. Göhde) St., nach **Cöthen** (Werkzeug- u. Maschinenfabrik, A.-G., vorm. Aug. Paschen) A., nach **Groß-Auheim** A., nach **Magdeburg-Buckau** (Maschinenfab. Buckau A.-G.), nach **Neustadt a. Hardt** (Reich-Schmitt) St., nach **Nürnberg** St., nach **Sömmerda**, nach **Sorau**, nach **Wittenberg**, Bez. Halle, M.;

von Gürtlern nach **München** (Roth) St.;

von Kesselschmieden nach **Barmen** (Maß u. Hardt) L.;

von Metallarbeitern aller Branchen nach **Breslau** (Waggonfabrik), nach **Elberfeld-Küppersteg** (vorm. Bayer u. Co.) A., nach **Gräfrath** bei Wald (Rheinland), nach **Lübeck** (Schiffswerft Henry Koch und Lübecker Maschinenbau-A.-G.) A., nach **München** (Kohler) D., nach **Crimmitschau** (Kirmse) D., nach **Nürnberg** (Braun) Str., nach **Striegau** in Schl., nach **Mainz** L.;

von Metallbrückern nach **Nürnberg** (Bing) M.;

von Metallgießern nach **Nürnberg** (Bräun) L.

von Metallschlägern nach **München** (St.);

von Planirern nach **Düsseldorf** (Wortmann & Elbers);

von Schleifern nach **Bielefeld** (Bielefelder Nähmaschinen- und Fahrradfabrik, nach **München** (Roth) Str.;

von Schlossern nach **Harthau** i. S. (Drechsler u. Wagner, Geldschrankfabrik), nach **Langerfeld** b. Barmen (Hedmann) D., nach **Nürnberg** (Braun) Str., nach **Paunsdorf** (G. Böttcher) Str.;

von Werkzeugschlossern nach **Breslau** M.

(Die mit St. bezeichneten Orte sind Streikgebiete, **welche überhaupt zu meiden sind**; v. St. heißt: Streik in Aussicht; L.: Lohnbewegung; A.: Aussperrung; D.: Differenzen; M.: Maßregelung; Mi.: Mißstände; R.: Lohn- oder Akkordreduktion; F.: Einführung einer Fabrikordnung.)

Notes: This figure shows an example from the newspaper of the metal workers' union (June 2, 1900).

B Data harmonization

Matching union membership and CBAs

Sources and occupational coverage Union membership data from Hirschfeld (1908) cover 61 occupations for the period 1896–1906, with more limited coverage for earlier years. Employment data from the 1895 occupation census (Statistik des Deutschen Reichs Volume 109) report employment for 161 occupations in the industrial sector.

Troeltsch and Hirschfeld (1905, p. 48-55) provide detailed correspondence tables linking union membership categories to census occupations. In general, we follow their proposed mapping.

Exclusions and sample construction Despite this correspondence, several occupations must be excluded for substantive or data-related reasons:

1. *Non-matchable occupations:* Troeltsch and Hirschfeld (1905) emphasize that for some unions (e.g., sculptors, industrial and commercial auxiliary workers, and engine operators and stokers) a meaningful correspondence with census occupations is not possible. This reflects either incompatible classification schemes or the absence of a corresponding union. In total, this affects 30 of the 161 industrial occupations in the census.

2. *Occupations without unionization:* Some industrial sectors appear to have lacked union members entirely, to the best of our knowledge. This includes all occupations in chemicals (6 occupations), forestry-related by-products, illuminants, fats, oils, and varnishes (5 occupations), and artistic professions (4 occupations).

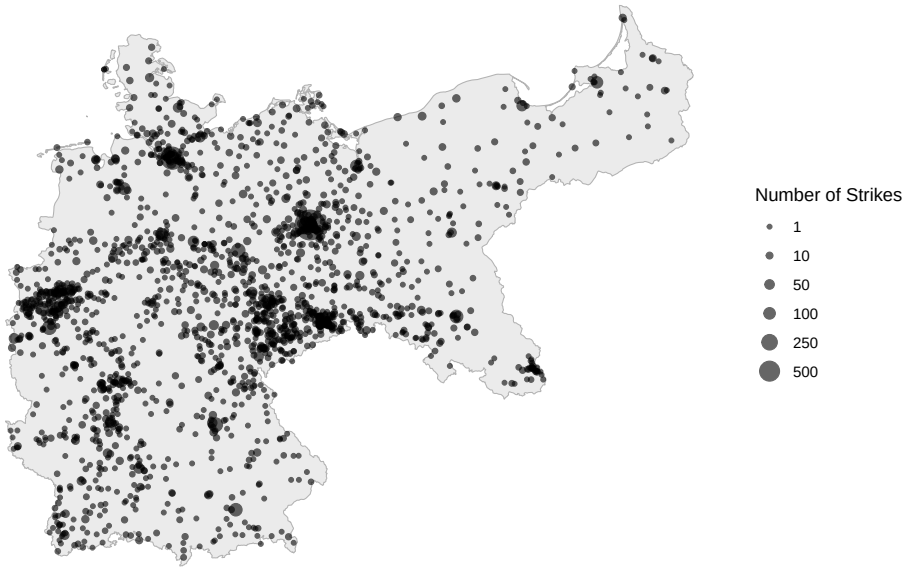
3. *Matched occupations without members in 1896:* For two harmonized occupation categories, matching between union membership and employment data is feasible, but no union members are observed in 1896. As these occupations also lack a union headquarters,required for the instrumental-variables strategy, they are excluded from the main sample.

4. *Missing membership data despite union presence:* For five harmonized occupation categories, unions clearly existed, as indicated by the presence of union headquarters, but membership data for 1896 are unavailable. These occupations are therefore excluded from the baseline analysis.

Final sample After applying these restrictions, the final sample used in the instrumental-variables analysis consists of 24 harmonized occupation categories observed across 999 counties. Counties with zero employment in a given occupation are dropped from the corresponding occupation-specific sample.

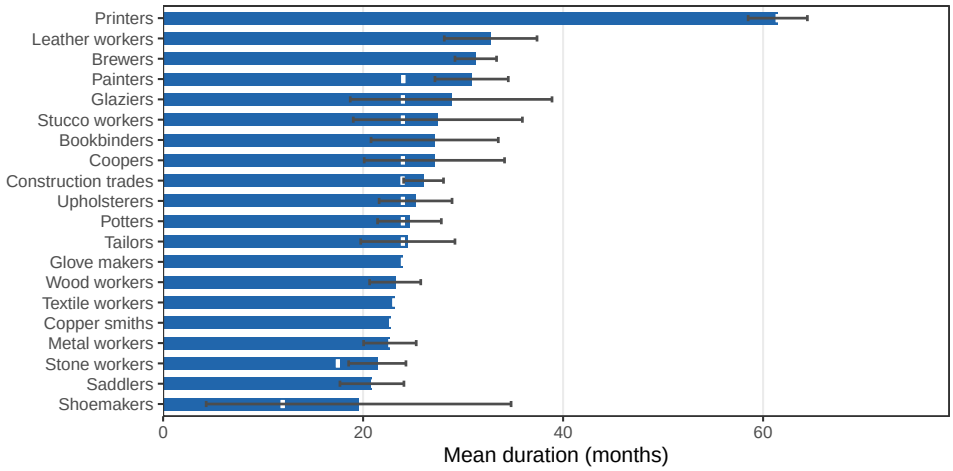
C Descriptive statistics

Figure C.1: Number of strikes and location, 1899-1905



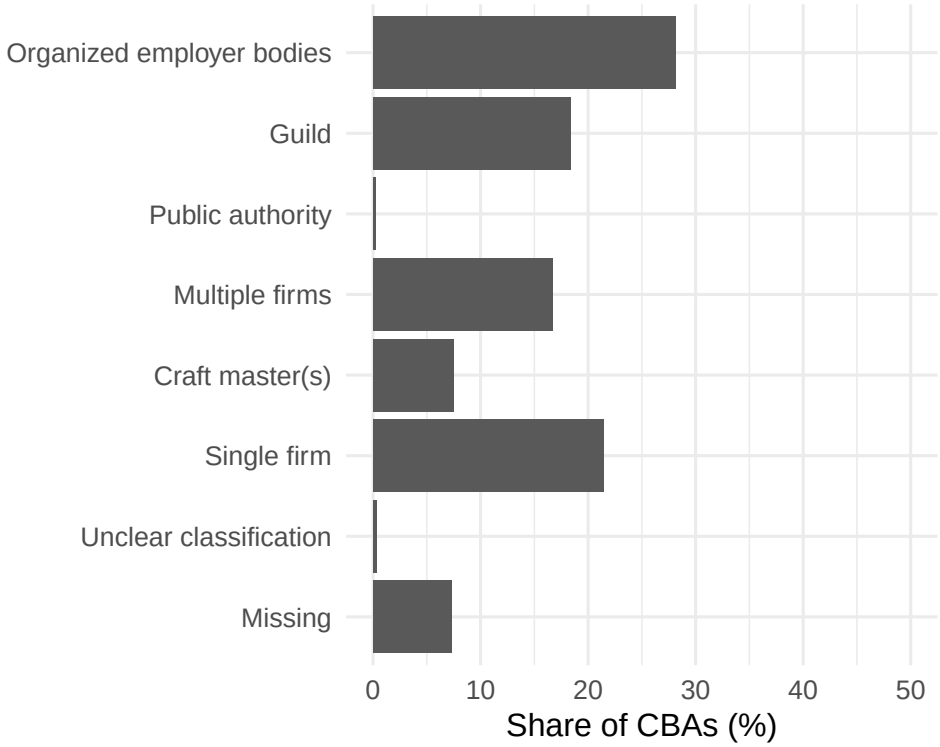
Notes: The map plots the number of strikes in one location over the period of 1899 to 1905. Larger dots indicate more strikes.

Figure C.2: Duration of CBAs



Notes: The figure shows the mean duration of CBAs in months, by occupation. White bars indicate median durations. 95% confidence intervals are shown for all occupations with more than one CBA.

Figure C.3: Employer negotiators and Free Trade Unions



Notes: Figure C.3 restricts the sample to agreements involving the Free Trade Unions and reports the corresponding employer-side distribution. "Multiple" indicates that more than one body negotiated on that side. "Unclear classification" pools cases where the negotiator cannot be identified from the document; "Missing" indicates that the document contains no negotiator information.

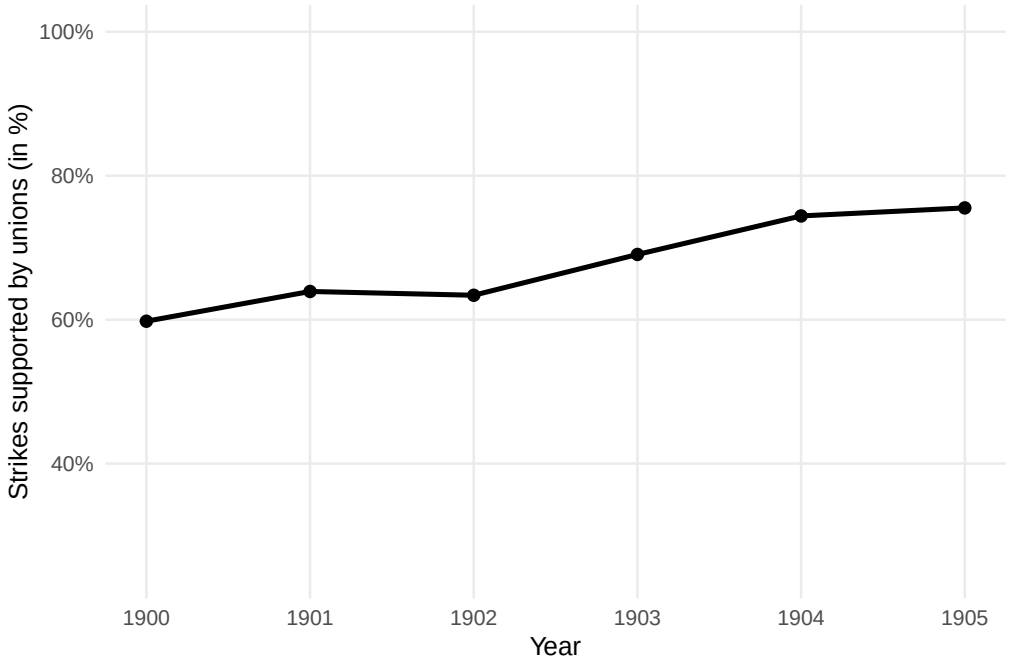
Table C.1: Descriptive statistics

Occupation	Workers	Union members (%)	Strikes per 1,000 workers	CBAs per 1,000 workers
Bakers and confectioners	293,495	0.3	0.19	0.07
Bookbinders	63,703	6.9	1.29	0.17
Brewers	99,206	5.0	1.21	1.62
Construction trades	1,150,659	2.3	2.80	0.27
Coopers	63,943	6.2	1.58	0.19
Copper smiths	13,680	16.7	1.61	0.15
Glass workers	53,131	4.0	1.69	0.00
Glaziers	25,307	4.6	1.54	1.15
Glove makers	16,278	15.4	1.97	0.06
Hat makers	23,816	13.7	1.85	0.00
Leather workers	51,941	7.5	1.39	0.23
Metal workers	1,286,234	2.3	1.09	0.11
Painters	138,890	3.6	1.53	0.44
Porcelain workers	44,527	14.3	0.56	0.00
Potters	51,872	5.1	2.70	1.95
Printers	81,282	25.9	1.05	0.33
Saddlers	76,084	2.4	1.30	0.04
Shoemakers	433,372	2.1	0.46	0.07
Stone workers	175,428	1.4	2.95	0.54
Stucco workers	14,997	3.1	7.67	1.87
Tailors	857,123	1.0	0.29	0.12
Textile workers	1,017,060	1.6	0.51	0.00
Tobacco workers	152,051	9.2	0.72	0.00
Upholsterers	32,697	2.6	3.06	0.70
Wood workers	652,878	4.4	2.26	0.15

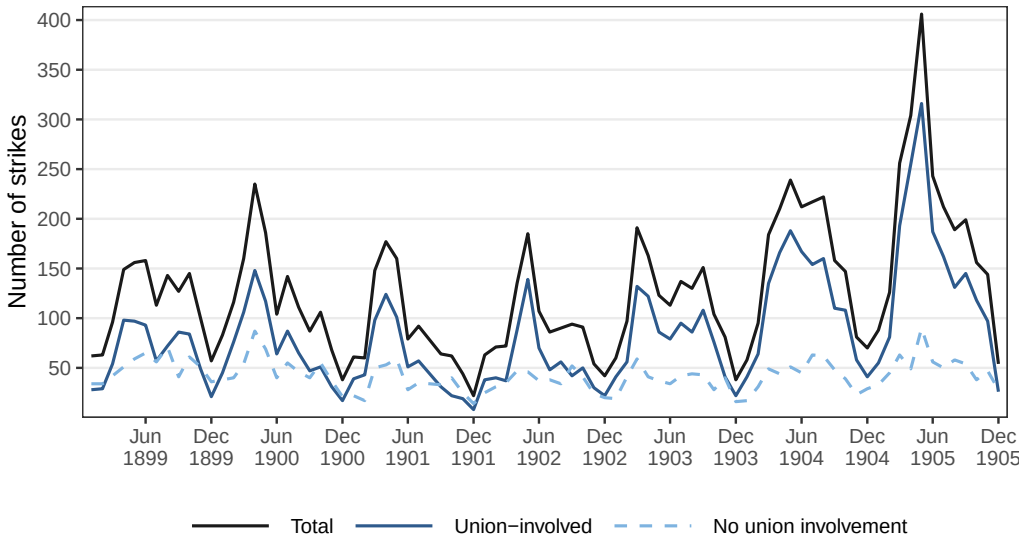
Notes: The table reports the number of workers (column 2), union members, relative to the number of workers in % (column 3), strikes per 1,000 workers (column 4), and CBAs per 1,000 workers (column 5) by occupation.

D Comparison of strategies

Figure D.1: Share of strikes supported by unions



(a) Year



(b) Month

Notes: The figure plots the yearly share of recorded strikes involving unions on the yearly level (Figure D.1a) and monthly strike counts by union involvement on the monthly level (Figure D.1b) in the administrative strike statistics.

Table D.1: Strike characteristics by union involvement, alternative samples

Dependent variable	Strikers (1)	Duration (2)	Participation (3)	Demand CBA (4)	No failure (5)
Panel A: Restricted sample					
Union strike (dummy)	66.816***	10.742***	4.029***	0.086***	0.118***
	(10.390)	(1.055)	(1.043)	(0.013)	(0.025)
Mean dep. var.	67.127	14.252	58.806	0.098	0.553
SD dep. var.	260.486	22.744	29.908	0.298	0.497
R-squared	0.148	0.341	0.216	0.241	0.198
Observations	2734	2734	2734	2350	2734
Panel B: Excluding stronghold of liberal unions (metal workers)					
Union strike (dummy)	60.658***	15.129***	3.608***	0.076***	0.099***
	(8.346)	(1.079)	(0.801)	(0.016)	(0.018)
Mean dep. var.	71.844	20.343	60.097	0.100	0.578
SD dep. var.	232.753	31.387	29.247	0.301	0.494
R-squared	0.209	0.404	0.288	0.288	0.240
Observations	6917	6917	6917	5951	6917
Panel C: Excluding strongholds of Catholic unions					
Union strike (dummy)	63.857***	15.229***	3.602***	0.071***	0.081***
	(10.283)	(1.025)	(0.780)	(0.018)	(0.019)
Mean dep. var.	70.538	20.259	58.451	0.096	0.561
SD dep. var.	248.359	31.945	29.847	0.295	0.496
R-squared	0.172	0.407	0.273	0.271	0.216
Observations	6226	6226	6226	5341	6226
County × occupation FE & quarter FE	✓	✓	✓	✓	✓

Notes: Each column reports a separate fixed-effects regression of the indicated outcome on an indicator for union involvement. All specifications absorb county × sector fixed effects and quarter fixed effects. Panel A restricts the sample to county–sector cells observed in at least two quarters with variation in union presence. Panel B excludes the metal workers sector (*Metallarbeiter*), the primary stronghold of the liberal free unions. Panel C excludes provinces with Catholic majorities in 1900 (Bavaria, Rhineland, Westphalia, Alsace-Lorraine, Baden, Hohenzollern, Posen, and West Prussia), where Catholic trade unions were most active. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table D.2: Strike characteristics by union involvement, alternative FE

Dependent variable	Strikers (1)	Duration (2)	Participation (3)	Demand CBA (4)	No failure (5)
Panel A: County × quarter FE + sector FE					
Union strike (dummy)	56.837***	14.610***	4.228***	0.089***	0.094***
	(11.253)	(0.718)	(0.861)	(0.014)	(0.020)
Mean dep. var.	72.217	20.211	58.182	0.111	0.574
SD dep. var.	237.317	30.302	29.817	0.314	0.495
R-squared	0.211	0.497	0.339	0.305	0.314
Observations	7252	7252	7252	6352	7252
Panel B: Sector × quarter FE + county FE					
Union strike (dummy)	50.367***	17.167***	3.578***	0.073***	0.069***
	(6.629)	(1.053)	(0.770)	(0.009)	(0.016)
Mean dep. var.	71.109	20.950	58.292	0.103	0.567
SD dep. var.	223.017	31.943	29.757	0.304	0.495
R-squared	0.189	0.319	0.242	0.233	0.193
Observations	9305	9305	9305	8113	9305
Panel C: County × sector × year FE					
Union strike (dummy)	70.411***	13.874***	4.511***	0.094***	0.125***
	(14.091)	(0.666)	(0.909)	(0.015)	(0.019)
Mean dep. var.	74.255	19.757	58.636	0.108	0.579
SD dep. var.	245.673	30.119	29.818	0.311	0.494
R-squared	0.225	0.524	0.347	0.346	0.327
Observations	6612	6612	6612	5744	6612

Notes: Each column reports a separate fixed-effects regression of the indicated outcome on an indicator for union involvement. The panel titles describe the FE structure. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table D.3: Strike characteristics by union involvement, alternative clustering

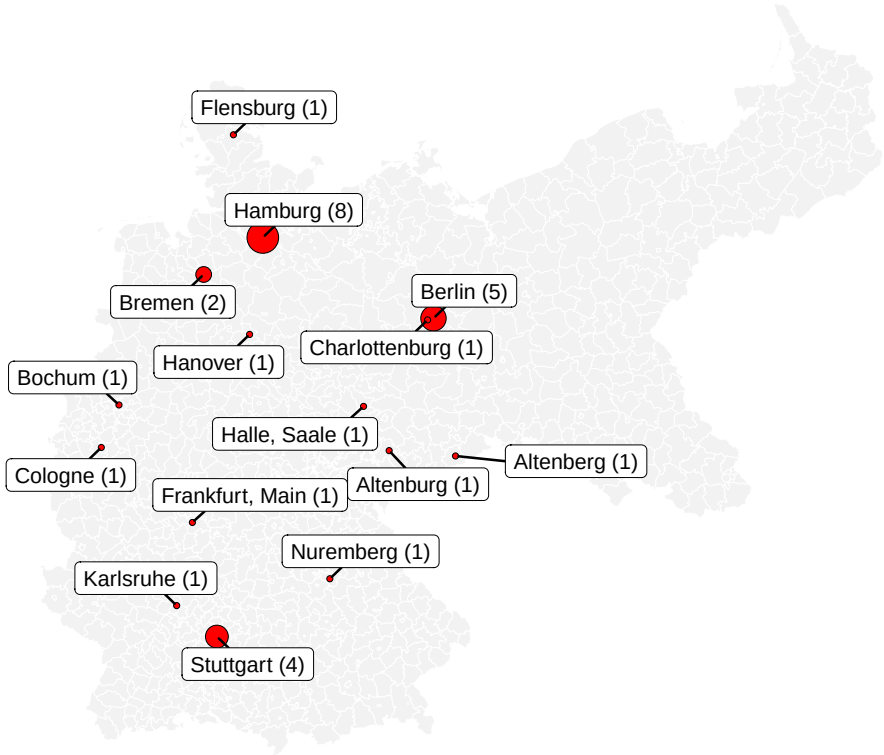
Dependent variable	Strikers (1)	Duration (2)	Participation (3)	Demand CBA (4)	No failure (5)
Panel A: County × occupation FE + quarter FE (full sample)					
Union strike (dummy)	60.902***	16.127***	3.372***	0.075***	0.084***
	(11.058)	(1.106)	(0.605)	(0.022)	(0.026)
Mean dep. var.	72.178	20.729	58.012	0.101	0.567
SD dep. var.	230.326	31.533	29.950	0.301	0.496
County × occupation FE	✓	✓	✓	✓	✓
Quarter FE	✓	✓	✓	✓	✓
County × occupation × quarter FE					
R-squared	0.188	0.391	0.294	0.270	0.226
Observations	8190	8190	8190	7045	8190
Panel B: County × occupation × quarter FE (restricted sample)					
Union strike (dummy)	67.808***	10.895***	3.973***	0.096***	0.130***
	(14.181)	(1.191)	(0.944)	(0.021)	(0.024)
Mean dep. var.	66.143	14.322	58.997	0.099	0.556
SD dep. var.	254.950	22.621	29.789	0.299	0.497
County × occupation FE					
Quarter FE					
County × occupation × quarter FE	✓	✓	✓	✓	✓
R-squared	0.204	0.428	0.328	0.304	0.321
Observations	2866	2866	2866	2467	2866

Notes: Each column reports a separate fixed-effects regression of the respective outcome on an indicator for union involvement. Panel A includes county-occupation and quarter-year fixed effects. Panel B includes county-occupation-quarter fixed effects and is estimated on the restricted sample of county-occupation-quarter cells with at least two disputes and within-cell variation in union involvement. Standard errors are clustered at the county level and the occupation level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

E Union strength and CBAs

E.1 Details instrument

Figure E.1: Location of union headquarters



Notes: This map shows the headquarters of the unions in 1894. In parentheses the number of headquarters in this city.

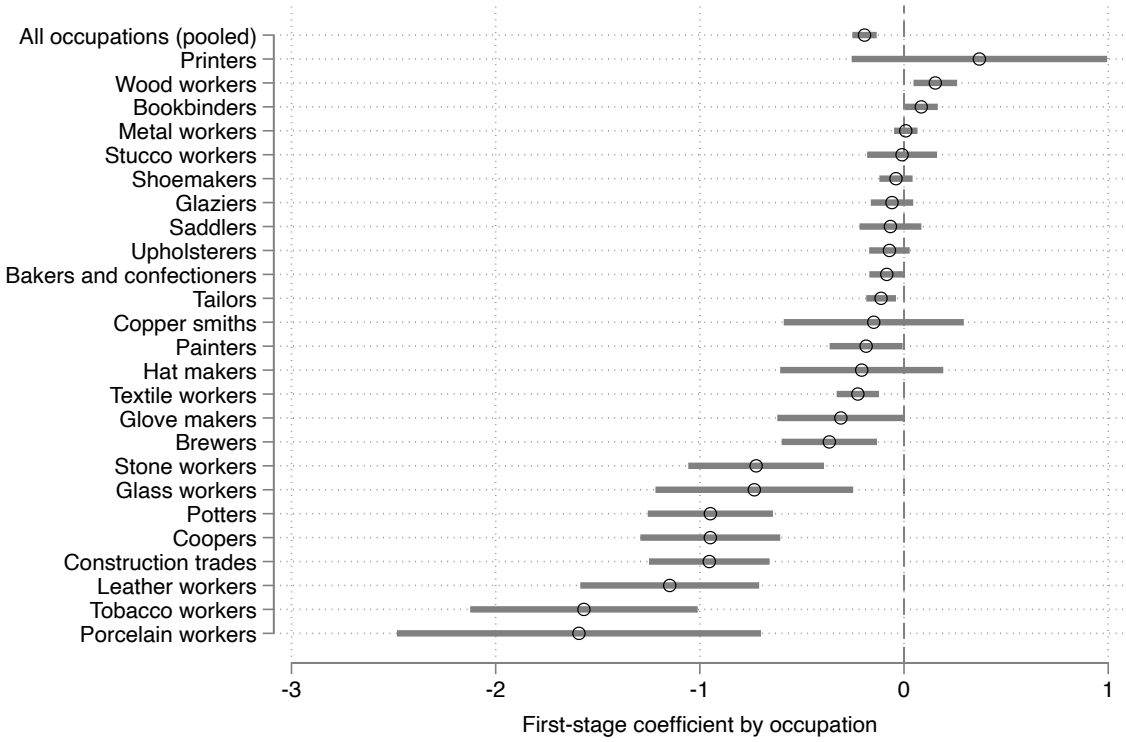
Table E.1: Headquarters of centralized unions

Sector	Headquarter location in 1894
Bakers and confectioners	Hamburg
Barbers	Hamburg
Bookbinders	Stuttgart
Brewers	Hannover
Construction trades	Hamburg
Coopers (barrel makers)	Bremen
Copper smiths	Hamburg
Furriers	Hamburg
Glass workers	Hamburg
Glaziers	Karlsruhe
Glove makers	Stuttgart
Hat makers	Altenburg
Leather workers	Altenberg
Metal workers	Stuttgart
Millers	Halle Saale
Miners	Bochum
Painters	Hamburg
Porcelain workers	Charlottenburg
Potters	Berlin
Printers	Berlin
Roofers	Frankfurt am Main
Saddlers	Berlin
Shoemakers	Nürnberg
Stone workers	Berlin
Stucco workers	Köln
Tailors	Flensburg
Textile workers	Berlin
Tobacco workers	Bremen
Upholsterers	Hamburg
Wood workers	Stuttgart

Notes: The table lists the headquarters locations of Free Trade Unions used to construct the distance-to-headquarters instrument. Headquarters locations refer to the city in which the national union office was located as of 1894, the formative period of union reorganization following the repeal of the anti-socialist laws.

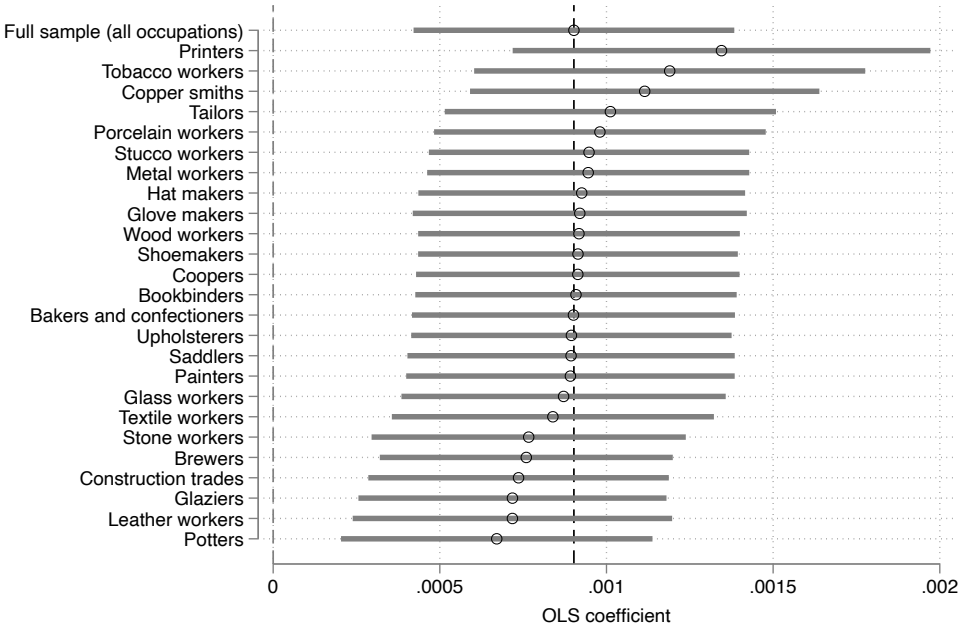
E.2 First stage and reduced form analysis.

Figure E.2: Occupation-specific first-stage relationships

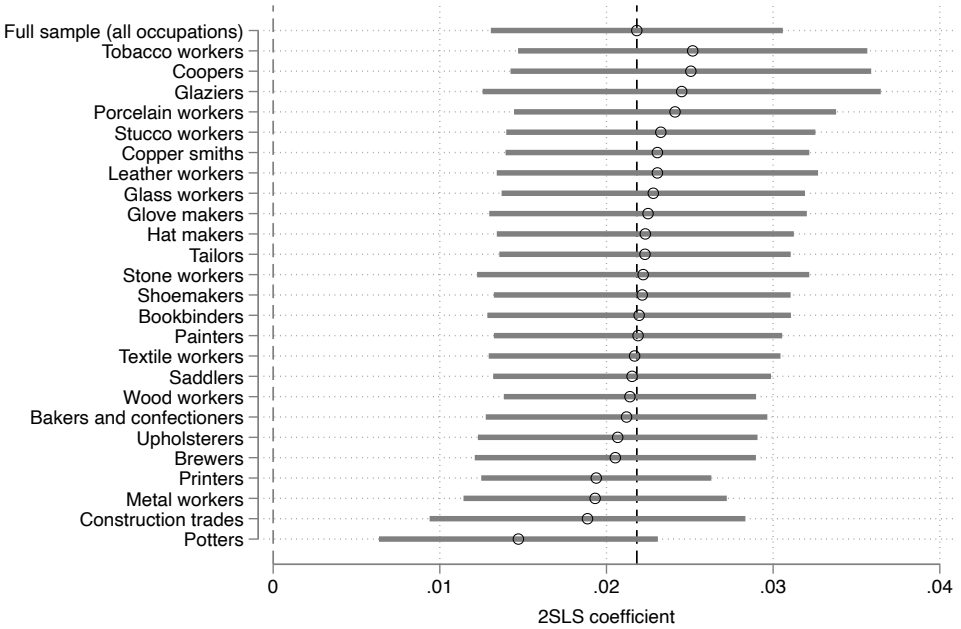


Notes: This figure plots occupation-specific first-stage estimates from regressions of county–occupation unionization in 1896 on distance to the relevant union headquarters. Each point corresponds to a separate regression estimated within an occupation and controls for predetermined county-level occupation employment. The coefficients capture the relationship between proximity to the headquarters (divided by 100) and subsequent union strength (defined as Free Trade Union membership as a percentage of county-occupation employment) within an occupation.

Figure E.3: Leave-one-occupation-out



(a) OLS estimates



(b) 2SLS estimates

Notes: Each panel reports leave-one-occupation-out estimates of the effect of union share (defined as Free Trade Union membership as a percentage of county-occupation employment) on CBA incidence. In Panel (a), coefficients are from the baseline OLS specification with county and occupation fixed effects and predetermined county-level occupation employment controls. In Panel (b), coefficients are from the corresponding 2SLS specification instrumenting union share with distance to the relevant union headquarters. Each point shows the estimated coefficient when omitting the indicated occupation from the sample; error bars denote 95% confidence intervals.

Table E.2: OLS results, all occupations

Dep. var. (dummy)	CBA	
	(1)	(2)
Union share	0.0014***	0.0014***
	(0.0002)	(0.0002)
Mean dep. var.	0.013	0.013
SD dep. var.	0.114	0.114
Control		✓
Occupation FE	✓	✓
County FE	✓	✓
R-squared	0.126	0.129
Observations	37979	37979

Notes: This table reports OLS results using all industrial occupations. Union share is defined as Free Trade Union membership as a percentage of county-occupation employment. All specifications include county and occupation fixed effects. Control refers to predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.3: First-stage results

Dep. var.	Union strength (in %)	
	(1)	(2)
Distance to closest HQ	-0.1945***	-0.1934***
	(0.0296)	(0.0296)
Mean dep. var.	1.899	1.899
SD dep. var.	7.775	7.775
Control		✓
Occupation FE	✓	✓
County FE	✓	✓
Observations	22052	22052

Notes: This table reports first-stage estimates from regressions of county–occupation unionization in 1896 on distance to the relevant union headquarters. The dependent variable is union share (defined as Free Trade Union membership as a percentage of county-occupation employment). Distance to headquarters is measured in kilometers (divided by 100). All specifications include county and occupation fixed effects. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.4: Reduced-form results

Dep. var.	Centralized CBA (dummy)	
	(1)	(2)
Distance to closest HQ	-0.0038***	-0.0037***
	(0.0006)	(0.0006)
Mean dep. var.	0.022	0.022
SD dep. var.	0.145	0.145
Control		✓
Occupation FE	✓	✓
County FE	✓	✓
Observations	22052	22052

Notes: This table reports reduced-form estimates from regressions of collective bargaining agreement (CBA) outcomes on distance to the relevant union headquarters. The dependent variable is a binary indicator equal to one if at least one Free Trade Union CBA is observed in the county–occupation cell. Distance to headquarters is measured in kilometers (divided by 100) and refers to the location of the national union office. All specifications include county and occupation fixed effects. Control refers to predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

E.3 Complier analysis

Table E.5: Compliers – extensive and intensive margin

Dep. var.	Union presence (dummy) (1)	Union membership (in %) (2)
Distance to closest HQ	-0.0088***	0.0618
	(0.0013)	(0.1480)
Mean dep. var.	0.125	15.108
SD dep. var.	0.330	16.875
Control	✓	✓
Occupation FE	✓	✓
County FE	✓	✓
R-squared	0.388	0.583
Observations	22052	2544

Notes: Unit of observation is a county×occupation cell. Column (1) reports first-stage estimates where the dependent variable equals one if any Free Trade Union membership is observed in the county–occupation cell in 1896. Column (2) conditions on cells with positive union presence (defined as Free Trade Union membership as a percentage of county-occupation employment). Distance to closest headquarters is measured in kilometers (divided by 100). All specifications include county and occupation fixed effects and predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.6: Compliers – characteristics

	Mean	Boot.-SE	Proportion	Boot.-SE
whole sample	0.9757	0.0147	1.0000	0.0000
complier	1.5670	0.2427	0.0699	0.0058
never-taker	0.7406	0.0203	0.8229	0.0052
always-taker	2.3940	0.0890	0.1072	0.0025

Notes: Complier, never-taker, and always-taker means of local employment shares and the estimated complier share, computed for the binary specification (union presence instrumented by a close-proximity indicator) following Marbach and Hangartner (2020). The procedure does not incorporate fixed effects; the characterization therefore describes compliers for the binary instrument in levels.

E.4 Threats to identification

Table E.7: Pre-existing union headquarters, first stage

Dep. var.: Union share	(1)	(2)
Distance to closest newspaper hub	-0.0425	-0.0421
	(0.0367)	(0.0367)
Mean dep. var.	2.013	2.013
SD dep. var.	7.878	7.878
Control		✓
Occupation FE	✓	✓
County FE	✓	✓
Observations	12919	12919

Notes: Unit of observation is a county×occupation pair. The dependent variable is the union share (defined as Free Trade Union membership as a percentage of county-occupation employment). The sample is restricted to occupations with an union newspaper in the 1870s.Estimating the reduced form of the main specification on this same restricted sample yields a positive and significant coefficient, indicating that the insignificant first stage reported here reflects the choice of instrument rather than a loss in power. All specifications include county and occupation fixed effects; columns labeled "Control" additionally include predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.8: Placebo outcome: Early labor conflict

Dep. var.	Strike, 1871-1874 (dummy)	
	(1)	(2)
Distance to closest HQ	0.0003	0.0016
	(0.0012)	(0.0011)
Mean dep. var.	0.054	0.054
SD dep. var.	0.226	0.226
Control		✓
Occupation FE	✓	✓
County FE	✓	✓
Observations	9630	9630

Notes: Unit of observation is a county×occupation pair. Columns (1)–(2) use a binary indicator equal to one if at least one strike is recorded in the county–occupation cell between 1871 and 1874, a period that predates both the organizational expansion of the Free Trade Unions and the headquarters network used in the main analysis. Due to data availability, the strike regressions are estimated on a reduced set of occupations. Union share denotes Free Trade Union membership as a percentage of employment. All specifications include county and occupation fixed effects; columns labeled "Control" additionally include predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.9: Robustness 2SLS, sample restrictions

Dep. var.	Donut (exclude within)		Exclude HQ in		Top industrial
	10 km	15 km	Berlin	Hamburg	counties
	(1)	(2)	(3)	(4)	(5)
Union share	0.0270***	0.0245***	0.0082***	0.0167***	0.0172**
	(0.0069)	(0.0089)	(0.0030)	(0.0043)	(0.0083)
Mean dep. var.	0.021	0.019	0.022	0.022	0.051
SD dep. var.	0.142	0.135	0.146	0.146	0.219
KP rk F	27.63	12.56	45.68	32.21	10.96
AR F	41.27	18.94	8.51	23.77	6.55
Control	✓	✓	✓	✓	✓
Occupation FE	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓
Observations	20769	19424	17125	16868	4761

Notes: The table reports robustness checks for the IV estimates that address concerns related to headquarters locations. The dependent variable is a binary indicator equal to one if at least one Free Trade Union collective bargaining agreement is observed in the county–occupation cell. Columns (1) and (2) implement donut designs that exclude counties located within 10 km and 15 km, respectively, of the relevant union headquarters. Columns (3) and (4) re-estimate the specification after excluding occupations whose headquarters were located in Berlin and Hamburg, respectively. Column (5) only includes the top industrial counties for each occupation. All specifications instrument union share (defined as Free Trade Union membership as a percentage of county-occupation employment) with distance to the relevant union headquarters (divided by 100) and include county and occupation fixed effects. Control refer to predetermined county-level occupation employment controls. Kleibergen–Paap rk Wald F-statistics and Anderson–Rubin F-statistics are reported. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.10: Placebo: Instrument and employment growth, 1895-1907

Dep. var.: Employment share growth (in pp)	(1)	(2)	(3)
Distance to HQ	-0.0027	-0.0037	-0.0047
	(0.0020)	(0.0029)	(0.0029)
County FE		✓	✓
Occupation FE	✓	✓	✓
Employment control			✓
Observations	22,052	22,052	22,052

Notes: *Notes*: Unit of observation is a county-occupation cell. The dependent variable is the change in the occupation's employment share within the county between 1895 and 1907 (in percentage points). Distance to headquarters is measured in kilometers (divided by 100). Column (1) includes occupation fixed effects only; columns (2) and (3) add county fixed effects; column (3) additionally controls for predetermined occupation employment share. Standard errors clustered at the county level. *, **, *** denote significance at the 10, 5, and 1 percent levels.

Table E.11: Robustness to controlling for occupation-specific employment growth

Dep. var.: FTU CBA (dummy)	(1)	(2)
Union share, 1896	0.0192***	0.0191***
	(0.0041)	(0.0041)
Mean dep. var.	0.022	0.022
Kleibergen–Paap F	42.71	42.75
Anderson–Rubin F	37.94	37.68
Employment control	✓	✓
Employment-growth control		✓
Observations	22052	22052

Notes: Unit of observation is a county×occupation pair. Union share is defined as Free Trade Union membership as a percentage of county-occupation employment. All specifications include county and occupation fixed effects; columns labeled "Control" additionally include predetermined county-level occupation employment controls. Column 2 additionally controls for the growth in the occupation's county-level employment share between 1895 and 1907. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table E.12: Restricted CBAs, 1903-1905

Dep. var.: FTU CBA (dummy)	(1)	(2)	(3)	(4)
	OLS	2SLS	2SLS	2SLS (binary)
Union share, 1896	0.0007***	0.0110***	0.0113***	
	(0.0002)	(0.0033)	(0.0033)	
Union presence, 1896				0.3414***
				(0.1102)
Mean dep. var.	0.017	0.017	0.017	0.017
Kleibergen–Paap F		42.71	43.33	29.67
Anderson–Rubin F		13.43	14.29	14.11
Employment control	✓	✓		✓
Observations	22,052	22,052	22,052	22,052

Notes: Unit of observation is a county×occupation pair. Union share is defined as Free Trade Union membership as a percentage of county-occupation employment. All specifications include county and occupation fixed effects; columns labeled "Control" additionally include predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Recentered instrument Realized headquarters network may be spatially correlated with the broader geography of the labor movement, so that distance to the relevant union's headquarters partly captures generic proximity to plausible organizing centers (above all Berlin and Hamburg) rather than proximity to the specific occupation's headquarters. If that mechanical exposure drives the first stage, the exclusion restriction is threatened. To address it, the analysis uses a recentered version of the instrument following Borusyak and Hull (2023), which removes the component of the baseline instrument that arises mechanically from this non-random exposure. A key choice is the set of counterfactual assignments. These are drawn from the set of historically realized union-headquarters cities, which represent the locations that were in practice feasible organizing centers during the reorganization of the Free Trade Unions; assigning headquarters to arbitrary cities in the Empire would generate implausible counterfactuals unrelated to the historical problem unions actually faced.

Concretely, the distinct realized headquarters cities form the counterfactual pool, and in each of 1,000 draws every occupation is reassigned to a city sampled from this poolwith its realized city included in the supportso that the counterfactual distance for a county-occupation cell varies across occupations rather than only across counties. The expected distance under these draws is then subtracted from the realized distance, cell by cell. In the terminology of Borusyak and Hull (2023), this expected instrument is the confounding component of the formula instrument, and recentering removes variation driven by non-random exposure rather than by the realized assignment itself. The recentered instrument thus asks whether county c is unusually close to the historically realized headquarters for occupation o, relative to the average plausible alternative from the pool of feasible organizing centers.

Because recentering purges the non-random exposure component by construction, identification need not rely on county fixed effects to absorb it. We therefore report a specification that uses the recentered instrument while omitting county fixed effects.[1] This rests on a stronger exclusion restriction: conditional on the recentered instrument, occupation fixed effects, and controls, distance must be unrelated to agreement formation through any other county-level channel. Recentering therefore serves primarily to confirm that non-random exposure to plausible headquarters locations does not drive the estimate, rather than to provide an independent source of identification. The results are shown in Table E.13

[1] In our data, the recentered and raw instruments share nearly all identifying variation once county fixed effects are partialled out, because the counterfactual pool is common across occupations.

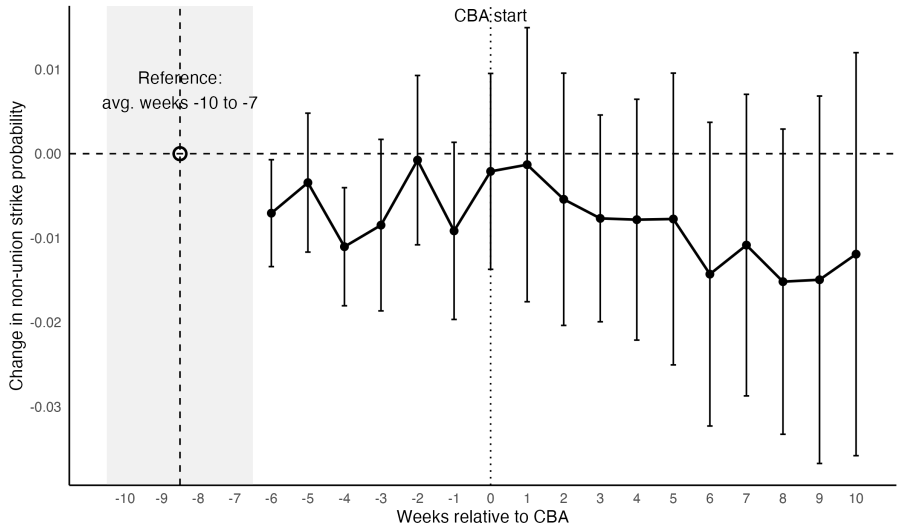
Table E.13: Recentered instrument

Dep. var.: centralized CBA (dummy)	(1) 2SLS	(2) Recentered 2SLS
Union share, 1896	0.0151***	0.0192***
	(0.0018)	(0.0036)
Mean dep. var.	0.022	0.022
Kleibergen–Paap F	86.96	45.64
Anderson–Rubin F	69.06	48.49
Employment control	✓	✓
County FE		
Occupation FE	✓	✓
Observations	22052	22052

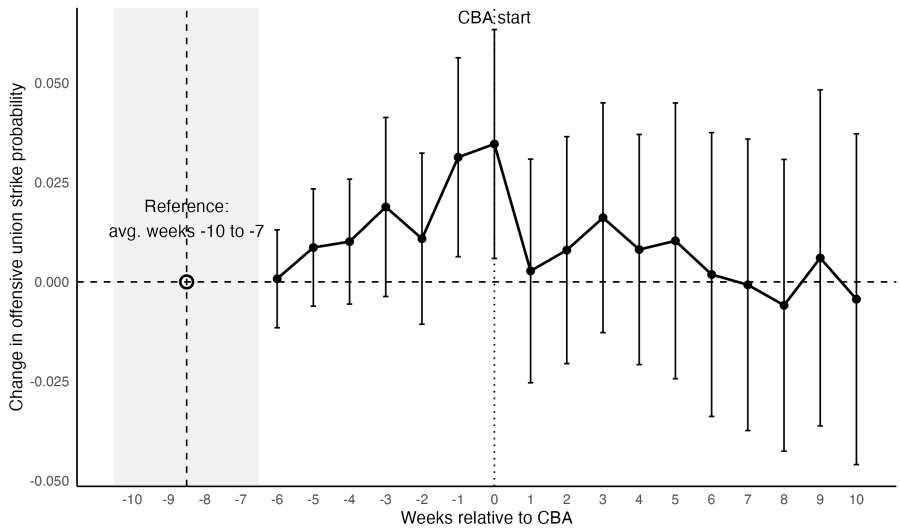
Notes: Unit of observation is a county×occupation pair. Column 1 uses the raw instrument, column 2 the recentered instrument. Union share is defined as Free Trade Union membership as a percentage of county-occupation employment. All specifications include occupation fixed effects; columns labeled "Control" additionally include predetermined county-level occupation employment controls. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

F Mechanism

Figure F.1: Event-study estimates of strike incidence around the start of CBAs



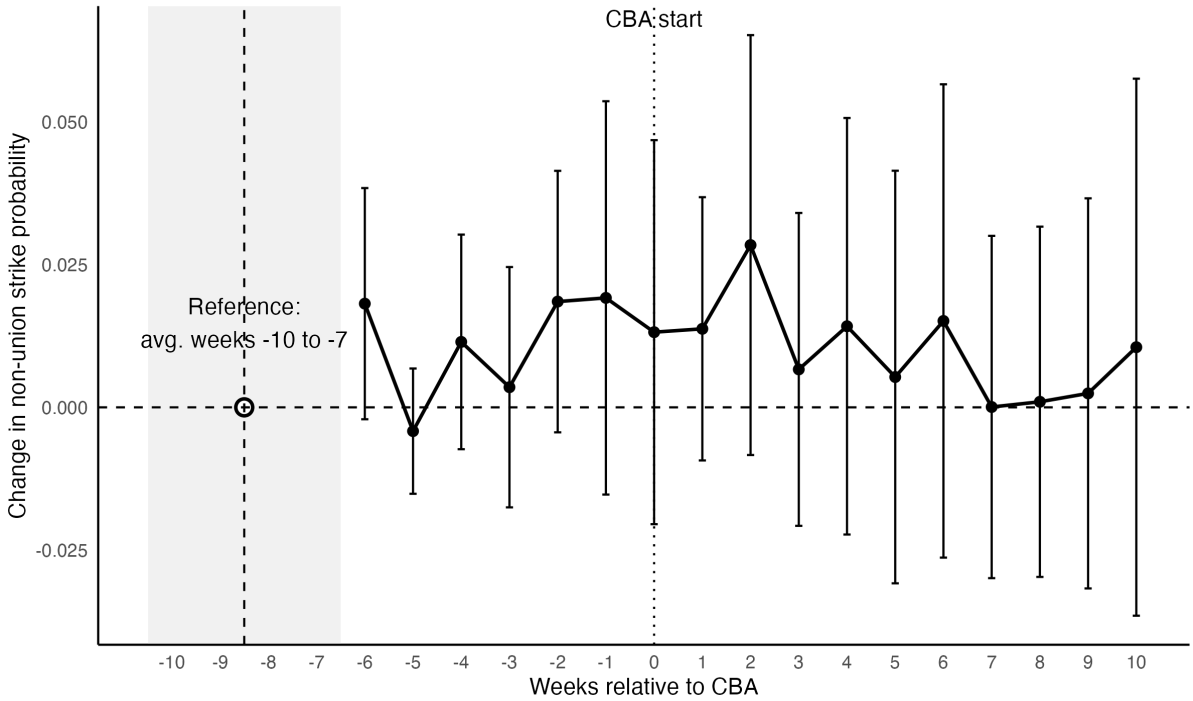
(a) Non-union strikes (1899–1905)



(b) Offensive union strikes only (1903–1905)

Notes: The figures report event-study estimates of the probability that a strike occurs in a county–occupation cell relative to the start of the first observed CBA (eq. 5). The horizontal axis shows weeks relative to the start of a CBA ($j = 0$). Coefficients are relative to the average strike incidence in weeks -10 to -7. Error bars represent 95% confidence intervals based on standard errors clustered at the county–occupation level. Figure F.1a shows results for non-union-organized strikes, utilizing all recorded strikes for the period 1899–1905, while Figure F.1b focuses on offensive union strikes only in a reduced sample (1903–1905).

Figure F.2: Event-study estimates, Non-union strikes around non-union agreements



Notes: The figure reports event-study estimates of the probability that a non-union strike occurs in a county–occupation cell relative to the start of the first observed *not* negotiated by a centralized union (eq. 5). Non-union agreements are defined as those in which no centralized union appears as the worker-side negotiating party, i.e., agreements negotiated by individual groups of workers or with unclear worker-side classification. The horizontal axis shows weeks relative to the start of a non-union CBA ($j = 0$). Coefficients are relative to the average strike incidence in weeks -10 to -7. Error bars represent 95% confidence intervals based on standard errors clustered at the county–occupation level.

Table F.1: Heterogeneity by agreement type and employer, OLS

Dep. var. FTU CBA with	peace obligation (1)	local coverage (2)	one firm coverage (3)	employer bargaining association (4)
Union share	0.0008***	0.0008***	0.0001	0.0003*
	(0.0003)	(0.0002)	(0.0001)	(0.0002)
Mean dep. var.	0.018	0.019	0.004	0.007
SD dep. var.	0.132	0.136	0.060	0.081
Control	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓
County FE	✓	✓	✓	✓
R-squared	0.151	0.171	0.079	0.125
Observations	22052	22052	22052	22052

Notes: Unit of observation is a county-occupation pair. The dependent variable is a binary indicator equal to one if at least one Free Trade Union agreement of the specified type is observed between 1903 and 1905. Column 1 considers agreements with a peace obligation. Column 2 considers agreements with broader local coverage. Column 3 considers agreements confined to a single firm. Column 4 considers agreements negotiated against an employer bargaining association. Union share denotes Free Trade Union membership as a percentage of employment in 1896. All specifications include county and occupation fixed effects and control for predetermined county-level occupation employment. Standard errors are clustered at the county level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

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