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Bargaining power and wages: Collective wage agreements and union membership in Germany

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Abstract: This paper investigates whether workers' bargaining power, which extends beyond union membership to collective wage agreements in Germany, affects the level and distribution of wages at the regional level. We conduct fixed-effect regression analysis and a DFL decomposition on SOEP data from 2014 to 2021 and find, first, that both collective wage agreements and union membership statistically and economically significantly raise wage levels at the national level. Second, and importantly, this effect is regionally heterogeneous: Collective wage agreements continue to be linked to higher wages at the regional level, whereas the relationship is weakened or disappears altogether for union membership. Third, collective wage agreements go along with lower overall wage inequality, while union membership compresses wage inequality mainly at the lower end of the distribution.

SER Keywords: trade unions, collective bargaining, union membership, income, income distribution

JEL classification: D31, J51

1. Introduction

Bargaining power is a key determinant of wages and of the inequality in wages, as socioeconomics has understood for a long time (Ashenfelter and Johnson 1969; Galbraith 2017; Marx 1958). It is institutionalized by the political and welfare state system with its inherent bargaining regime and thus defines the monetary outcome of the relationship between employers and employees (Manow 2020; Streeck 2014). Although labor unions are the core actor in representing the working class and their bargaining position, there are different channels of exerting this bargaining power. These channels are constituted in interaction with the legal and political foundations of the societal system (Moudud 2025).

One of these channels are collective wage agreements, which are negotiated by labor unions within a coordinated framework, discussed politically, and implemented based on the legislative framework. In Western Europe, and especially in Germany, collective wage agreements were an important way in which unions affected wages and their distribution beyond their membership in the post-World War II period (Jäger, Noy, and Schoefer 2022a). However, starting in the mid-1990s, this strong protective character through the system of industrial relation in Germany was disrupted by reforms weakening the collective bargaining coverage, mainly through opening up opt-out possibilities for employers (Bosch 2018a; Ellguth, Gerner, and Stegmaier 2014; Hassel 1999; Jäger et al. 2022a:62). This has led to decreasing coverage rates for collective wage agreements and an increased size of the low-wage sector, further promoted by other free-market reforms in the labor market (Bosch 2018b:19f.; Manow 2020:117ff.).

In theoretical and empirical work, especially in economics, this bargaining power has often been translated into, and operationalized as, unionization rates, typically from a U.S.-oriented vantage point (Card 2001; Farber et al. 2021; Kristal and Cohen 2016). This literature finds a wage premium for union membership (Bonaccolto-Töpfer and Schnabel 2023; Farber et al. 2021), but also significant heterogeneity in the relationship between unionization and income inequality both in the U.S. and across Europe (e.g. Card, Lemieux, and Riddell 2023; Farber et al. 2021; Montebello, Spiteri, and Von Brockdorff 2023). This literature deals with regional variation mostly in the form of cross-country comparison, taking average values for every country as a whole (Herzer 2016; Montebello et al. 2023; Stockhammer 2017; Tridico 2018) thereby neglecting within country differences. Crucially, these analyses do not differentiate between union membership and collective wage agreement coverage (Kaplan and Naidu 2024), although the latter frequently exceeds the former on a global scale (Jäger, Naidu, and Schoefer 2024).

In contrast, in economic sociology and old institutionalist economic thought, bargaining power institutions are understood as inherently shaped through the social, political and legal system

within a country and permeated by power, which are constantly contested and therefore changing over time (Commons 1924; Granovetter 1985, 2005; Moudud 2025; Streeck 1992). However, to the best of our knowledge, this literature does not yet quantify the effects of collective bargaining agreements and union membership. This is the gap that this paper aims to close.

Differentiating between collective bargaining coverage and union membership matters particularly in the case of Germany, where collective wage agreements are negotiated through labor unions, but the individual coverage is independent from a union membership. Labor unions are historically a strong and institutionalized social partner in counterbalancing power and had a tight connection to the German social democratic party (Lehndorff, Dribbusch, and Schulten 2018; Manow 2020). However, this institution came under pressure due to far reaching reforms, and a disempowerment of the legal protective mechanisms (Jackson and Sorge 2012; Lehndorff et al. 2018). Collective wage agreement coverage (Blömer et al. 2023:38f.; Destatis 2025; Lübker and Schulten 2024:10) and union membership rates have been declining in Germany over the past decade (OECD and AIAS 2021), as it is the case in most European countries (OECD and AIAS 2023). Furthermore, collective bargaining coverage and union membership differ in Germany – both historically and currently – not only between the former East and West, but also on the regional level of federal states (Lübker and Schulten 2024; Schnabel 2016:160). This regional differentiation thus exemplifies the different institutional settings in terms of bargaining power. Although there are nationwide regulations, descriptive evidence suggests that bargaining strength develops differently at the regional level. Our argument claims, that the institutionalization of bargaining power gives rise to different power constellations at the regional level due to its social and economic environment, one example is the sectoral distinction. This is also reflected in the different economic performance of the federal states (Lehmann and Wikman 2023), even though Germany covers a comparatively small geographical area.

This study thus aims to take a step towards disentangling union membership and union coverage by empirically assessing the relationships of both collective wage agreements and unionization rates with the level and distribution of wages in Germany. Using data from the Socio-Economic Panel (SOEP) for 2014 to 2021, we first present descriptive analysis of the labor market and socio-demographic differences between individuals covered by a collective wage agreement in comparison to union members. Secondly, using fixed effect regressions, this study finds a statistically and economically significant positive link between both collective wage agreements and union membership on the one hand, and the level of individual wages on the other hand. The estimated effect is stronger for collective bargaining agreements, and it is robust to an alternative operationalization of collective bargaining coverage through the level of codetermination. Breaking the sample down

into five German regions, we also show that the impact of collective wage agreements on individual wages varies geographically, while the correlation between union membership and wages is weaker, when analyzed by region and federal state. Finally, we apply a DiNardo, Fortin, and Lemieux (1996) (DFL) decomposition to compare the impact of collective wage agreements and union membership on the German wage distribution. Again, both of these factors reduce income inequality, albeit through different effects: Union membership compresses the wage distribution by raising wages at the lower end of the distribution, while collective wage agreements tend to reduce inequality by increasing the overall wage level.

The contribution of this study is twofold. First, it demonstrates the relevance of collective bargaining agreements in Germany in theoretically conceptualizing, and empirically operationalizing, bargaining power. Secondly, it emphasizes the relevance of regional differentiation beyond national borders and average values when investigating collective bargaining power theoretically and empirically.

The remainder of this study is structured as follows: Section 2 addresses theoretical and empirical aspects of bargaining power in related international research. Section 3 turns to the features of the German system of industrial relations, and gives an overview of relevant research on Germany. Section 4 derives the hypotheses, delineates the data basis, its operationalization and presents preliminary descriptive evidence. The methodological approach is explained in Section 5, and Section 6 presents the results. Section 7 tests the robustness, Section 8 discusses the results, and Section 9 concludes.

2. Collective wage agreements and unions: Theory and empirics

From a neoclassical viewpoint, unions are *a priori* distortions in competitive labor markets. By negotiating higher wages for members, they create wage premia that exceed marginal productivity, potentially leading to inefficiencies such as reduced employment and resource misallocation (Friedman 2002:124; Hayek 1960:384ff.). In contrast, the monopsony literature argues that unions may counter the power of monopsonistic employers who might otherwise suppress wages, thus leading to more efficient outcomes (Manning 2013:325ff.). Under imperfect competition, the presence of unions can thus reduce employers' profits and increase workers' wages in several ways: First, higher bargaining power of workers may narrow the wage gap between high-skilled and low-skilled workers (Checchi and García-Peñalosa 2008). Second, there may be spillover effects from the wages of union to nonunion workers (Fortin, Lemieux, and Lloyd 2021). These spillovers can be the result of union threat effects, competition in the labor market,

or the establishment of wage norms (Green, Sand, and Snoddy 2022; Jäger et al. 2024; Kahn 1980).

However, economic sociology differentiates these conceptualizations of labor markets by taking institutionalization and power imbalances in bargaining into account. This literature focuses on the institutionalization of the distribution of power in the bargaining position (Korpi 1985:38f.), the influence of networks in constituting a bargaining position (Granovetter 2005:36ff.) and the (changing) conflictual partnership of capital and labor (Streeck 2014:111f.). Institutionalist theories also emphasize regional and sectoral specificities (Pernicka et al. 2021; Streeck 2009) and how the (national) institutional settings impact labor market outcomes (Jäger et al. 2024). This is particularly relevant in Germany, where the decentralization of wage bargaining is partially determined at the sectoral and/or regional level (e.g. Jäger et al. 2022a). With his analysis of the two-faced function of unions as representers of the employees, Freeman (1976) conceptualizes the bargaining process as intrinsically built on (regionally specific) compromises. In his terminology, the (exit-)voice function of unions allows workers to jointly express demands and constitute collective bargaining power, especially at the (local) organizational level (Bashshur and Oc 2015; Freeman 2005; Freeman and Medoff 1984). Different organizational structures form specific configurations of power, interests, and norms (Refslund and Arnholtz 2022).

Against this backdrop, sociological research in this area focuses on the individual bargaining position (Auspurg and Gundert 2015; Kristal et al. 2025) and wage outcomes. With a focus on 16 capitalist democracies from 1960 to 2005, Kristal (2010:746) finds that indicators for workers' bargaining power are correlated with a higher labor share of national income. They also explain rising inequality (in the US) through diminished political and economic power of collective bargaining (Kristal and Cohen 2016) in the vein of Korpi's (1985) power resource approach, where bargaining power is weakened during the neoliberal area (Jacobs and Myers 2014:768f.).

Although macroeconomic indicators, institutional frameworks, and union density may appear similar across countries, collective bargaining processes exhibit significant regional variations. Bhuller et al. (2022) emphasize that bargaining mechanisms differ even in comparable macroeconomic contexts, reflecting the importance of institutional and regional factors in shaping wage-setting practices. Filauro and Parolin (2019) for instance, analyzing data from 2006 to 2014 and focusing on the EU-28 and U.S., suggest that within-state income differences in the U.S. contribute more to overall union-wide inequality than between-state differences. Thus, a common understanding in these studies is that the institutional context and its influence on the

wage setting mechanism play a crucial role in determining relative bargaining power (Agovino, Garofalo, and Cerciello 2019; Guschanski and Onaran 2022; Zwysen 2023).

The idea of understanding collective wage agreements and union density as a part of bargaining power in an institutionalized setting was likewise already prominent within Original (Old) Institutional Economics, which understands the economy as embedded in and shaped by (legal) institutions (Moudud 2025). Concerning the level of individual wages and wage inequality, scholars in this tradition argue that institutional mechanisms are crucial for determining individual economic outcomes. These conceptualizations build on "old institutionalist" economic thought (Commons 1924; Hale 1923; Hohfeld 1913; Veblen 1899). Following this argument of institutional embeddedness, collective bargaining is perceived as rebalancing power in structured labor markets. In this view, employers wield disproportionate wage-setting power, and labor market outcomes are shaped by structural and institutional factors rather than purely competitive forces (Rubery 1978). Organized collective action is challenging systemic inequalities to secure better wages, benefits, and working conditions, confronting employers' opposing interests. Dowrick's (1989) analysis of union-oligopoly bargaining illustrates how collective bargaining exert countervailing power against concentrated corporate market strengths by improving workers' fallback options, their reservation wages. This mechanism contributes to fairer wages and working conditions. In revisiting the original institutional economics, Moudud (2025) reminds economists of the legal foundations of economic relationships and argues more broadly for an institutionally shaped and contested political domain, which determines (every) economic relationship. This view is supported by research which explicitly centers the discussion of employees' bargaining power around the legal foundation and constraints of this relationship (Dukes 2014; Dukes and Streeck 2022; Weinberg 2025).

Empirical work that acknowledges an institutional context shaping the room for maneuver of bargaining power has shown that declining bargaining power – again typically operationalized as union density – is, first, linked to higher wage inequality and, second, to higher functional inequality between wages and profits.

Regarding the first, Farber et al. (2021) provide time-series evidence over the 20th century (1927 to 2017), showing a negative correlation between union density and income inequality in the U.S., arguing that declining unionization has contributed to rising inequality. Similarly, Kristal and Cohen (2017) find that the decline in unionization was a major driver of increased wage and income inequality in the U.S. between 1968 and 2012. For 37 OECD countries, Zsoltl, Gotti, and Sekut (2023) find a statistically significant negative relationship between union density and income inequality, with an even stronger correlation for the share of workers covered

by collective bargaining. Flaherty (2015) also demonstrates that increased unionization reduces the incomes of the top 1% and lowers inequality in 14 OECD countries from 1990 to 2010. Tridico (2018) highlights the weakening of unions as one of the primary causes of growing income inequality in 25 OECD countries between 1990 and 2013. For European countries, Jaumotte and Osorio Buitron (2020) and Keune (2021) find a negative correlation between union density and the income share of the top 10% and the Gini coefficient. However, factors like union representation, broader objectives, minimum wages, and government extensions of collective agreements can qualify this relationship, especially in the EU-27 (Keune 2021).

On the second point, Bengtsson (2014) confirms a positive link between collective bargaining power and the wage share across 16 advanced capitalist economies from 1960 onward. Card (2001), Guschanski and Onaran (2017), and Card, Lemieux, Riddell (2020), show that unionization is positively associated with the wage share for the U.S. and developed OECD nations. Fichtenbaum (2009) and Kristal (2010) find the same for U.S. manufacturing. However, some studies find a mixed or negative relationship, among them Checchi and García-Peñalosa (2008), who suggest that unionization may increase inequality only in some cases, particularly when focused on wage bargaining, and Scheve and Stasavage (2009). More recently, Tober (2022) shows that the relationship between unionization and inequality weakens as EU integration increases. Finally, Herzer (2016) and Montebello et al. (2023) observe substantial heterogeneity in the effects of unionization on income inequality for OECD and European countries. While unions tend to reduce inequality on average, the relationship is u-shaped and varies across countries and time periods (Herzer 2016; Montebello et al. 2023).

To conclude, the empirical research im- or explicitly refocuses on the institutional setting and the politically contested domain in which bargaining power is constituted and legally defined. This understanding is routed in the tradition of economic sociology as well as in old institutional economics. When investigating unions beyond their density, there is evidence that they are linked to higher wages at the individual level, and to lower inequality in wages. With a few exceptions (Farber et al. 2021; Herzer 2016) these analyses focus on the link of the subject studied and do not provide causal evidence. Surprisingly, collective wage agreements are typically not a focus of these analyses despite the attention to the institutional framework. The next chapter argues that understanding collective wage agreements as an inextricable part of bargaining power, which varies not only on a national, but also a regional level, is particular important for the case of Germany due to its legal and institutional setting.

3. Collective wage agreements and unions in Germany

Germany's system of industrial relations is notable for its intermediate level of collective wage agreement coverage compared to other regimes. In Wagner-Systems such as the U.S., Canada, and Australia, union membership and collective wage agreement coverage rates are closely aligned, while Scandinavian countries and France reach nearly full coverage. Germany falls between these extreme cases, due to its strong institutionalization of codetermination rights (Jäger et al. 2024; Jäger, Noy, and Schoefer 2022b). Until the 1990s, the literature interpreted the German model of industrial relations as promoting equity and efficiency by protecting workers' bargaining position, stimulating the investment in their skills and simultaneously enhancing the corporate performance (Streeck 1992). Its dual system of interest representation, combining collective bargaining with works councils (Bosch 2018a:57ff.), exemplifies a model of conflictual partnership in which labor and capital – in the form of unions, employers' associations, and firms – engage within a structured, cooperative framework while maintaining the potential for conflict (Jäger et al. 2022a:60f.).

This system is embedded in the legal and institutional fabric of German industrial relations, including constitutional protections like Article 9(3) of the Basic Law and specific legislation such as the Collective Agreements Act (Tarifvertragsgesetz, TVG) and the Works Constitution Act (Betriebsverfassungsgesetz, BetrVG) (Bosch 2018a:58; Müller and Schulten 2023:241f.). Centralized unions like IG Metall, the metal workers' union and the service-sector union Ver.di remain among the world's largest unions. They have been instrumental in preserving employment and safeguarding industries during crises like the 2008/09 financial recession and the COVID-19 pandemic (Bosch 2018a:63ff.; Jäger et al. 2022a:75).

However, this takes place against a backdrop of weakened collective bargaining coverage and decentralization of wage policies starting in the 1990s (Hassel 1999). This led in turn to a growing low-wage sector, which was further impacted by the far-reaching labor market deregulations in the 2000's (Avdagic and Baccaro 2014:706; Bosch 2018b:19f.; Manow 2020:117ff.).
With regard to collective bargaining, this set of reform implemented the so-called favorability principle, opening or hardship clauses. These derogation clauses permit employers to *not* adhere to collective bargaining agreements on the sectoral or national level based on specific conditions (e.g. Bosch 2018a; Brändle and Heinbach 2013; Ellguth et al. 2014; Jäger et al. 2022a:62). As a result, an increasing number of companies deviates from negotiated collective agreements (Bosch 2018b:24f.). In addition, a process of vertical disintegration, that is, outsourcing of previously in-house production or services and the increased use of external suppliers, weakens the

uniform protection through collective wage agreements and disrupts a common sectoral wage level (Benassi and Dorigatti 2020:1042; Doellgast and Greer 2007:70f.).

In sum, these developments led to a break with the formal centralized and protective system of industrial relations. In response, Germany introduced a statutory minimum wage through the Minimum Wage Act (Mindestlohngesetz, MiLoG) in 2015. Incidentally, the law institutionalizing the minimum wage (Free Collective Bargaining Law or Tarifautonomiestärkungsgesetz) also aims to expand collective agreement coverage and simplify the process for declaring generally binding agreements (Bosch 2018a:67), however with limited success so far.

In theory, these legally binding agreements imply a statutory extension of collective wage agreements, expanding the scope of the coverage of negotiated wage agreements through a so-called "declaration of general applicability" ("Allgemeinverbindlichkeitserklärung"). These declarations could extend wage negotiations between unions and employers' association at the sectoral level to all firms within that sector (Bosch 2018b, 2018a). In practice, however, this mechanism is rarely used at the sectoral level. Instead, this process is applied routinely within German firms, so that employers often extend the benefits of wage negotiations to all employees, regardless of union membership (*erga omnes* clauses). By contrast, a legally binding extension of agreements to all firms in a sector requires a formal declaration from the state under certain conditions, notably if a collective agreement already covers 50% of employees and if the majority of the six-person central bargaining committee (composed equally of employer and union representatives) agrees. Since 2015, general applicability can also be justified on the grounds of public interest (Bosch 2018b:11f.). Although the Free Collective Bargaining Law was intended to simplify this process, there is no mechanism of automatic or mandatory sector-wide enforcement. Expanding the scope of these clauses would require a change in the legal foundation of the institutionalized bargaining power in Germany.

These developments altered the institutional framework of bargaining power. Card, Heining, and Kline (2013) suggest, that institutional changes in the wage-setting process are crucial for the rise of wage inequality. Due to Germany's dual system of sectoral and firm-level bargaining, the degree of collective bargaining coverage differ across federal states and industries (e.g. Lübker and Schulten 2020, 2022, 2024; Müller and Schulten 2023:250). The growth model also plays a role (Baccaro, Blyth, and Pontusson 2022; Baccaro and Pontusson 2016): export-oriented industries and the public sector maintain robust industrial relations with higher rates of collective agreement coverage, while the service sector, particularly in eastern Germany, experiences a decline in both union membership and bargaining coverage. In addition, collective wage

agreements differ historically for white and blue-collar workers (cf. e.g. Jäger et al. 2024:8; Meier 2021:16; with reference to: Meine 2005).

Empirical research on Germany finds mixed results regarding the link between wage levels and bargaining power through three different channels: wage agreements, unionization and workers' representation. Regarding the first channel, Hirsch and Mueller (2020:1143) apply pooled OLS regressions to data from 1994 to 2009 and find that collective bargaining agreements contribute to wage premia of 1.9 log points. Fitzenberger, Kohn, and Lembcke (2006) examine the effects of collective bargaining and firm-level agreements in a cross section for the year 2001 using OLS and quantile regressions, showing that covered firms generally pay higher wages and that union density influences both wage levels and dispersion (Fitzenberger, Kohn, and Lembcke 2013). Addison et al. (2014) analyze firm-level wages from 2000 to 2008 reporting that entering a collective wage agreement increases average wages between about 3% to 3.5%, while leaving one decreases wages between about 3% to 4%.

Regarding unionization, Bonaccolto-Töpfer and Schnabel (2023:12) identify a union wage premium of about 3% beyond the collective bargaining premium using the 2015 and 2019 waves SOEP data, but this does not hold for several groups, among them women. On an individual level, Benassi and Vlandas (2022) show that collective bargaining and especially union membership reduces the risk of receiving low pay with SOEP data in 2015. This result do not hold on the sectoral level: while bargaining coverage offers protection against low pay, union density does not show a statistically significant impact (Benassi and Vlandas 2022:1033). Finally, Jäger, Schoefer, and Heining (2021) do not find a statistically significant impact of worker representation on German company boards on wage setting (Jäger et al. 2021:720).

Regarding empirical research on wage *inequality* and bargaining power, there is likewise a division into different channels: wage agreements and unionization. Concerning the first, Jäger et al. (2024) show that in Germany, compared to the U.S., collective wage agreement coverage rates are significantly higher and more stable across the wage distribution. In their analysis, counterfactually increased coverage to 100% has only minor effects on wage inequality, with minimal reductions in variance and the Gini, indicating that collective bargaining plays a weaker role in reducing wage dispersion (Jäger et al. 2024:63ff.). On the other hand, Hirsch and Müller (2020:1144) find by comparing data from 1994 up to 2009 that the decline in collective bargaining coverage alone explains 14% of the rise in wage premium dispersion.

In contrast, deunionization appears to be linked to widening wage inequality in Germany: From 1995 to 2010, de-unionization accounted for approximately 60% of the changes in the wage

distribution, while shifts in workforce composition explained another 25% (Biewen and Seckler 2019:492). Similarly, Dustmann, Ludsteck, and Schönberg (2009) show that without the decline in unionization in the 1990s, wages - particularly for lower-income workers - would have been higher. From 1993 to 2018, there was a persistent increase in male earnings inequality, while female earnings inequality declined at the bottom due to robust wage growth, whereas inequality at the top rose, particularly among top female earners (Drechsel-Grau et al. 2022).

In conclusion, bargaining power strengthens workers' ability to negotiate higher wages, particularly in imperfect labor markets where employers hold wage-setting power. Empirical evidence from Germany shows that firms covered by collective agreements tend to pay higher wages. While there is strong empirical evidence supporting the idea that bargaining power reduces wage inequality, the effects are not uniform across all contexts. In line with an institutionalized understanding of bargaining power, put forward by economic sociologists and old economic institutionalist, wage agreements, union membership and codetermination are part of the power of employees. This paper contributes to the recent empirical literature by aiming to capture the multifaceted nature of bargaining power by differentiating between union membership and collective bargaining agreements, and by including regional and sectoral variations.

4. Hypotheses, data and descriptive evidence

While union membership remains a key indicator of bargaining power, the literature review and the review of German wage-setting institutions has shown that collective wage agreements are likewise an important factor in determining wages levels and their distribution. This bargaining power is constituted within an institutional setting, that differs on a regional and sectoral level. Therefore, in line with both theoretical considerations and the available empirical evidence, we derive the following hypotheses:

1) Both collective wage agreements and union membership have a positive impact on the level of individual wages in Germany.
2) The impact of collective wage agreements and union membership differ at the regional level in Germany.
3) Both collective wage agreements and union membership have a positive effect in reducing wage inequality in Germany.

This analysis uses the waves from 2014 to 2021 of the German SOEP (2023), which is a high-quality, representative dataset of more than 11,000 private households in Germany (see Goebel et al. 2019 for a description of the dataset). It is particularly suited for the analysis conducted

here since it contains data on individual wages, collective bargaining coverage at the individual level, union membership, as well as a host of socio-economic, individual and firm-level characteristics. We restrict the sample to employees between the age of 18 and 67 with a positive gross monthly wage, thus excluding all those self-employed, in school, in an apprenticeship, in training, and retired. This yields a sample size of 106,785 observations.

The primary dependent variable is income earned through wage labor, which our data provide as the nominal monthly gross wage in Euro. The main independent variable is constructed from the survey question whether an individual is paid according to a collective wage agreement and thus covered by collective bargaining. While the waves of 2014 to 2017 contain several possible answers, including the distinction between a legally binding company wage agreement, a collective wage agreement not legally binding and a legally binding collective wage agreement. From 2018 onwards this is captured as a yes/no response. We therefore code this variable as a binary dummy. We use union membership as an additional explanatory variable, which is also coded as binary.

Our controls cover labor market characteristics on the one hand, and socio-economic variables on the other. In the first category, an important control variable is the sector of employment, since collective bargaining agreements often refer to the sectoral level in Germany, as discussed above. This variable is measured as categorical variable with five aggregated ISIC categories (1. construction, mining, quarrying, electricity, gas and water supply; 2. manufacturing; 3. service sector covering trade, transportation, accommodation and food, and business and administrative services; 4. public sector including public administration, community, social and other services and activities; 5. agriculture. Additional labor market control variables are education, based on ISCED with the categories primary and less, secondary and tertiary; employment status (blue collar, public service, white collar); full-time employment (binary dummy) and marginal employment (also a binary dummy if the wage is below a certain minimum, which was 450 Euro in 2021), a dummy variable for civil servant (public official, "Beamte"), and work experience in full-time work in years. Regarding socio-demographic characteristics, we include gender (binary), the absence of a migration history (binary, including direct or indirect), marital status (binary), age (categorized in 18-35, 36-50 and 51-67), children in household (binary), German citizenship (binary), and region (categories: south, west, north, center, east and in federal states). For a detailed overview of all variables used and their operationalization, see Appendix B). The selected control variables are consistent with commonly used variables in analyses dealing with our research topic.

Using the waves from 2014 to 2021, Table 1 reports the descriptive statistics for the whole sample, as well as comparing employees covered and not-covered by a collective wage agreement. As the last column illustrates, employees with such an agreement earn on average 12% more in gross monthly wages than employees not covered based on a simple regression model. Sector affiliation likewise makes a difference, the service sector and agriculture have a negative correlation with being covered in comparison to the reference category of construction, whereas the public sector has a significant positive correlation.

Table 1: Descriptive statistics for whole sample and by collective wage agreement coverage

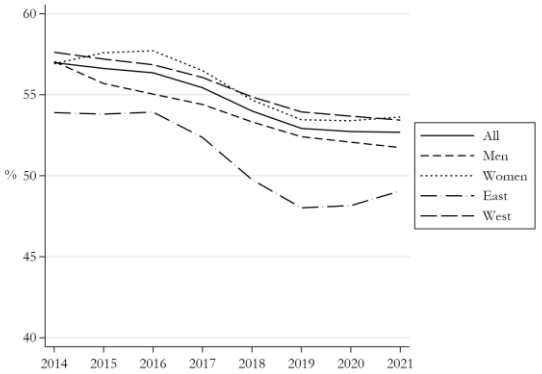
	Whole Sample					With Collective Wage Agreement			No Collective Wage Agreement			Differences	
	Min	Max	Mean	SD	N	Mean	SD	N	Mean	SD	N		
Monthly Wage	1	165000	2815.1	2260.6	106785	2887.1	1649.6	57194	2732.0	2802.4	49591	0.12***	(0.007)
Collective Wage Agreem.	0	1	0.54	0.50	106794								
Union Member	0	1	0.14	0.34	106794	0.20	0.40	57195	0.06	0.24	49599	1.35***	(0.042)
Region													
South	0	1	0.29	0.45	106751	0.29	0.45	57174	0.28	0.45	49577	0.027	(0.028)
West	0	1	0.26	0.44	106751	0.27	0.44	57174	0.26	0.44	49577	-0.12**	(0.041)
North	0	1	0.18	0.38	106751	0.19	0.39	57174	0.17	0.38	49577	0.072*	(0.029)
Center	0	1	0.11	0.31	106751	0.10	0.30	57174	0.11	0.31	49577	-0.18***	(0.035)
East	0	1	0.17	0.37	106751	0.15	0.36	57174	0.18	0.38	49577	0.11***	(0.033)
Labor Market Characteristics													
Construction	0	1	0.06	0.24	105182	0.06	0.23	56511	0.06	0.24	48671	-0.046	(0.050)
Manufacturing	0	1	0.19	0.39	105182	0.18	0.39	56511	0.19	0.40	48671	-0.081*	(0.032)
Service Sector	0	1	0.38	0.48	105182	0.28	0.45	56511	0.49	0.50	48671	-0.88***	(0.026)
Public Sector	0	1	0.34	0.48	105182	0.45	0.50	56511	0.22	0.42	48671	1.07***	(0.028)
Agriculture	0	1	0.03	0.17	105182	0.03	0.16	56511	0.04	0.19	48671	-0.42***	(0.066)
Primary or Less Education	0	1	0.08	0.27	102998	0.07	0.25	55417	0.09	0.29	47581	-0.37***	(0.044)
Secondary Education	0	1	0.63	0.48	102998	0.64	0.48	55417	0.61	0.49	47581	0.11***	(0.027)
Tertiary Education	0	1	0.29	0.45	102998	0.29	0.45	55417	0.29	0.46	47581	0.0090	(0.029)
Blue Collar Worker	0	1	0.22	0.42	105531	0.22	0.41	56719	0.23	0.42	48812	-0.12***	(0.028)
Public Service	0	1	0.07	0.26	105531	0.09	0.29	56719	0.05	0.22	48812	0.65***	(0.050)
White Collar Worker	0	1	0.70	0.46	105531	0.69	0.46	56719	0.72	0.45	48812	-0.10***	(0.026)
Full-time employed	0	1	0.74	0.44	106742	0.74	0.44	57155	0.74	0.44	49587	0.0038	(0.025)
Marginal Employment	0	1	0.06	0.25	106794	0.03	0.18	57195	0.10	0.30	49599	-1.21***	(0.041)
Civil Servant	0	1	0.26	0.44	105157	0.40	0.49	56697	0.10	0.29	48460	1.87***	(0.033)
Work Experience	0	51.42	15.26	12.20	106246	15.82	12.33	56908	14.62	12.02	49338	0.48***	(0.048)
Socio-Demographic Characteristics													
Women	0	1	0.54	0.50	104170	0.55	0.50	55891	0.53	0.50	48279	0.071**	(0.026)
No Migration History	0	1	0.26	0.44	104179	0.25	0.43	55894	0.27	0.44	48285	0.15***	(0.029)
Married	0	1	0.64	0.48	103944	0.65	0.48	55762	0.63	0.48	48182	0.073**	(0.026)
Age: 18-35	0	1	0.24	0.42	106185	0.22	0.42	56877	0.25	0.43	49308	-0.16***	(0.027)
Age: 36-50	0	1	0.42	0.49	106185	0.41	0.49	56877	0.42	0.49	49308	-0.031	(0.023)
Age: 51-67	0	1	0.35	0.48	106185	0.36	0.48	56877	0.33	0.47	49308	0.17***	(0.026)
Child(ren) in Household	0	1	0.47	0.50	106185	0.46	0.50	56877	0.48	0.50	49308	-0.093***	(0.024)
German Citizenship	0	1	0.89	0.32	106414	0.90	0.30	57049	0.87	0.33	49365	0.27***	(0.038)

Note: Dummy variables, except for monthly wage and work experience in years. Differences are based on a regression model of the selected variable (except log(monthly wage)) on the collective wage agreement dummy while controlled for federal state (except by region) and survey year; Robust standard errors clustered at the individual level, standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.00$.
Source: own calculations, data: SOEP (2023).

Figure 1 and Figure 2 show the long-term trends in our two main dependent variables, collective wage agreement coverage and union density in Germany for 2014 to 2021. Figure 1 shows that the coverage of collective wage agreements has declined continuously over the time horizon covered here, from about 57% of employees to about 53% of employees. Women's employment under collective bargaining agreements has consistently exceeded that of male employment since 2015, within a range of approximately 2% difference. By region, the rapid fall between 2016 and 2019 is most noticeable, with a small recovery towards the end of our time period at about 49%. In contrast, about 53% of employees are covered by collective wage agreements in the West in 2021. The gap between West and East German employees with collective wage agreements reaches a maximum of 6 percentage points in 2019.

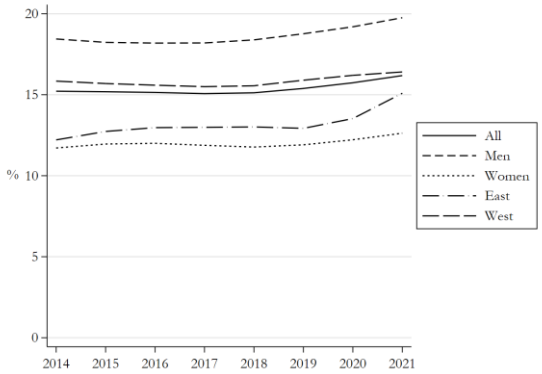
Figure 2 shows that both the level and the trend of union density differs to collective bargaining agreements. Union density amounts to about 14% in our data, rising to about 15% by the end of our observation period. Union coverage is higher for men than for women at about 19% for the former and about 12% for the latter in 2021. Membership in trade unions rises faster in East Germany than in West Germany, almost closing the gap at about 14% versus 15%, respectively, by the end of our time period. These data suggest that collective bargaining agreements have impacts that differ from those of trade unions, and these differences are compounded by gendered and by regional effects. These data tally well with other sources and only differ in an explainable range (Blömer et al. 2023; Destatis 2025; Lübker and Schulten 2024; OECD and AIAS 2023).

Figure 1: Collective wage agreement density in Germany, 2014 to 2021



Note: This figure shows the ratio of employees 18-67 covered by a collective wage agreement relative to total employees with subsamples by gender and region. Cross-sectional weights are applied.
Source: own calculations, data: SOEP (2023).

Figure 2: Union member density in Germany, 2014 to 2021

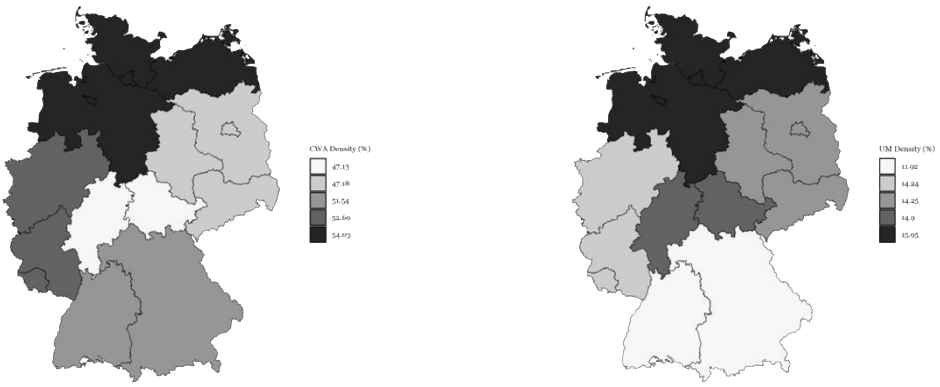


Note: This figure shows the ratio of employees 18-67, which are union members relative to total employees with subsamples by gender and region. Cross-sectional weights are applied.
Source: own calculations, data: SOEP (2023).

As shown so far, the density of collective wage agreements, as well as of union members, differs not only between women and men, but also between east and west in Germany. For additional

differences of these two groups in terms of labor-market and socio-economic characteristics see composition graphs in Appendix A. Figure 3 shows collective bargaining coverage and union membership density in five German regions (North, South, East, West, and Center) in 2021. The North has the highest collective wage agreement coverage and union membership density. The Center has the lowest collective wage agreement coverage at 47%, while the South has the lowest union density. The western part of Germany has a relatively high collective wage agreement coverage rate at around 53%, but a lower union density.

Figure 3: Collective wage agreement and union membership density in Germany, 2021



Note: These figures show the percentage share of employees age 18-67 in 2021 which are covered by a collective wage agreement (left-hand side) and a union member (right-hand side) relative to total employees by regions.
Source: own calculations, data: SOEP (2023).

All in all, the data presented used in this analysis thus indicate, first, that collective wage agreements affect workers' wage, including for individual sub-groups. Second, both the level and the trend of collective wage agreement and of union coverage differ over the time horizon covered in this study. Finally, the groups of employees that are covered by collective wage agreements and those that are union members differ in their composition, especially by region and gender. In the remainder of this paper, we focus mainly on the former.

5. Method: Estimating a collective bargaining effect

5.1 Regression analysis: Collective bargaining and individual wages

To investigate the link between wage and collective wage agreements, we first use a fixed effects model. The baseline specification for individual i at time t is defined as follows:

$$\ln(wage_{it}) = \beta_1 CWA_{it} + \beta_2 UM_{it} + \sum_j ß_j X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

with i = 1 to N, and t = 2014 to 2021. Wage is logarithmized as the dependent variable, CWA is the collective wage agreement dummy, UM stands for the union membership dummy and X denotes the additional control variables that are integrated into the model incrementally, which cover sector, education, employment status, age, marital status, children, and citizenship. Both gender and migration background are covered by the individual fixed effects α_i, which control for all time-invariant unobserved heterogeneity. ε_{it} is the error term under the assumption that $\mathbb{E}[\varepsilon_{it} \mid X_{it}, \alpha_i] = 0$, that is, it is uncorrelated with the independent variables conditional on the fixed effects. All estimations use robust standard errors in the panel data regression.

Because of a positive Wooldridge Test, the model specification accounts for heteroskedasticity in the panel data, and it furthermore corrects for within-panel correlation (autocorrelation), including serial correlation, as well as multicollinearity among closely related control variables through standard errors clustered at the individual level. A clustered robust Hausman test supports the specification as a fixed effect model.

The initial baseline model includes only collective wage agreement coverage as an explanatory variable, followed by a similar bare-bones model for union membership. In the following specification, we include both collective wage agreement coverage as well as union membership as we add controls sequentially to address omitted variable bias by accounting for other potential determinants of wages. The following models thus include labor-market characteristics (sector affiliation, education, employment status, civil servant, and work experience), socio-demographics characteristics (age, marital status, children, and German citizenship), federal states, and the survey year. Adding controls in this step-wise fashion not only shows whether the relationship between collective bargaining agreement and union coverage on the one hand, and individual wage on the other hand are robust, but it also helps distinguish between individual, firm-level, and institutional factors potentially influencing the dependent variable while mitigating omitted variable bias.

In a second step, we investigate the regional variation to which our descriptive data pointed in more detail. We therefore split the sample, first into five regions and then into individual federal states. These model specifications can show the differences for every sample individually and not just the difference of collective bargaining effects, which we would estimate using an interaction term.

5.2 DFL Decomposition: Collective bargaining and the wage distribution

In a third step, we analyze the effect of collective bargaining on inequality following the approach of DiNardo, Fortin, and Lemieux (1996) by relying on the reweighted counterfactual distributions of individual wages based on the probability of coverage by a collective wage agreement and being a union member. These unconditional quantile regressions have the advantage over Kitagawa-Oaxaca-Blinder decompositions that they depict the entire distribution rather than just the mean, and that they estimate the effect of controls at specific quantiles of the wage distribution, as our research interest warrants.

Instead of directly comparing different measurements of inequality over time or groups, a DFL analysis constructs a counterfactual distribution by reweighting the observed wage distributions based on the probability of an individual being in a particular group. The general formula to create the weight for a counterfactual distribution is as follows:

$$\hat{w}(X)=\frac{P(C=1 \mid X)}{P(C=0 \mid X)} \times \frac{P(C=0)}{P(C=1)} \qquad (2)$$

where X represents the set of individual and labor market characteristics. C = 1 or C = 0 indicates individuals covered or not covered. $P(C=0 \mid X)$ is the probability of being covered given X, estimated using a simple logit model, with robust standard errors clustered at the individual level including the labor market as well as socio demographic characteristics as already used for the previous regression analysis. $P(C=0 \mid X)$ equals therefore $1 - P(C=1 \mid X)$. $P(C=0)$ and $P(C=1)$ are the overall sample proportions of covered and non-covered individuals to ensure that the overall distribution maintains the correct population proportions. The purpose of the DFL weight is to create a counterfactual distribution that shows what the wage distribution would look like if covered individuals had the same characteristics as those not covered. The counterfactual wage distributions of 100% coverage, of 0% coverage and with the created weight are applied to kernel density estimates, which allows to summarize various income inequality metrics for the different groups, like the Gini, the Atkinson Indices, or the Generalized Entropy (GE). This approach helps to assess the impact of both collective wage

agreements and union membership on wage dispersion, by isolating the role of institutional arrangements while controlling for differences in individual and labor market characteristics for the time period analyzed.

6. Results

6.1 Collective wage agreements and individual wages

This section first shows the results of a fixed effects model regressing collective wage agreement coverage and union membership on individual wages, adding controls sequentially. As Table 2 shows, both collective wage agreement coverage and union membership are statistically significant across all specifications. The effect size is also economically significant: the collective wage agreement bonus amounts to roughly 6% of wages, ranging from about 5,9% to about 8.6%. The union premium is similarly robust in terms of statistical significance, but its effect varies more. It appears to be notably susceptible to the addition of labor market variables (model 3) and socio-demographic characteristics (model 4). In our preferred full specification in model 6, it amounts to about 5.3%.

Table 2: Regression results for collective bargaining power on individual wages

Dependent Variable: Log(wage)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Collective Wage Agreement	0.086***		0.085***	0.059***	0.060***	0.065***
	(0.0074)		(0.0074)	(0.0056)	(0.0056)	(0.0056)
Union Membership		0.10***	0.098***	0.055***	0.053***	0.053***
		(0.013)	(0.013)	(0.010)	(0.010)	(0.010)
Constant	7.59***	7.62***	7.58***	6.55***	6.50***	7.12***
	(0.0040)	(0.0018)	(0.0043)	(0.048)	(0.052)	(0.080)
Labor-market-characteristics	no	no	no	yes	yes	yes
Socio-demographic-characteristics	no	no	no	no	yes	yes
Federal state	no	no	no	no	no	yes
Year	no	no	no	no	no	yes
Observations	106785	106785	106785	100004	99042	99042

Note: Results of panel data fixed effects regression models, incrementally adding control variables; Robust standard errors clustered at the individual level are used; Standard errors in parentheses; Significance levels * p < 0.05. ** p < 0.01. *** p < 0.001.
Source: own calculations, data: SOEP (2023).

For succinctness, we relegate the full regression results including all controls to the Appendix C.1. However, the controls in the full model show the expected effects. Wage is lower in the service sector and in agriculture, returns to education are positive and substantial, blue-collar workers earn lower wages than white collar workers, who in turn are out-earned by public sector employees and in particular civil servants. Regarding socio-demographics, age, work experience,

and citizenship also broadly follow the expected patterns, while, individuals with children in the household show a lower wage compared to those without children.

Overall, these results point to a significant role for collective wage agreement coverage in addition to union membership in determining individual wages. Both imply substantial premia for employees' wages, both individually and jointly, although the effect is remarkably stable for collective wage agreement coverage across all specifications. This analysis thus provides evidence that supports our first hypothesis: Collective bargaining power has a positive impact on the level of wages in Germany.

6.2 Regional variation in collective wage agreements and wages

We turn to the second hypothesis, conjecturing that the impact of collective bargaining power differs at the regional level in Germany, Table 3 shows the results of the full specification of equation (1) (model 6) for five German regions (see Appendix C.6 for full regression table). These regions are subdivided as follows: South (Baden-Wuerttemberg and Bavaria), West (North-Rhine Westphalia, Rhineland-Pfalz, and Saarland), and North (Mecklenburg-Vorpommern, Schleswig-Holstein, Hamburg, Bremen, and Lower Saxony); these regions make up former West Germany. In addition, we define the Center (Hessen and Thuringia); and East (Berlin, Brandenburg, Saxony, and Saxony-Anhalt), covering former East Germany and Berlin. While the coefficients for collective wage agreement coverage are positive and statistically significant in all regions, their magnitude varies. The largest effect size is observed for the Center with the wage premium amounting to about 7.6%, followed by the South and East at around 7%, respectively, while the West and North are lower at about 5.9% and 5.1%, respectively.

In contrast, the effect of union membership is statistically significant only in the Center and the East. The somewhat higher constant in the South, West, and North, which represents the baseline change in wages for individuals who are not covered by collective bargaining, may point to structural differences in labor market institutions or production structures between former East and West Germany. Of course, it is also conceivable that union wage effects are primarily captured through collective wage agreements, rather than individual membership, in the South, West, and North.

Table 3: Regression results for collective bargaining power on individual wages by region

Dependent Variable: Log(wage)	South	West	North	Center	East
Collective Wage Agreement	0.072***	0.059***	0.051***	0.076***	0.074***
	(0.0097)	(0.011)	(0.013)	(0.019)	(0.015)
Union Membership	0.040	0.029	0.038	0.11**	0.079**
	(0.021)	(0.015)	(0.021)	(0.040)	(0.025)
Constant	7.27***	7.06***	7.20***	6.87***	6.76***
	(0.085)	(0.11)	(0.13)	(0.22)	(0.31)
Labor-market-characteristics	yes	yes	yes	yes	yes
Socio-demographic-characteristics	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes
Observations	28362	25951	17664	10429	16636

Note: Results of panel data fixed effects regression models including all control variables as specified in Model 6; Robust standard errors clustered at the individual level are used; The sample is subdivided by region: South includes Baden-Wuerttemberg and Bavaria; Center includes the federal states of Hessen and Thuringia; North-Rhine Westfalia, Rhineland-Pfalz and Saarland constitute the category West; Berlin, Brandenburg, Saxony and Saxony-Anhalt are included in East; and North includes Mecklenburg-Vorpommern, Schleswig-Holstein, Hamburg, Bremen and Lower Saxony; Standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.
Source: own calculations, data: SOEP (2023).

Table 4 shows the same estimation – the full specification of equation (1) – for one selected German federal state for each region (see Appendix C.8 for the full regression table). They reiterate the findings from the five regions in Table 3: The effect of collective wage agreement coverage is large and robust, higher in the Center and East than in the South, West, and North. In contrast, union membership is statistically significant only in the Center and East, and baseline wage as indicated by the constant is lower in these regions.

Table 4: Regression results for collective bargaining power on individual wages by federal state

Dependent Variable: Log(wage)	South: Bavaria	West: North-Rhine-Westf	North: Lower Saxony	Center: Hessen	East: Saxony
Collective Wage Agreement	0.065***	0.062***	0.040*	0.077**	0.10***
	(0.014)	(0.012)	(0.017)	(0.024)	(0.026)
Union Membership	0.043	0.030	0.033	0.16**	0.073**
	(0.025)	(0.018)	(0.028)	(0.058)	(0.025)
Constant	7.13***	7.00***	7.21***	6.80***	6.80***
	(0.11)	(0.12)	(0.15)	(0.28)	(0.30)
Labor-market-characteristics	yes	yes	yes	yes	yes
Socio-demographic-characteristics	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes
Observations	16382	20280	9747	6886	6138

Note: Results of panel data fixed effects regression models including all control variables as specified in Model 6. Robust standard errors clustered at the individual level are used. The whole sample is subdivided by Federal State. This table displays one Federal State of every of the five Regions defined previously. Standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.
Source: own calculations, data: SOEP (2023).

In summary, the results from this section highlight regional differences in the effects of collective bargaining power. While collective wage agreements are consistently positively linked to higher wages of employees, our findings for union membership are mixed. The latter appears to matter more in former East German regions with lower base wage increases.

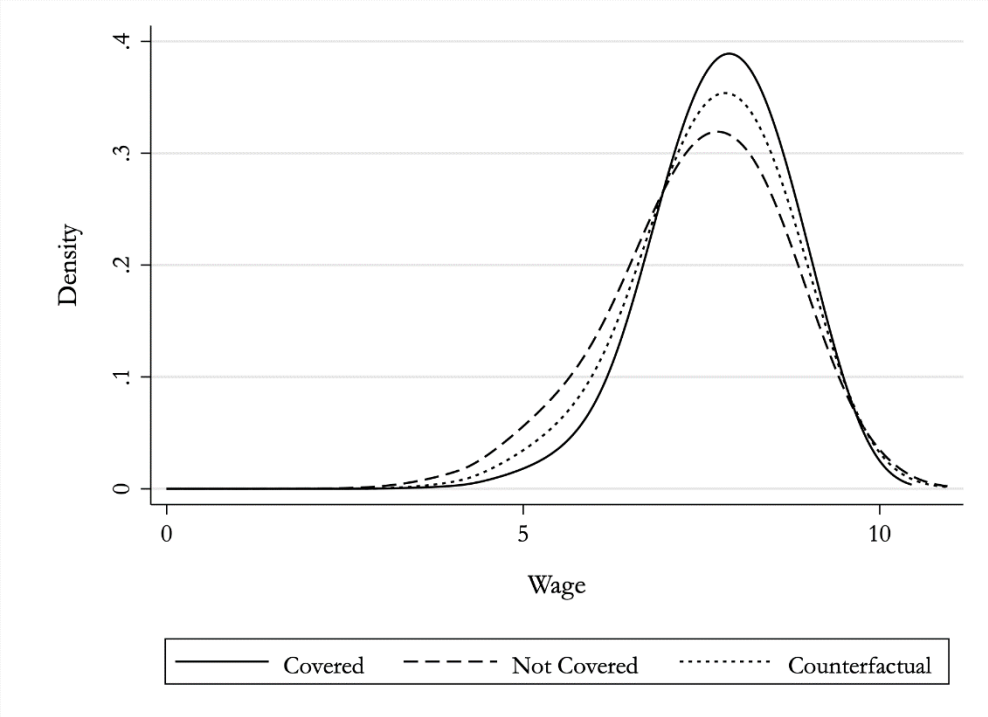
We therefore conclude that this analysis provides evidence for the second hypothesis, which posits that the impact of collective bargaining power differs on the level of federal states in Germany.

6.3 Distributional effects of collective bargaining power

Next, we examine the effect of collective wage agreements and of union coverage on wage inequality using the DFL decomposition, which constructs reweighted counterfactual distribution of individual wages. Our aim is to assess the third hypothesis, namely that collective wage agreements have a positive effect in reducing wage inequality in Germany.

Figure 4 shows the kernel density estimates of the wage distribution for our two groups: employees that are covered (solid line) and employees that are not covered (dashed line) by collective bargaining agreements. The dotted line shows the counterfactual distribution that would prevail if workers without coverage had the same labor market and socio-demographic characteristics as those with coverage. It is clearly discernible that collective wage agreements increase wage, since the solid line is to the right of the dashed line for most points on the x-axis. In particular, lower levels of logarithmic wages appear to benefit the most, and the higher peak suggests that wage distribution is compressed, thus reducing wage inequality.

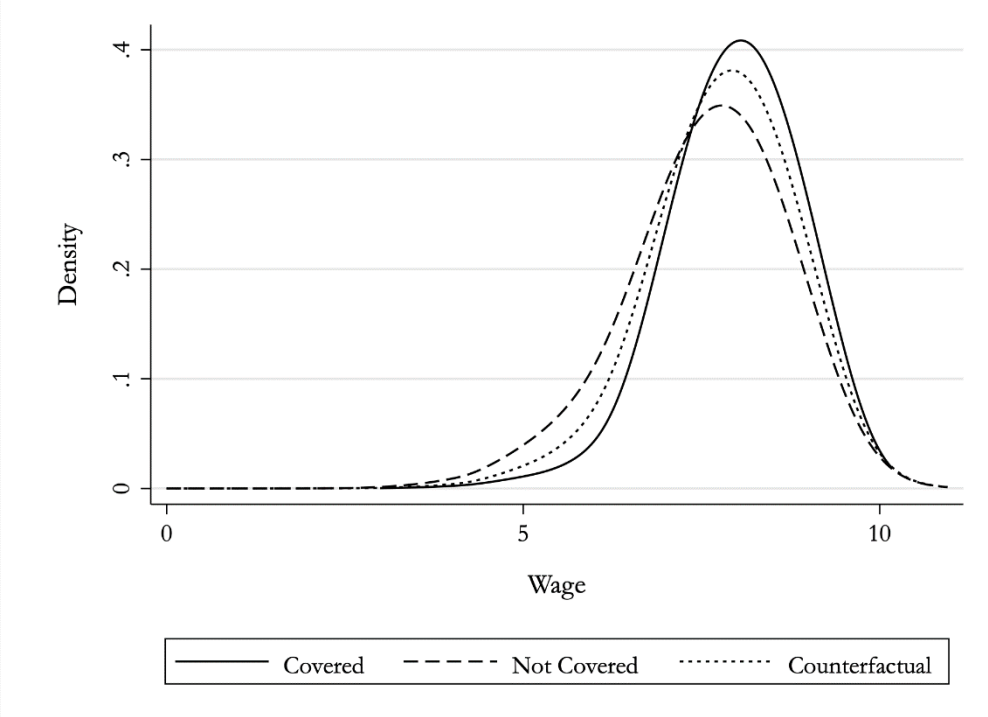
Figure 4: DFL Decomposition for collective wage agreement coverage



Note: This figure shows kernel density estimates of logarithmic wages for three groups: individuals covered by collective wage agreements, individuals not covered, and the counterfactual distribution for workers without coverage with the characteristics of those with coverage. Densities are estimated using a biweight kernel and bandwidth of 2.
Source: own calculations, data: SOEP (2023).

Figure 5 shows the same information for union membership, yielding a very similar picture. Here, too, an equalizing effect is discernible, which appears to be even stronger at the lower end of the wage distribution compared to collective wage agreements. At the same time, the higher peak indicates more wage compression, as well as a distributional shift to the right placing the compression at a higher wage level. Equally to the counterfactual distribution for collective wage agreement, a distribution of those not covered, but with the characteristics of the union members appear to equal out only a part of the differences in wage levels (dotted line).

Figure 5: DFL Decomposition for union membership



Note: This figure shows kernel density estimates of logarithmic wages for three groups: union members, no union members and the counterfactual distribution for no union members with the characteristics of those who are. Densities are estimated using a biweight kernel and bandwidth of 2.
Source: own calculations, data: SOEP (2023).

Table 5 displays selected distributional indicators for those covered, those not covered, and the counterfactual distribution of those not covered with the characteristics of those covered by collective wage agreements and union membership. See Appendix D.1 for a detailed overview of percentiles and all inequality measurements. For collective wage agreements, median wage for covered individuals exceeds that of non-covered individuals, confirming that collective wage agreements are associated with higher wages. The counterfactual median falls between these values, implying that observable characteristics cannot fully explain this difference and that wage-setting mechanisms under collective wage agreements thus account for a part of the wage gap. The mean is lower than the median in both cases, indicating that the data are slightly left-skewed after logarithmization.

Table 5: Distributional statistics and inequality measurements for DFL Decomposition

	Collective Wage Agreement			Union Membership		
	Covered	Not Covered	Counterfactual	Covered	Not Covered	Counterfactual
Median	7.90	7.65	7.78	8.07	7.74	7.91
Mean	7.77	7.47	7.59	7.97	7.58	7.78
Std. dev.	0.70	1.05	0.91	0.63	0.91	0.82
Gini	0.31	0.46	0.39	0.27	0.40	0.34
Atkinson A(2)	0.44	0.70	0.59	0.39	0.62	0.54
p90/p10	5.00	13.49	11.56	3.59	11.56	6.14
p90/p50	1.85	2.76	2.17	1.66	2.26	1.98
GE(0)	0.19	0.44	0.33	0.15	0.33	0.25
GE(1)	0.16	0.37	0.27	0.13	0.27	0.21

Note: DFL Decomposition based on the monthly gross wage in Euros estimated for collective wage agreement (column one to three) and union membership (column four to six).The first four rows report distributional statistics based on the applied panel: 50% percentile (media), mean, standard deviation and variance, followed by Gini and Atkinson index (2), defined as A(e), where e > 0 is the inequality aversion parameter; Percentile ratios and Generalized Entropy indices, defined as GE(a), where a = income difference sensitivity parameter, are displayed in the last four rows.
Source: own calculations, data: SOEP (2023).

Other metrics for the distribution of wages also show that collective wage agreements substantially reduce inequality. The Gini for workers covered by collective wage agreements is much lower than among those not covered, at about 0.31 and 0.46, respectively. The Atkinson indices, which require researchers to make explicit choices regarding inequality aversion, also show that inequality is significantly lower within the group of workers covered by collective wage agreements. We assume here a high weight on lower wages. The 90/10 ratio, which is intuitive by measuring how much higher wages of the top 10% are than those of the bottom 10% of workers. In the group of workers covered by collective wage agreements, the worker at the 90^{th} percentile earns 5 times as much as the worker at the 10^{th} percentile. This ratio rises to about 13.49 for non-covered workers. If the non-covered had the same characteristics as those of the covered workers, then the multiple would still be around 11.56. Finally, Generalized Entropy (GE) indices further illustrate these effects. The GE(0) index, which emphasizes differences at the lower end of the wage distribution, amounts to about 0.19 for workers covered by collective wage agreements and around 0.44 for non-covered workers. The GE(1) index, which weighs all differences equally, shows a similar pattern (0.16 vs. 0.37). All of these metrics thus indicate significant wage compression within the group of workers covered by collective agreements, compared to those not covered. In addition, the counterfactuals suggest that a substantial part of the inequality among non-covered workers remains if observable labor market and socio-demographic characteristics are controlled for.

The second block of columns in Table 5 shows that both median and mean wage for union members is notably higher not only compared to non-members, but also relative to those covered by collective wage agreements, corroborating the well-known union wage premium. However, the counterfactual median and mean suggest that a larger share of this premium is explained by characteristics than for those covered by collective wage agreements.

Wage inequality is notably lower among union members than non-members. The 90/10 ratio amounts to about 3.59 for union members, which is much lower than the about 11.56 observed for non-union members in our data. Here, again, characteristics carry the bulk of the reduction. This pattern is not so strong for the other inequality metrics. In particular, the Gini and the 90/50 ratio, which show changes in the middle and the upper half of the distribution, respectively, react less strongly to union membership, although in all cases inequality is lower for union members than for those covered by collective wage agreements.

To sum up, our findings in this section show clearly that both collective wage agreements and union coverage reduce wage inequality in our data. Union membership appears to have a slightly stronger effect on wage compression, although a substantial share of the reduction in inequality due to characteristics, especially at the lower end of the wage distribution. These results thus indicate that collective wage agreements and union membership are complementary mechanisms in shaping wage structures and reducing wage inequality.

7. Alternative model specifications and robustness checks

We perform a series of robustness checks to investigate the stability of our results. These include, first, an alternative definition of the main explanatory variable using codetermination, second, applying cross-sectional weights, and third, altering the dependent variable for both the fixed effects model and the decomposition.

First, we replace the main independent variable collective wage agreement by a variable capturing codetermination, that is, the institutionalized incorporation of workers in firm management. Firm size defines the extent of codetermination, starting with shop-floor work rights, such as a required works council, and ranging to the legal requirement to allocate at least a third (for firms with 500 to 2000 employees) and up to half of board seats (for firms above 2000 employees) to workers. As the shop-floor work rights start with five regular employees in a firm (cf. e.g Addison 2009; Addison, Schnabel, and Wagner 2001:663), this is the cut off for the first category. The second category of our variable is less precise, because the SOEP has only the category for 200 to 2000 employees, so that we are not able to differentiate further. We therefore use a

dummy variable with the categories 0-4, 5-2000, and 2000+ employees, translating to no codetermination (as reference category), one third or less and parity codetermination, as the best possible approximation to codetermination given our data restrictions.

Table 6 shows that our findings remain remarkably robust. Codetermination is consistently and statistically significantly positively associated with wages, and a stronger form of codetermination leads to higher wage increases.

Table 6: Regression results for codetermination and individual wages

Dependent Variable: Log(Wage)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
One Third or less Codetermination	0.24***		0.24***	0.14***	0.14***	0.12***
	(0.018)		(0.018)	(0.013)	(0.013)	(0.013)
Parity Codetermination	0.32***		0.31***	0.18***	0.18***	0.16***
	(0.020)		(0.020)	(0.014)	(0.014)	(0.014)
Union Membership		0.10***	0.082***	0.032***	0.030***	0.023**
		(0.013)	(0.012)	(0.0084)	(0.0084)	(0.0080)
Constant	7.46***	7.62***	7.45***	6.49***	6.42***	7.24***
	(0.017)	(0.0018)	(0.017)	(0.044)	(0.048)	(0.071)
Labor-market-characteristics	no	no	no	yes	yes	yes
Socio-demographic-characteristics	no	no	no	no	yes	yes
Federal state	no	no	no	no	no	yes
Year	no	no	no	no	no	yes
Observations	106785	106785	106785	100004	99042	99042

Note: Results of panel data fixed effects regression models, incrementally adding control variables; Robust standard errors clustered at the individual level are used; Standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.
Source: own calculations, data: SOEP (2023).

Second, we estimate an alternative specification of equation (1) incorporating cross-sectional weights (and thus excluding fixed effects). This approach accounts for potential heteroskedasticity and ensures that the results are not driven by unbalanced sampling weights in the data. The results remain consistent both with the original specification (see Appendix C.2) and for the subsamples by region and federal state (see Appendix C.7 and Appendix C.9.), leading us to conclude that the findings are robust to our choice of estimation technique.

Third, we replace the dependent variable, which was monthly wage in the main section, by actual and contractual hourly wages both in the fixed effects model (equation (1)) and in the DFL decomposition. In both cases, the results are qualitatively and quantitatively robust: see Appendix C.3 for the fixed effects model, C.4 for the weighted model and Appendix D.2 for the table and Appendix D.3 for the graphs of the DFL decomposition.

All in all, our findings are largely robust to all three changes, which leads us to conclude cautiously that our findings are not sensitive to an alternative definition of our main dependent variable, to our choice of estimation technique, nor to the specification of our dependent variable as monthly rather than hourly wage.

8. Discussion

Our analysis has shown that bargaining power has a positive effect on individual wage levels, both through collective wage agreements and through union membership. Even after accounting for various control variables, the positive effect of bargaining power remains statistically and economically significant. The regression estimations result in a wage premium of 6.5% for individuals covered by a collective wage agreement, and within the wage structure these individuals earn higher median and mean wages than non-covered workers. For union members, we estimate a 5.3% wage premium and union membership likewise accounts for higher median and mean wages compared to the group of non-covered individuals, as indicated through the counterfactual analysis. This fits well with the international and previous German literature (Addison et al. 2014:105; Bonaccolto-Töpfer and Schnabel 2023:7; Hirsch and Mueller 2020:1134).

Our second main finding is that regional variation in the effect of bargaining power on individual wage levels is a key aspect of the German wage setting system: The effect of union membership is smaller and even diminishes when analyzing different German regions. In contrast, the coefficients for collective wage agreement are positive and statistically significant in all five defined regions and translate to a 5.1% wage premium in the North region and up to 7.6% in the Center region for workers under a collective wage agreement. This, again, is in line with descriptive evidence for regional variation in the German federal states (Lübker and Schulten 2020, 2022).

Third, we find that bargaining power is linked to wage inequality: Both collective wage agreements and union membership reduce wage dispersion; particularly union membership does so by acting at the lower end of the distribution. This is in line with the general argument of the literature (Benassi and Vlandas 2022:1033), but the size of our effects are larger than in Jäger et al. (2024) for 2018. This may partly be due to methodological reasons, since Mincer predictors compress wage dispersion; the main difference, however, arises from our broader data basis, which also includes the sectors of health care, social work, and education (Jäger et al. 2024:58).

Although our findings extend the literature in what we consider plausible ways, their limitations should nonetheless be noted. First, distinguishing between industry- and plant-level collective agreements is not possible due to data restrictions, which may obscure additional heterogeneity in coverage. Second, our analysis, like the existing literature, documents correlations and cannot establish causality, since it does not rely on exogenous variation. Therefore, the estimated collective bargaining parameters should be interpreted cautiously. Finally, the usual issues regarding unobservables and selection apply.

9. Conclusion

This paper presented evidence that bargaining power exerts a significant influence on both individual wage levels and wage inequality in Germany. The analysis contributes to the literature by analyzing not only union density but also collective wage agreements and codetermination, thereby capturing additional dimensions of bargaining power. We posit a multifaceted impact of bargaining power: while neoclassical perspectives critique unions for distorting labor markets, institutional theories emphasize their productivity-enhancing and equity-promoting roles. Since wages levels and their distribution are not deviations from a simple equilibrium, but rather a reflection of the division of power between employees and employers, institutionalist approaches in both economics and sociology point to the particular significance of the (legal) framework conditions for the constitution of bargaining power. Our findings show the enduring relevance of bargaining power in shaping equitable labor market outcomes. Even in an era of declining membership of unions, their roles remain vital in addressing contemporary labor market inequalities.

Drawing on old institutional economic thought, this study argues for a broader measurement of workers' power, beyond union density or membership. Using SOEP data from 2014 to 2021, panel data fixed effects regression and DFL decomposition, we find, first, that in general collective wage agreements and union membership have a positive effect on individual wage levels even after accounting for various control variables. However, second, these effects vary by region and federal state. Notably, the coefficients for union membership decline or become insignificant when subsampling different regions and federal states while wage agreements continue to be linked to wages in a regionally disaggregated approach. The regional differences in our analysis illustrate the theoretical considerations of economic interaction being embedded in a specific social and political context. At the same time, they hint at a potential problem when analyzing bargaining power, and in particular union density, solely at the national level. Third, the analysis of counterfactual distributions reveals that both our indicators are negatively associated with wage inequality. Turning to the wage distribution, in contrast to the previously analyzed individual wage levels, the estimations show a structural difference between the two groups. We demonstrate that union membership compresses the distribution particularly at the lower end, whereas wage agreements increase the distribution more evenly and reduce inequality overall. We deduce from this that collective wage agreements and union membership are complementary mechanisms for altering the wage distribution. In line with our theoretical assumption, that they are different channels through which bargaining power is exerted in Germany. Finally, all of our results are robust to alternative model specifications, including the use of the

level of codetermination to alter the independent variables and the use of individual hourly wages to change the dependent variable.

Based on this analysis, we argue that collective wage agreements play a crucial role in determining wages and reducing wage inequality, underlining that union-related power continues to influence labor market outcomes despite declining union membership in absolute terms. Unlike union membership - a voluntary individual decision - coverage under collective wage agreements is not directly chosen by workers themselves. Instead, coverage depends on institutional and legal frameworks, including the mechanism of statutory extension of agreements, which extends collective agreements beyond signatory parties and thereby amplifies their impact. Nonetheless, both union membership and collective wage agreement coverage face collective action problems: union membership depends on the individual worker willing to participate, while collective wage agreements rely on coordinated action and political support to maintain and extend their coverage. Given the demonstrated effects of collective wage agreements in increasing wages and reducing inequality, one way of reducing inequality by affecting the "predistribution" (as opposed to redistribution through taxes and transfers) could be by counteracting the declining trend in their coverage rate. That is, policy measures aimed at reinforcing the statutory extension of collective wage agreements could be critical components in reducing the inequality in the primary income distribution in Germany.

Naturally, multiple avenues for future research remain to be explored. Besides alternative modeling approaches, cross-country analysis of the research subject accounting for regional disparities, and techniques of inequality measurements, one way forward would be to analyze policy variation that exogenously shifts coverage. This is also pointed out by Jäger et al. (2024:77) and conducted by Farber et al. (2021:1376f.) for the U.S. case. Considering the limitation of this empirical analysis, future research could address the challenges of the used operationalizations to replicate and support these findings. Furthermore, this approach to analyze the power of unions in terms of collective bargaining power should be likewise meaningful in more differentiated contexts and units of analysis and therefore a valuable contribution to the existing research.

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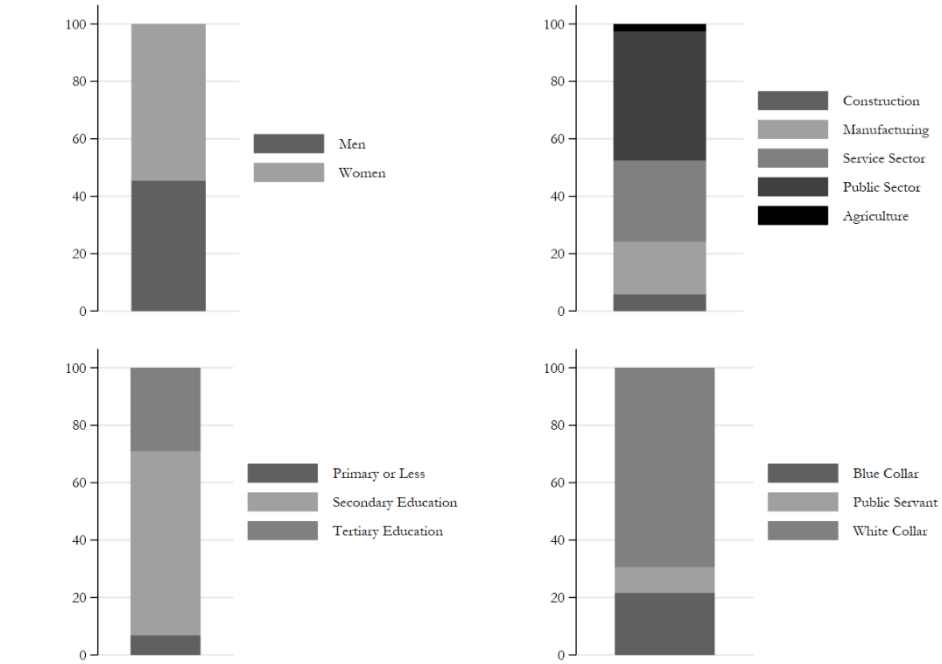
APPENDIX

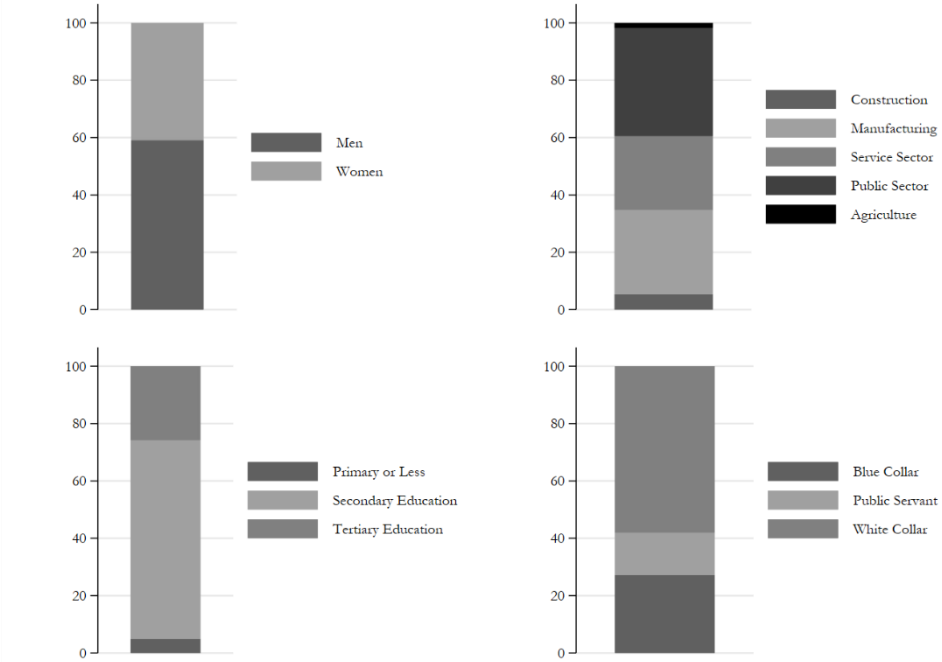
A. Data description: Socio-economic and labor-market characteristics of individuals with a collective wage agreement and of union members

Figure A6: Wage agreement coverage by labor-market and socio-economic characteristics



Note: This figure shows the composition of employees covered by a collective wage agreement based on socio-economic (left side) and labor-market characteristics (right side). Source: own calculations, data: SOEP (2023).

Figure A7: Union membership by labor-market and socio-economic characteristics



Note: This figure shows the composition of employees covered by a collective wage agreement based on socio-economic (left side) and labor-market characteristics (right side). Source: own calculations, data: SOEP (2023).

B. Survey Questions and Variables' Operationalization

Table B7: Overview Variables' Operationalization

Variables	Raw Variable	Explanation / Survey Question(s)	(Recoded) Categories	Remark	Dataset
Individual Wage	pglabgro	Current Gross Labor Income in Euro as generated value: "The variable PGLABGRO represents the current gross labor income of all SOEP respondents who are employed in each respective wave. […] if no individual longitudinal information is available, we base the imputation on a regression using different Mincer covariates, also taking into account current net labor income." (SOEP 2024a)	Numeric Value (in €)	→ Other possible Variables & Reason to decide against: * plc0584 "Lohn Gehalt als Arbeitnehmer € Brutto letzter Monat", only since 2019 * plc0013_h "Bruttoverdienst Vormonat (harmonisiert)", more observations in pglabgro → generated ln(Income) for Regression analysis, excluded Income > 0	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:11)
Hourly Wage (Real & Contractual)	plb0186_h plb0176_h	Hours per week actual: And how many hours do you generally work per week, including any overtime? - [Whole number] Hours per week Contracted working hours: How many hours per week are stipulated in your contract (excluding overtime)? - [Whole number] Hours per week	Numeric Value (in €)	→ Other possible Variables & Reason to decide against: * pgvebzeit "Vereinbarte Arbeitszeit pro Woche" & pgtatzeit "Tatsächliche Arbeitszeit pro Woche", slightly higher cases in harmonized version	PL: Data from individual questionnaires(SOEP 2024c, 2024b)
Collective Wage Agreement	plc0502_h	Collective bargaining agreement for wages: Are you paid according to a collectively agreed wage agreement?	Yes [1] No [0]	→ The waves of 2014 to 2017 contain several possible answers, but the waves from 2018 onwards only give the option of agree (yes) or disagree (no), thats why we are not able to distinguish on the level of collective wage agreement and a binary variable was created. The previous categories are, where 1 to 3 resulted in yes: * [1] Yes, a legally binding company wage agreement. * [2] Yes, paid according to a collective wage agreement that is not legally binding for this sector / company. * [3] Yes, a legally binding collective wage agreement. * [4] No, my job is exempt from the collective wage agreement in place where I work. * [5] No, there is no collective wage agreement. * [6] Don't know → For 2020, values are replaced by the previous or the following year, as there were no data collected. → Because this main independent variable was only asked in 1995 and since 2014 onwards, the time frame of the analysis starts in 2014 to make sure to have a comprehensive dataset.	PL: Data from individual questionnaires (SOEP 2024e)
Union Member	plh0263_h	Trade Union Member: Are you a member of one of the following organizations or unions? - trade union?	Yes [1] No [0]	→ For years in which no values were collected, the values from the previous year or the following year have been used, justified by our relatively short analysis period in which we assume that joining and leaving a trade union does not fluctuate greatly.	PL: Data from individual questionnaires (SOEP 2024f)

Level of Codetermination	pgbetr	Type of Codetermination based on firm size/employees, Question about the number of people employed in the entire company referring to all company sites not just the local branch	Parity Codetermination [3] One Third or less Codetermination [2] No Codetermination [1]	→ This variable describes workers representation in corporate codetermination, although the second category is not precise, as we are not able to differentiate between One Third or Less Codetermination, the categories are based on the following quantity of employees: * Parity Codetermination: more than 2000 employees * One Third or less Codetermination.: up to 2000 employees * No Codetermination: under 5 employees	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:42f.)
Sector	p_nace2	Industry Occupation (NACE Rev. 2, Sector): What sector of business or industry is your company or institution active in for the most part?	Construction (incl. Mining etc.) [1] Manufacturing [2] Market Services [3] Non-market Services [4] Agriculture [5]	→ Own summarization based on aggregated categories of ISIC (International Standard Industrial Classification)	PL: Data from individual questionnaires (SOEP 2024g)
Education	pgisced97	Education ISCED-1997-Classification	Tertiary Education [3] Secondary Education [2] Primary or Less Education [1]	→ Own summarization of the level of Education based on ISCED (International Standard Classification of Education) → Excluded from further analysis: * category "still in school"	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:49f.)
Employment Status	plb0568_h pgstib	Current professional position [harmonized]: What is your current occupational status? / Which job position do you currently hold? Occupational Position	White Collar Worker [3] Public Servant (incl. Judges & Military) [2] Blue Collar Worker [1]	→ Excluded from further analysis: * category "Self Employed" * category "Apprentice/Trainee"	PL: Data from individual questionnaires (SOEP 2024d) PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:17f.)
Employment Full Time	plb0176_h	Contracted working hours: How many hours per week are stipulated in your contract (excluding overtime)? - [Whole number] Hours per week	>= 31 hours [1] <= 30 hours [0]		PL: Data from individual questionnaires (SOEP 2024b)
Marginal Employment	pgemplst	Employment Status	Marginal Employment [1] No Marginal Employment [0]		PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:18f.)
Civil Servant	pgoeffd	Civil servant, asked whether the respondents' employment is in the civil service	Yes [1] No [0]	→ Question for all employed persons	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:39)
Work Experiences in years	pgexpft	Working Experience Full-Time Employment	In years with months in decimal form	→ Generated: pgexpft uses calendar information up to December of the previous year of Individual	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:45ff.)

Gender	sex	Female Gender	Yes [1] No [0]		PPATHL: Person-Related Meta-Dataset (SOEP Group 2024b:12f.)
Migration History	migback	Migration Background	Yes [1] No [0]	→ Categories of direct and indirect migration background are summarized	PPATHL: Person-Related Meta-Dataset (SOEP Group 2024b:28f.)
Marital Status	pgfamstd	Marital Status in Survey Year	Yes [1] No [0]	→ Marital status is describing the institutional status of marriage at the time of the person interview. Marital status is based on information given by the respective person on his or her current relationship as well as on retrospective information about previous relationships asked in the biography questionnaire	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:10)
Age	d11101	Indicates the age of the individual in years	Age: 18-35 [1] Age: 36-50 [2] Age: 51-67 [3] Age: 68 or more [4]	→ Excluded from further analysis: * Category: 68 or more years old	PEQUIV Variables with Extended Income Information for the SOEP (Grabka 2024:15)
Children	d11107	Children in Household	Yes [1] No [0]	→ Indicates the number of persons in the household under the age of 18 at the time of the interview.	PEQUIV Variables with Extended Income Information for the SOEP (Grabka 2024:21)
German Citizenship	pgnation	First Nationality of Respondent: German	Yes [1] No [0]	→	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:6f.)
Region	l11101	German Federal States of respondents' Residence	South [1] West [2] North [3] Center [4] East [5]	→ Regions are defined based on the German federal states and categorized as follows: * South: Baden-Wuerttemberg and Bavaria * West: North-Rhine Westphalia, Rhineland-Pfalz, and Saarland * North: Mecklenburg-Vorpommern, Schleswig-Holstein, Hamburg, Bremen, and Lower Saxony * Center: Hessen and Thuringia → East: Berlin, Brandenburg, Saxony, and Saxony-Anhalt	PEQUIV Variables with Extended Income Information for the SOEP (Grabka 2024:38)
Federal State	l11101	German Federal States of respondents' Residence	[1] Schleswig-Holstein, [2] Hamburg, [3] Lower Saxony, [4] Bremen, [5] North-Rhine-Westfalia, [6] Hessen, [7] Rhineland-Pfalz, [8] Baden-Wuerttemberg, [9] Bavaria, [10] Saarland, [11] Berlin, [12] Brandenburg, [13], Mecklenburg-Vorpommern, [14] Saxony, [15] Saxony-Anhalt, [16] Thuringia	→ This variable indicates the German federal state in which the household was located at the time of the survey	PEQUIV Variables with Extended Income Information for the SOEP (Grabka 2024:38)

East & West Germany	l11102	State of Residence: East Germany	Yes [1] No [0]	→ This variable indicates whether the household was located in the former East or West Germany at the time of the survey	PEQUIV Variables with Extended Income Information for the SOEP (Grabka 2024:39)
Self Employed	pgstib	Occupational Position	Yes [1] No [0]	→ Generated to exclude this group from further analysis * To double check, because so far exclusion already by Age, In School, and Self-Employed based on Employment Status	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:17f.)
Personal Number	pid	The central individual identifier across time is PID, which is fixed over time (and of course datasets).	Numeric value		PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:5)
Survey Year	syear	Year of data collection	Numeric value in years	→ Time period of analysis: 2014 to 2021	PGEN: Person-Related Status and Generated Variables (SOEP Group 2024a:5f.)
Cross sectional weight	w11105	Individual weights to compensate for unequal probabilities of selection and sample attrition are necessary to obtain populations-based statistics.		→ The individual weights also encompass population weights.	PEQUIV Variables with Extended Income Information for the SOEP (Grabka 2024:165)

Note: This table offers an overview of all variables utilized and their original name from the SOEP (see the first and second columns); In addition, the survey question or an explanation of the survey question, as well as the used (recoded) categories of the respective variable, can be found; In instances where further elaboration is necessary, column five offers a commentary on the utilization or operationalization of the corresponding variable. The final column provides the source reference, indicating the specific data set utilized. It is noteworthy that certain variables may be present across multiple data sets from the SOEP - this column indicates which one was used for the present analysis.

C. Regression Analysis

C.1. Regression results – Collective bargaining power and individual wages

Table C8: Complete - Collective bargaining power and individual wages

Dependent Variable: Log(wage)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Collective Wage Agreement	0.086***		0.085***	0.059***	0.060***	0.065***
	(0.0074)		(0.0074)	(0.0056)	(0.0056)	(0.0056)
Union Membership		0.10***	0.098***	0.055***	0.053***	0.053***
		(0.013)	(0.013)	(0.010)	(0.010)	(0.010)
Manufacturing (Ref.: Construction)				0.026	0.026	0.025
				(0.016)	(0.017)	(0.017)
Service Sector (Ref.: Construction)				-0.077***	-0.077***	-0.079***
				(0.017)	(0.017)	(0.017)
Public Sector (Ref.: Construction)				-0.029	-0.029	-0.044*
				(0.021)	(0.021)	(0.021)
Agriculture (Ref.: Construction)				-0.053*	-0.050	-0.052*
				(0.026)	(0.026)	(0.025)
Secondary Education (Ref.: Primary or Less Education)				0.18***	0.17***	0.13**
				(0.046)	(0.046)	(0.046)
Tertiary Education (Ref.: Primary or Less Education)				0.76***	0.77***	0.67***
				(0.061)	(0.062)	(0.061)
Public Service (Ref. Blue Collar Worker)				0.19***	0.19***	0.19***
				(0.041)	(0.042)	(0.042)
White Collar Worker (Ref. Blue Collar Worker)				0.061***	0.059***	0.052***
				(0.0073)	(0.0074)	(0.0073)
Full-time employed				0.12***	0.12***	0.11***
				(0.0074)	(0.0074)	(0.0074)
Marginal Employment				-0.64***	-0.64***	-0.61***
				(0.016)	(0.016)	(0.017)
Civil Servant				0.032***	0.030**	0.028**
				(0.0096)	(0.0096)	(0.0094)
Work Experience				0.043***	0.037***	0.0010
				(0.00076)	(0.00086)	(0.0018)
Age: 36-50 (Ref.: Age: 18-35)					0.11***	0.061***
					(0.0086)	(0.0085)
Age: 51-67 (Ref.: Age: 18-35)					0.15***	0.055***
					(0.011)	(0.011)
Women					0	0
					(.)	(.)
Married					0.024**	0.015
					(0.0088)	(0.0086)
Child(ren) in Household					-0.055***	-0.037***
					(0.0066)	(0.0066)
No Migration History					0	0
					(.)	(.)
German Citizenship					0.062**	0.036
					(0.022)	(0.022)
Hamburg (Ref.: Schleswig-Holstein)						0.0079
						(0.057)
Lower Saxony (Ref.: Schleswig-Holstein)						-0.020
						(0.068)
Bremen (Ref.: Schleswig-Holstein)						0.062
						(0.19)
North-Rhine-Westfalia (Ref.: Schleswig-Holstein)						-0.0019
						(0.070)
Hessen (Ref.: Schleswig-Holstein)						-0.022
						(0.094)
Rhineland-Pfalz (Ref.: Schleswig-Holstein)						0.037
						(0.079)
Baden-Wuerttemberg (Ref.: Schleswig-Holstein)						-0.063
						(0.079)
Bavaria (Ref.: Schleswig-Holstein)						-0.034
						(0.075)
Saarland (Ref.: Schleswig-Holstein)						0.076
						(0.100)
Berlin (Ref.: Schleswig-Holstein)						-0.050
						(0.077)
Brandenburg (Ref.: Schleswig-Holstein)						-0.070
						(0.088)
Mecklenburg-Vorpommern (Ref.: Schleswig-Holstein)						-0.094
						(0.11)
Saxony (Ref.: Schleswig-Holstein)						0.094
						(0.096)
Saxony-Anhalt (Ref.: Schleswig-Holstein)						-0.27**
						(0.10)
Thuringia (Ref.: Schleswig-Holstein)						-0.22*
						(0.11)
2015 (Ref.: 2014)						0.025***

						(0.0037)
2016 (Ref.: 2014)						0.057***
						(0.0047)
2017 (Ref.: 2014)						0.087***
						(0.0060)
2018 (Ref.: 2014)						0.13***
						(0.0073)
2019 (Ref.: 2014)						0.17***
						(0.0088)
2020 (Ref.: 2014)						0.20***
						(0.010)
2021 (Ref.: 2014)						0.25***
						(0.012)
Constant	7.59***	7.62***	7.58***	6.55***	6.50***	7.12***
	(0.0040)	(0.0018)	(0.0043)	(0.048)	(0.052)	(0.080)
Control for individual labor-market characteristics	no	no	no	yes	yes	yes
Control for individual socio-demographic- characteristics	no	no	no	no	yes	yes
Control for federal state	no	no	no	no	no	yes
Control for year	no	no	no	no	no	yes
Observations	106785	106785	106785	100004	99042	99042
Individuals	22263	22263	22263	21112	20870	20870

Note: Results of panel data fixed effects regression models, incrementally adding control variables; Robust standard errors clustered at the individual level are used; Standard errors in parentheses. Significance levels * p < 0.05. ** p < 0.01. *** p < 0.001. Source: SOEP (2023).

C.2. Regression results – Collective bargaining power and individual wages cross-sectional weight

Table C9: Collective bargaining power and individual wages, Alternative model specification with cross-sectional weight

Dependent Variable: Log(wage)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Collective Wage Agreement	0.28***		0.24***	0.13***	0.13***	0.13***
	(0.017)		(0.018)	(0.012)	(0.012)	(0.012)
Union Membership		0.35***	0.28***	0.10***	0.10***	0.098***
		(0.018)	(0.018)	(0.013)	(0.013)	(0.012)
Manufacturing (Ref.: Construction)				0.10***	0.12***	0.11***
				(0.024)	(0.024)	(0.023)
Service Sector (Ref.: Construction)				-0.22***	-0.16***	-0.16***
				(0.025)	(0.024)	(0.023)
Public Sector (Ref.: Construction)				-0.30***	-0.19***	-0.19***
				(0.028)	(0.028)	(0.027)
Agriculture (Ref.: Construction)				-0.20***	-0.15***	-0.13***
				(0.039)	(0.037)	(0.036)
Secondary Education (Ref.: Primary or Less Education)				0.25***	0.25***	0.26***
				(0.027)	(0.029)	(0.028)
Tertiary Education (Ref.: Primary or Less Education)				0.67***	0.65***	0.66***
				(0.029)	(0.031)	(0.031)
Public Service (Ref. Blue Collar Worker)				0.54***	0.50***	0.46***
				(0.029)	(0.028)	(0.028)
White Collar Worker (Ref. Blue Collar Worker)				0.36***	0.37***	0.35***
				(0.017)	(0.016)	(0.016)
Full-time employed				0.42***	0.34***	0.34***
				(0.012)	(0.013)	(0.013)
Marginal Employment				-1.32***	-1.28***	-1.28***
				(0.021)	(0.022)	(0.022)
Civil Servant				0.068***	0.069***	0.071***
				(0.019)	(0.019)	(0.018)
Work Experience				0.014***	0.017***	0.017***
				(0.00052)	(0.00077)	(0.00076)
Age: 36-50 (Ref.: Age: 18-35)					0.018	0.011
					(0.017)	(0.016)
Age: 51-67 (Ref.: Age: 18-35)					-0.18***	-0.20***
					(0.022)	(0.021)
Women					-0.18***	-0.18***
					(0.015)	(0.014)
Married					0.055***	0.047***
					(0.012)	(0.012)
Child(ren) in Household					0.025*	0.030*
					(0.012)	(0.012)
No Migration History					0.034	0.068**
					(0.021)	(0.021)
German Citizenship					0.024	0.033
					(0.028)	(0.027)
Hamburg (Ref.: Schleswig-Holstein)						0.12*
						(0.049)
Lower Saxony (Ref.: Schleswig-Holstein)						-0.039
						(0.031)
Bremen (Ref.: Schleswig-Holstein)						-0.12
						(0.065)
North-Rhine-Westfalia (Ref.: Schleswig-Holstein)						-0.012
						(0.029)

Hessen (Ref.: Schleswig-Holstein)						0.053
						(0.032)
Rhineland-Pfalz (Ref.: Schleswig-Holstein)						-0.029
						(0.037)
Baden-Wuerttemberg (Ref.: Schleswig-Holstein)						0.065*
						(0.030)
Bavaria (Ref.: Schleswig-Holstein)						0.021
						(0.030)
Saarland (Ref.: Schleswig-Holstein)						0.016
						(0.057)
Berlin (Ref.: Schleswig-Holstein)						-0.064
						(0.038)
Brandenburg (Ref.: Schleswig-Holstein)						-0.14***
						(0.036)
Mecklenburg-Vorpommern (Ref.: Schleswig-Holstein)						-0.22***
						(0.042)
Saxony (Ref.: Schleswig-Holstein)						-0.17***
						(0.033)
Saxony-Anhalt (Ref.: Schleswig-Holstein)						-0.28***
						(0.053)
Thuringia (Ref.: Schleswig-Holstein)						-0.15***
						(0.037)
2015 (Ref.: 2014)						0.0069
						(0.0071)
2016 (Ref.: 2014)						0.020*
						(0.0081)
2017 (Ref.: 2014)						0.031***
						(0.0085)
2018 (Ref.: 2014)						0.060***
						(0.0087)
2019 (Ref.: 2014)						0.086***
						(0.0090)
2020 (Ref.: 2014)						0.10***
						(0.0098)
2021 (Ref.: 2014)						0.14***
						(0.012)
Constant	7.53***	7.63***	7.51***	6.66***	6.68***	6.62***
	(0.016)	(0.010)	(0.016)	(0.037)	(0.044)	(0.049)
Control for individual labor-market characteristics	no	no	no	yes	yes	yes
Control for individual socio-demographic- characteristics	no	no	no	no	yes	yes
Control for federal state	no	no	no	no	no	yes
Control for year	no	no	no	no	no	yes
Observations	103101	103101	103101	98996	98617	98617
Individuals	22085	22085	22085	20979	20778	20778

Note: Results of regression models, incrementally adding control variables using a cross-sectional weight created by SOEP; Robust standard errors clustered at the individual level are used; Standard errors in parentheses; Significance levels * p < 0.05. ** p < 0.01. *** p < 0.001. Source: SOEP (2023).

C.3. Regression results - Collective bargaining power and individual hourly wages

Table C10: Collective bargaining power and individual hourly wage, Alternative model specification

Dependent Variable:	Log Hourly Wage contractual			Log Hourly Wage real		
	Model 4	Model 5	Model 6	Model 4	Model 5	Model 6
Collective Wage Agreement	0.030***	0.031***	0.035***	0.032***	0.033***	0.037***
	(0.0042)	(0.0042)	(0.0041)	(0.0045)	(0.0044)	(0.0044)
Union Membership	0.023**	0.021**	0.021**	0.025**	0.024**	0.024**
	(0.0077)	(0.0077)	(0.0075)	(0.0088)	(0.0088)	(0.0085)
Manufacturing (Ref.: Construction)	0.016	0.019	0.017	0.027*	0.029*	0.028*
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Service Sector (Ref.: Construction)	-0.045***	-0.042***	-0.044***	-0.038***	-0.037***	-0.039***
	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)
Public Sector (Ref.: Construction)	-0.017	-0.015	-0.030*	-0.0043	-0.0025	-0.018
	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)
Agriculture (Ref.: Construction)	-0.042*	-0.038	-0.040*	-0.041*	-0.038	-0.040*
	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)	(0.019)
Secondary Education (Ref.: Primary or Less Education)	0.14***	0.13***	0.084*	0.11***	0.11**	0.062
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Tertiary Education (Ref.: Primary or Less Education)	0.44***	0.44***	0.34***	0.39***	0.39***	0.29***
	(0.043)	(0.044)	(0.043)	(0.043)	(0.043)	(0.042)
Public Service (Ref. Blue Collar Worker)	0.011	0.0093	0.0077	-0.0046	-0.0082	-0.010
	(0.029)	(0.029)	(0.029)	(0.030)	(0.030)	(0.031)
White Collar Worker (Ref. Blue Collar Worker)	0.036***	0.035***	0.028***	0.030***	0.029***	0.021***
	(0.0056)	(0.0057)	(0.0056)	(0.0058)	(0.0059)	(0.0058)
Full-time employed	-0.091***	-0.090***	-0.10***	-0.057***	-0.057***	-0.069***
	(0.0053)	(0.0053)	(0.0052)	(0.0053)	(0.0053)	(0.0052)
Marginal Employment	-0.14***	-0.13***	-0.11***	-0.12***	-0.11***	-0.086***

	(0.0100)	(0.010)	(0.0099)	(0.0099)	(0.0099)	(0.0098)
Civil Servant	0.022**	0.021**	0.019**	0.021**	0.021**	0.019**
	(0.0066)	(0.0067)	(0.0065)	(0.0070)	(0.0070)	(0.0068)
Work Experience	0.042***	0.038***	0.00064	0.046***	0.042***	0.0044**
	(0.00070)	(0.00078)	(0.0014)	(0.00075)	(0.00083)	(0.0015)
Age: 36-50 (Ref.: Age: 18-35)		0.098***	0.046***		0.097***	0.044***
		(0.0069)	(0.0068)		(0.0074)	(0.0072)
Age: 51-67 (Ref.: Age: 18-35)		0.13***	0.029**		0.12***	0.026**
		(0.0091)	(0.0089)		(0.0096)	(0.0094)
Women		0	0		0	0
		(.)	(.)		(.)	(.)
Married		0.027***	0.019**		0.022**	0.013*
		(0.0066)	(0.0064)		(0.0070)	(0.0068)
Child(ren) in Household		-0.011*	0.0075		-0.0061	0.013*
		(0.0053)	(0.0051)		(0.0056)	(0.0054)
No Migration History		0	0		0	0
		(.)	(.)		(.)	(.)
German Citizenship		0.052***	0.026		0.042**	0.016
		(0.016)	(0.015)		(0.015)	(0.015)
Hamburg (Ref.: Schleswig-Holstein)			-0.0069			0.031
			(0.034)			(0.042)
Lower Saxony (Ref.: Schleswig-Holstein)			-0.047			-0.012
			(0.043)			(0.056)
Bremen (Ref.: Schleswig-Holstein)			-0.044			-0.045
			(0.10)			(0.10)
North-Rhine-Westfalia (Ref.: Schleswig-Holstein)			-0.022			0.026
			(0.043)			(0.055)
Hessen (Ref.: Schleswig-Holstein)			-0.071			-0.065
			(0.055)			(0.067)
Rhineland-Pfalz (Ref.: Schleswig-Holstein)			-0.029			0.0059
			(0.053)			(0.061)
Baden-Wuerttemberg (Ref.: Schleswig-Holstein)			-0.080			-0.075
			(0.047)			(0.057)
Bavaria (Ref.: Schleswig-Holstein)			-0.048			-0.040
			(0.043)			(0.054)
Saarland (Ref.: Schleswig-Holstein)			0.049			0.11
			(0.074)			(0.095)
Berlin (Ref.: Schleswig-Holstein)			-0.056			-0.035
			(0.047)			(0.059)
Brandenburg (Ref.: Schleswig-Holstein)			-0.094			-0.084
			(0.054)			(0.064)
Mecklenburg-Vorpommern (Ref.: Schleswig-Holstein)			-0.085			-0.040
			(0.058)			(0.070)
Saxony (Ref.: Schleswig-Holstein)			-0.030			-0.023
			(0.054)			(0.061)
Saxony-Anhalt (Ref.: Schleswig-Holstein)			-0.12			-0.11
			(0.068)			(0.074)
Thuringia (Ref.: Schleswig-Holstein)			-0.10			-0.077
			(0.085)			(0.084)
2015 (Ref.: 2014)			0.031***			0.032***
			(0.0029)			(0.0030)
2016 (Ref.: 2014)			0.062***			0.060***
			(0.0037)			(0.0038)
2017 (Ref.: 2014)			0.097***			0.095***
			(0.0046)			(0.0047)
2018 (Ref.: 2014)			0.14***			0.13***
			(0.0054)			(0.0056)
2019 (Ref.: 2014)			0.18***			0.18***
			(0.0064)			(0.0066)
2020 (Ref.: 2014)			0.21***			0.21***
			(0.0073)			(0.0076)
2021 (Ref.: 2014)			0.26***			0.27***
			(0.0085)			(0.0091)
Constant	1.97***	1.90***	2.56***	1.84***	1.77***	2.41***
	(0.035)	(0.038)	(0.052)	(0.035)	(0.038)	(0.059)
Control for individual labor-market characteristics	yes	yes	yes	yes	yes	yes
Control for individual socio-demographic- characteristics	no	yes	yes	no	yes	yes
Control for federal state	no	no	yes	no	no	yes
Control for year	no	no	yes	no	no	yes
Observations	98914	97980	97980	98869	97936	97936
Individuals	20764	20539	20539	20747	20523	20523

Note: Results of panel data fixed effects regression models, incrementally adding control variables; Robust standard errors clustered at the individual level are used; Dependent variable is altered in hourly wage instead of income; Standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

C.4. Regression results - Collective bargaining power and individual hourly wages cross-sectional weight

Table C10: Collective bargaining power and individual hourly wage, Alternative model specification with cross-sectional weight

Dependent Variable:	Log Hourly Wage contractual			Log Hourly Wage real		
	Model 4	Model 5	Model 6	Model 4	Model 5	Model 6
Collective Wage Agreement	0.11***	0.11***	0.11***	0.11***	0.11***	0.11***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)
Union Membership	0.096***	0.097***	0.090***	0.098***	0.099***	0.092***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Manufacturing (Ref.: Construction)	0.11***	0.12***	0.11***	0.12***	0.13***	0.11***
	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)	(0.020)
Service Sector (Ref.: Construction)	-0.15***	-0.11***	-0.11***	-0.14***	-0.10***	-0.10***
	(0.021)	(0.022)	(0.021)	(0.021)	(0.022)	(0.020)
Public Sector (Ref.: Construction)	-0.20***	-0.14***	-0.14***	-0.19***	-0.14***	-0.13***
	(0.025)	(0.025)	(0.024)	(0.024)	(0.025)	(0.024)
Agriculture (Ref.: Construction)	-0.20***	-0.17***	-0.15***	-0.21***	-0.18***	-0.16***
	(0.034)	(0.034)	(0.032)	(0.033)	(0.033)	(0.031)
Secondary Education (Ref.: Primary or Less Education)	0.23***	0.22***	0.23***	0.22***	0.21***	0.22***
	(0.025)	(0.027)	(0.027)	(0.025)	(0.027)	(0.027)
Tertiary Education (Ref.: Primary or Less Education)	0.62***	0.60***	0.61***	0.58***	0.56***	0.57***
	(0.027)	(0.029)	(0.029)	(0.028)	(0.029)	(0.029)
Public Service (Ref. Blue Collar Worker)	0.40***	0.37***	0.32***	0.36***	0.34***	0.29***
	(0.028)	(0.027)	(0.027)	(0.027)	(0.026)	(0.026)
White Collar Worker (Ref. Blue Collar Worker)	0.30***	0.31***	0.28***	0.29***	0.30***	0.27***
	(0.015)	(0.015)	(0.014)	(0.015)	(0.014)	(0.014)
Full-time employed	-0.030**	-0.040***	-0.039***	-0.0021	-0.0071	-0.0073
	(0.010)	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)
Marginal Employment	-0.36***	-0.34***	-0.34***	-0.33***	-0.30***	-0.30***
	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
Civil Servant	0.065***	0.065***	0.066***	0.065***	0.066***	0.067***
	(0.017)	(0.017)	(0.016)	(0.017)	(0.017)	(0.016)
Work Experience	0.010***	0.0097***	0.011***	0.010***	0.0094***	0.010***
	(0.00046)	(0.00065)	(0.00063)	(0.00045)	(0.00064)	(0.00062)
Age: 36-50 (Ref.: Age: 18-35)		0.052***	0.043**		0.051***	0.043**
		(0.015)	(0.015)		(0.015)	(0.015)
Age: 51-67 (Ref.: Age: 18-35)		-0.013	-0.039*		-0.0050	-0.033
		(0.018)	(0.018)		(0.018)	(0.017)
Women		-0.11***	-0.11***		-0.098***	-0.092***
		(0.013)	(0.013)		(0.013)	(0.013)
Married		0.076***	0.067***		0.072***	0.064***
		(0.011)	(0.010)		(0.010)	(0.010)
Child(ren) in Household		0.060***	0.065***		0.063***	0.067***
		(0.011)	(0.011)		(0.011)	(0.011)
No Migration History		0.024	0.064***		0.015	0.056**
		(0.018)	(0.018)		(0.018)	(0.018)
German Citizenship		0.043	0.055*		0.034	0.046*
		(0.024)	(0.024)		(0.023)	(0.023)
Hamburg (Ref.: Schleswig-Holstein)			0.096*			0.11**
			(0.044)			(0.040)
Lower Saxony (Ref.: Schleswig-Holstein)			-0.024			-0.033
			(0.028)			(0.027)
Bremen (Ref.: Schleswig-Holstein)			-0.11			-0.098
			(0.064)			(0.059)
North-Rhine-Westfalia (Ref.: Schleswig-Holstein)			-0.019			-0.020
			(0.027)			(0.027)
Hessen (Ref.: Schleswig-Holstein)			0.046			0.025
			(0.029)			(0.029)
Rhineland-Pfalz (Ref.: Schleswig-Holstein)			-0.039			-0.033
			(0.035)			(0.034)
Baden-Wuerttemberg (Ref.: Schleswig-Holstein)			0.090**			0.075**
			(0.028)			(0.027)
Bavaria (Ref.: Schleswig-Holstein)			0.040			0.036
			(0.027)			(0.026)
Saarland (Ref.: Schleswig-Holstein)			0.023			0.012
			(0.052)			(0.048)
Berlin (Ref.: Schleswig-Holstein)			-0.083*			-0.076*
			(0.032)			(0.032)
Brandenburg (Ref.: Schleswig-Holstein)			-0.18***			-0.20***
			(0.034)			(0.032)
Mecklenburg-Vorpommern (Ref.: Schleswig-Holstein)			-0.25***			-0.24***
			(0.042)			(0.043)
Saxony (Ref.: Schleswig-Holstein)			-0.22***			-0.22***
			(0.029)			(0.028)
Saxony-Anhalt (Ref.: Schleswig-Holstein)			-0.30***			-0.30***
			(0.051)			(0.049)
Thuringia (Ref.: Schleswig-Holstein)			-0.19***			-0.19***
			(0.032)			(0.032)

2015 (Ref.: 2014)			0.013*			0.016**
			(0.0056)			(0.0055)
2016 (Ref.: 2014)			0.036***			0.040***
			(0.0071)			(0.0069)
2017 (Ref.: 2014)			0.054***			0.062***
			(0.0076)			(0.0074)
2018 (Ref.: 2014)			0.081***			0.090***
			(0.0072)			(0.0071)
2019 (Ref.: 2014)			0.11***			0.12***
			(0.0077)			(0.0076)
2020 (Ref.: 2014)			0.14***			0.16***
			(0.0082)			(0.0081)
2021 (Ref.: 2014)			0.19***			0.22***
			(0.011)			(0.011)
Constant	2.14***	2.06***	1.97***	2.07***	1.99***	1.89***
	(0.035)	(0.041)	(0.045)	(0.035)	(0.041)	(0.044)
Control for individual labor-market characteristics	yes	yes	yes	yes	yes	yes
Control for individual socio-demographic- characteristics	no	yes	yes	no	yes	yes
Control for federal state	no	no	yes	no	no	yes
Control for year	no	no	yes	no	no	yes
Observations	97915	97555	97555	97870	97511	97511
Individuals	20633	20447	20447	20616	20431	20431

Note: Results of regression models, incrementally adding control variables using a cross-sectional weight created by SOEP; Robust standard errors clustered at the individual level are used; Dependent variable is altered in hourly wage instead of income; Standard errors in parentheses. Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

C.5. Regression results – Collective bargaining power as codetermination and individual wages

Table C11: Collective bargaining power in form of the level of codetermination and individual wages

Dependent Variable: Log(wage)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
One Third or less Codetermination (Ref. No Codetermination)	0.24***		0.24***	0.14***	0.14***	0.12***
	(0.018)		(0.018)	(0.013)	(0.013)	(0.013)
Parity Codetermination (Ref. No Codetermination)	0.32***		0.31***	0.18***	0.18***	0.16***
	(0.020)		(0.020)	(0.014)	(0.014)	(0.014)
Union Membership		0.10***	0.082***	0.032***	0.030***	0.023**
		(0.013)	(0.012)	(0.0084)	(0.0084)	(0.0080)
Manufacturing (Ref.: Construction)				0.018	0.018	0.016
				(0.013)	(0.013)	(0.013)
Service Sector (Ref.: Construction)				-0.046***	-0.045**	-0.048***
				(0.014)	(0.014)	(0.014)
Public Sector (Ref.: Construction)				-0.021	-0.020	-0.036*
				(0.017)	(0.017)	(0.017)
Agriculture (Ref.: Construction)				-0.043*	-0.042*	-0.045*
				(0.021)	(0.021)	(0.020)
Secondary Education (Ref.: Primary or Less Education)				0.18***	0.17***	0.12**
				(0.041)	(0.042)	(0.041)
Tertiary Education (Ref.: Primary or Less Education)				0.68***	0.69***	0.56***
				(0.053)	(0.054)	(0.053)
Public Service (Ref. Blue Collar Worker)				0.084*	0.078*	0.074*
				(0.035)	(0.035)	(0.034)
White Collar Worker (Ref. Blue Collar Worker)				0.034***	0.033***	0.024***
				(0.0058)	(0.0058)	(0.0058)
Full-time employed				0.26***	0.26***	0.25***
				(0.0078)	(0.0079)	(0.0078)
Marginal Employment				-0.90***	-0.89***	-0.86***
				(0.019)	(0.019)	(0.019)
Civil Servant				0.024**	0.023**	0.022**
				(0.0076)	(0.0076)	(0.0073)
Work Experience				0.041***	0.036***	-0.012***
				(0.00068)	(0.00078)	(0.0016)
Age: 36-50 (Ref.: Age: 18-35)					0.099***	0.036***
					(0.0072)	(0.0071)
Age: 51-67 (Ref.: Age: 18-35)					0.13***	0.017
					(0.0095)	(0.0093)
Women					0	0
					(.)	(.)
Married					0.027***	0.017*
					(0.0076)	(0.0074)
Child(ren) in Household					-0.042***	-0.015*
					(0.0063)	(0.0061)
No Migration History					0	0
					(.)	(.)
German Citizenship					0.069***	0.037
					(0.021)	(0.020)
Hamburg (Ref.: Schleswig-Holstein)						0.0067
						(0.048)
Lower Saxony (Ref.: Schleswig-Holstein)						-0.042
						(0.054)
Bremen (Ref.: Schleswig-Holstein)						-0.018
						(0.13)
North-Rhine-Westfalia (Ref.: Schleswig-Holstein)						-0.055
						(0.062)
Hessen (Ref.: Schleswig-Holstein)						-0.025
						(0.082)
Rhineland-Pfalz (Ref.: Schleswig-Holstein)						0.029
						(0.071)
Baden-Wuerttemberg (Ref.: Schleswig-Holstein)						-0.049
						(0.066)
Bavaria (Ref.: Schleswig-Holstein)						-0.032
						(0.066)
Saarland (Ref.: Schleswig-Holstein)						0.081
						(0.083)
Berlin (Ref.: Schleswig-Holstein)						-0.039
						(0.068)
Brandenburg (Ref.: Schleswig-Holstein)						-0.033
						(0.068)
Mecklenburg-Vorpommern (Ref.: Schleswig-Holstein)						-0.082
						(0.092)
Saxony (Ref.: Schleswig-Holstein)						0.045
						(0.088)
Saxony-Anhalt (Ref.: Schleswig-Holstein)						-0.24*
						(0.10)
Thuringia (Ref.: Schleswig-Holstein)						-0.20*
						(0.091)
2015 (Ref.: 2014)						0.041***
						(0.0035)

2016 (Ref.: 2014)						0.084***
						(0.0044)
2017 (Ref.: 2014)						0.12***
						(0.0056)
2018 (Ref.: 2014)						0.18***
						(0.0068)
2019 (Ref.: 2014)						0.23***
						(0.0081)
2020 (Ref.: 2014)						0.28***
						(0.0093)
2021 (Ref.: 2014)						0.34***
						(0.011)
Constant	7.46***	7.62***	7.45***	6.49***	6.42***	7.24***
	(0.017)	(0.0018)	(0.017)	(0.044)	(0.048)	(0.071)
Control for individual labor-market characteristics	no	no	no	yes	yes	yes
Control for individual socio-demographic- characteristics	no	no	no	no	yes	yes
Control for federal state	no	no	no	no	no	yes
Control for year	no	no	no	no	no	yes
Observations	92999	106785	92999	90648	89774	89774
Individuals	21800	22263	21800	20903	20658	20658

Note: Results of panel data fixed effects regression models, incrementally adding control variables; Robust standard errors clustered at the individual level are used; Standard errors in parentheses. Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

C.6. Regression results - Collective bargaining power and individual wages by region

Table C12: Complete - Collective bargaining power and individual wages by region

Dependent Variable: Log(wage)	South	West	North	Center	East
Collective Wage Agreement	0.072***	0.059***	0.051***	0.076***	0.074***
	(0.0097)	(0.011)	(0.013)	(0.019)	(0.015)
Union Membership	0.040	0.029	0.038	0.11**	0.079**
	(0.021)	(0.015)	(0.021)	(0.040)	(0.025)
Manufacturing (Ref.: Construction)	0.086**	-0.024	-0.012	0.0082	0.026
	(0.031)	(0.041)	(0.034)	(0.050)	(0.031)
Service Sector (Ref.: Construction)	-0.017	-0.11*	-0.099**	-0.12*	-0.079*
	(0.031)	(0.042)	(0.033)	(0.049)	(0.035)
Public Sector (Ref.: Construction)	-0.016	-0.054	0.014	-0.12*	-0.053
	(0.039)	(0.046)	(0.043)	(0.060)	(0.046)
Agriculture (Ref.: Construction)	-0.028	-0.037	-0.059	-0.15*	-0.050
	(0.057)	(0.048)	(0.047)	(0.072)	(0.070)
Secondary Education (Ref.: Primary or Less Education)	0.062	0.16	0.032	0.44*	0.27
	(0.058)	(0.086)	(0.11)	(0.19)	(0.30)
Tertiary Education (Ref.: Primary or Less Education)	0.55***	0.73***	0.53***	0.86***	0.81*
	(0.11)	(0.12)	(0.13)	(0.20)	(0.32)
Public Service (Ref. Blue Collar Worker)	0.27***	0.15*	0.11	0.36*	0.074
	(0.078)	(0.062)	(0.094)	(0.16)	(0.11)
White Collar Worker (Ref. Blue Collar Worker)	0.052***	0.051***	0.047**	0.061*	0.052**
	(0.013)	(0.015)	(0.017)	(0.025)	(0.016)
Full-time employed	0.11***	0.11***	0.092***	0.096***	0.094***
	(0.015)	(0.015)	(0.017)	(0.023)	(0.017)
Marginal Employment	-0.62***	-0.58***	-0.64***	-0.59***	-0.60***
	(0.031)	(0.030)	(0.036)	(0.059)	(0.049)
Civil Servant	0.025	0.017	0.043*	0.045	0.028
	(0.019)	(0.019)	(0.019)	(0.025)	(0.023)
Work Experience	-0.00016	-0.00074	-0.0021	0.0085	0.0022
	(0.0033)	(0.0036)	(0.0041)	(0.0062)	(0.0044)
Age: 36-50 (Ref.: Age: 18-35)	0.054**	0.057**	0.057***	0.044	0.088***
	(0.017)	(0.018)	(0.016)	(0.032)	(0.019)
Age: 51-67 (Ref.: Age: 18-35)	0.046*	0.051*	0.042	0.068	0.092***
	(0.021)	(0.022)	(0.023)	(0.039)	(0.027)
Women	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)
Married	-0.014	0.031	0.025	0.023	-0.0047
	(0.017)	(0.016)	(0.021)	(0.020)	(0.021)
Child(ren) in Household	-0.037**	-0.051***	-0.028*	-0.060**	0.0025
	(0.014)	(0.012)	(0.014)	(0.019)	(0.016)
No Migration History	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)
German Citizenship	-0.018	0.087	0.034	-0.071	0.11
	(0.032)	(0.045)	(0.040)	(0.10)	(0.072)
2015 (Ref.: 2014)	0.033***	0.015*	0.029**	0.021	0.029**
	(0.0065)	(0.0075)	(0.0090)	(0.011)	(0.0091)
2016 (Ref.: 2014)	0.066***	0.049***	0.064***	0.033*	0.061***
	(0.0081)	(0.0094)	(0.011)	(0.015)	(0.011)
2017 (Ref.: 2014)	0.091***	0.074***	0.11***	0.061**	0.10***
	(0.010)	(0.012)	(0.014)	(0.019)	(0.014)
2018 (Ref.: 2014)	0.14***	0.12***	0.15***	0.093***	0.14***
	(0.013)	(0.014)	(0.017)	(0.024)	(0.017)
2019 (Ref.: 2014)	0.18***	0.17***	0.19***	0.12***	0.19***
	(0.016)	(0.017)	(0.021)	(0.029)	(0.021)
2020 (Ref.: 2014)	0.20***	0.19***	0.23***	0.14***	0.23***
	(0.018)	(0.020)	(0.023)	(0.033)	(0.024)
2021 (Ref.: 2014)	0.24***	0.25***	0.27***	0.17***	0.27***
	(0.021)	(0.023)	(0.026)	(0.038)	(0.028)
Constant	7.27***	7.06***	7.20***	6.87***	6.76***
	(0.085)	(0.11)	(0.13)	(0.22)	(0.31)
Control for individual labor-market characteristics	yes	yes	yes	yes	yes
Control for individual socio-demographic- characteristics	yes	yes	yes	yes	yes
Control for year	yes	yes	yes	yes	yes
Observations	28362	25951	17664	10429	16636
Individuals	6141	5598	3756	2321	3449

Note: Results of panel data fixed effects regression models including all control variables as specified in Model 6; Robust standard errors clustered at the individual level are used; The sample is subdivided by region. South includes Baden-Wuerttemberg and Bavaria; Center includes the federal states of Hessen and Thuringia; North-Rhine Westfalia, Rhineland-Pfalz and Saarland constitute the category West; Berlin, Brandenburg, Saxony and Saxony-Anhalt are included in East; North includes Mecklenburg-Vorpommern, Schleswig-Holstein, Hamburg, Bremen and Lower Saxony; Standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

C.7. Regression results - Collective bargaining power and individual wages by region cross-sectional weight

Table C13: Collective bargaining power and individual wages by region, Alternative model specification with cross-sectional weight

Dependent Variable: Log(wage)	South	West	North	Center	East
Collective Wage Agreement	0.095***	0.11***	0.15***	0.16***	0.20***
	(0.021)	(0.024)	(0.027)	(0.029)	(0.029)
Union Membership	0.12***	0.10***	0.10***	0.049	0.11***
	(0.022)	(0.024)	(0.028)	(0.037)	(0.031)
Manufacturing (Ref.: Construction)	0.086*	0.082	0.15**	0.13	0.079
	(0.036)	(0.043)	(0.050)	(0.069)	(0.073)
Service Sector (Ref.: Construction)	-0.16***	-0.22***	-0.16**	-0.084	-0.12
	(0.038)	(0.042)	(0.051)	(0.070)	(0.073)
Public Sector (Ref.: Construction)	-0.16***	-0.29***	-0.17**	-0.18*	-0.13
	(0.049)	(0.054)	(0.060)	(0.074)	(0.074)
Agriculture (Ref.: Construction)	-0.26***	-0.050	-0.11	-0.050	-0.12
	(0.078)	(0.058)	(0.068)	(0.13)	(0.085)
Secondary Education (Ref.: Primary or Less Education)	0.21***	0.27***	0.32***	0.28***	0.24**
	(0.046)	(0.055)	(0.065)	(0.056)	(0.079)
Tertiary Education (Ref.: Primary or Less Education)	0.63***	0.71***	0.68***	0.69***	0.62***
	(0.047)	(0.065)	(0.071)	(0.064)	(0.080)
Public Service (Ref. Blue Collar Worker)	0.41***	0.46***	0.53***	0.46***	0.56***
	(0.056)	(0.053)	(0.059)	(0.067)	(0.072)
White Collar Worker (Ref. Blue Collar Worker)	0.29***	0.34***	0.40***	0.44***	0.40***
	(0.028)	(0.030)	(0.035)	(0.045)	(0.042)
Full-time employed	0.014	0.11**	0.067	0.12**	0.064
	(0.039)	(0.035)	(0.039)	(0.036)	(0.045)
Marginal Employment	0.42***	0.31***	0.31***	0.33***	0.27***
	(0.025)	(0.026)	(0.028)	(0.037)	(0.031)
Civil Servant	-1.21***	-1.29***	-1.31***	-1.32***	-1.38***
	(0.042)	(0.040)	(0.046)	(0.068)	(0.053)
Work Experience	0.015***	0.018***	0.017***	0.015***	0.020***
	(0.0013)	(0.0014)	(0.0017)	(0.0022)	(0.0021)
Age: 36-50 (Ref.: Age: 18-35)	0.079**	-0.037	0.041	0.0063	-0.053
	(0.028)	(0.037)	(0.034)	(0.041)	(0.038)
Age: 51-67 (Ref.: Age: 18-35)	-0.13***	-0.19***	-0.22***	-0.16**	-0.38***
	(0.036)	(0.041)	(0.049)	(0.061)	(0.061)
Women	-0.21***	-0.17***	-0.20***	-0.23***	-0.11***
	(0.032)	(0.030)	(0.031)	(0.033)	(0.029)
Married	0.056*	0.045	0.032	0.070*	0.071**
	(0.023)	(0.023)	(0.026)	(0.032)	(0.025)
Child(ren) in Household	-0.025	0.055*	-0.0068	0.076*	0.065*
	(0.022)	(0.023)	(0.028)	(0.031)	(0.029)
No Migration History	0.050	0.063	0.090*	0.048	0.029
	(0.032)	(0.039)	(0.041)	(0.079)	(0.068)
German Citizenship	0.086	-0.024	0.042	0.033	0.026
	(0.046)	(0.043)	(0.078)	(0.083)	(0.088)
2015 (Ref.: 2014)	0.0031	-0.016	0.029	0.030	0.014
	(0.014)	(0.013)	(0.016)	(0.024)	(0.017)
2016 (Ref.: 2014)	0.027	-0.00057	0.024	0.041	0.024
	(0.014)	(0.017)	(0.020)	(0.027)	(0.018)
2017 (Ref.: 2014)	0.031*	0.00075	0.062**	0.034	0.045*
	(0.016)	(0.017)	(0.020)	(0.029)	(0.019)
2018 (Ref.: 2014)	0.045**	0.041*	0.075***	0.082**	0.090***
	(0.017)	(0.017)	(0.020)	(0.026)	(0.019)
2019 (Ref.: 2014)	0.074***	0.076***	0.094***	0.086**	0.12***
	(0.017)	(0.018)	(0.021)	(0.029)	(0.021)
2020 (Ref.: 2014)	0.075***	0.089***	0.11***	0.12***	0.16***
	(0.018)	(0.019)	(0.022)	(0.032)	(0.024)
2021 (Ref.: 2014)	0.097***	0.15***	0.16***	0.14***	0.20***
	(0.026)	(0.022)	(0.027)	(0.037)	(0.029)
Constant	6.70***	6.72***	6.48***	6.50***	6.45***
	(0.083)	(0.074)	(0.10)	(0.11)	(0.12)
Control for individual labor-market characteristics	yes	yes	yes	yes	yes
Control for individual socio-demographic characteristics	yes	yes	yes	yes	yes
Control for year	yes	yes	yes	yes	yes
Observations	28247	25793	17596	10370	16611
Individuals	6119	5563	3737	2308	3444

Note: Results of regression model including all control variables as specified in Model 6 using a cross-sectional weight created by SOEP; Robust standard errors clustered at the individual level are used; The sample is subdivided by region; South includes Baden-Wuerttemberg and Bavaria; Center includes the federal states of Hessen and Thuringia; North-Rhine Westfalia, Rhineland-Pfalz and Saarland constitute the category West; Berlin, Brandenburg, Saxony and Saxony-Anhalt are included in East; North includes Mecklenburg-Vorpommern, Schleswig-Holstein, Hamburg, Bremen and Lower Saxony; Standard errors in parentheses; Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

C.8. Regression results - Collective bargaining power and individual wages by federal state

Table C14: Complete - Collective bargaining power and individual wages by federal state

Dependent Variable: Log(wage)	Schles-wig-Hol-stein	Ham-burg	Lower Saxony	Bremen	North-Rhine-West-falia	Hessen	Rhine-land-Pfalz	Baden-Wuert-temberg	Bavaria	Saarland	Berlin	Branden-burg	Meckl.-Vorpom-mern	Saxony	Saxony-Anhalt	Thurin-gia
Collective Wage Agreement	0.053	0.042	0.040*	0.11*	0.062***	0.077**	0.066**	0.078***	0.065***	-0.083	0.043	0.067*	0.080**	0.10***	0.064*	0.075*
	(0.028)	(0.052)	(0.017)	(0.052)	(0.012)	(0.024)	(0.024)	(0.013)	(0.014)	(0.048)	(0.028)	(0.034)	(0.030)	(0.026)	(0.032)	(0.032)
Union Membership	0.025	0.044	0.033	-0.044	0.030	0.16**	0.0037	0.041	0.043	0.36	0.10	0.011	0.053	0.073**	0.11*	0.043
	(0.044)	(0.076)	(0.028)	(0.064)	(0.018)	(0.058)	(0.025)	(0.035)	(0.025)	(0.24)	(0.094)	(0.027)	(0.085)	(0.025)	(0.050)	(0.026)
Manufacturing (Ref.: Construction)	0.0088	-0.14	0.023	0.034	-0.0053	0.0055	-0.092	0.061	0.10**	0.027	-0.094	0.046	-0.24*	0.035	0.032	0.018
	(0.12)	(0.10)	(0.039)	(0.19)	(0.040)	(0.064)	(0.13)	(0.049)	(0.039)	(0.35)	(0.11)	(0.037)	(0.11)	(0.047)	(0.079)	(0.074)
Service Sector (Ref.: Construction)	-0.045	-0.16	-0.096*	-0.14	-0.085*	-0.100	-0.14	-0.025	-0.010	-0.52*	-0.20*	0.059	-0.16*	-0.072	-0.14	-0.16
	(0.11)	(0.12)	(0.041)	(0.18)	(0.039)	(0.058)	(0.15)	(0.050)	(0.040)	(0.24)	(0.10)	(0.051)	(0.079)	(0.056)	(0.078)	(0.084)
Public Sector (Ref.: Construction)	0.080	-0.067	0.041	-0.16	-0.029	-0.14	-0.12	-0.013	-0.0094	-0.41	-0.20	0.10	-0.063	-0.047	-0.12	-0.058
	(0.12)	(0.14)	(0.060)	(0.18)	(0.047)	(0.073)	(0.14)	(0.069)	(0.045)	(0.24)	(0.12)	(0.069)	(0.12)	(0.070)	(0.12)	(0.099)
Agriculture (Ref.: Construction)	-0.073	0.043	-0.071	0.31	0.020	-0.23*	-0.13	-0.031	-0.023	-0.55*	-0.70**	0.045	-0.044	0.019	-0.045	-0.083
	(0.12)	(0.15)	(0.057)	(0.23)	(0.053)	(0.099)	(0.14)	(0.070)	(0.083)	(0.26)	(0.22)	(0.19)	(0.17)	(0.091)	(0.084)	(0.099)
Secondary Education (Ref.: Primary or Less Education)	0.60	0.44***	-0.061	0.20	0.22*	0.65*	-0.061	-0.086	0.13	0.25	0.64***	-0.66*	0.026	0.43	0.14	0.073*
	(0.78)	(0.072)	(0.11)	(0.13)	(0.10)	(0.26)	(0.095)	(0.097)	(0.072)	(0.58)	(0.096)	(0.31)	(0.35)	(0.25)	(0.49)	(0.032)
Tertiary Education (Ref.: Primary or Less Education)	0.70	1.33***	0.43**	0	0.77***	1.17***	0.61**	0.23	0.76***	0	1.01***	0	0.45	1.00**	0.31	0.23
	(0.80)	(0.24)	(0.16)	(.)	(0.13)	(0.27)	(0.23)	(0.16)	(0.14)	(.)	(0.17)	(.)	(0.54)	(0.31)	(0.53)	(0.16)
Public Service (Ref. Blue Collar Worker)	-0.055	0.12	0.19	0.37	0.17*	0.33	0.15	0.37**	0.16	-0.16	-0.0019	0.20	-0.097	0.17	0.010	0.55
	(0.18)	(0.18)	(0.13)	(0.23)	(0.080)	(0.17)	(0.10)	(0.12)	(0.097)	(0.14)	(0.22)	(0.22)	(0.44)	(0.14)	(0.13)	(0.29)
White Collar Worker (Ref. Blue Collar Worker)	0.076*	0.0060	0.051*	0.10	0.060***	0.064	0.019	0.039	0.058***	0.031	0.15**	0.068*	-0.0090	0.013	0.055	0.055
	(0.034)	(0.050)	(0.023)	(0.064)	(0.017)	(0.034)	(0.029)	(0.020)	(0.016)	(0.077)	(0.049)	(0.029)	(0.051)	(0.022)	(0.040)	(0.035)
Full-time employed	-0.011	0.081	0.13***	0.14	0.11***	0.075**	0.12***	0.13***	0.096***	0.10	0.14***	0.032	0.084	0.073**	0.100*	0.13**
	(0.038)	(0.045)	(0.022)	(0.10)	(0.016)	(0.026)	(0.034)	(0.024)	(0.019)	(0.096)	(0.031)	(0.034)	(0.049)	(0.027)	(0.045)	(0.043)
Marginal Employment	-0.64***	-0.56***	-0.64***	-0.28	-0.58***	-0.49***	-0.59***	-0.64***	-0.60***	-0.39**	-0.65***	-0.53***	-0.72***	-0.65***	-0.54***	-0.77***
	(0.075)	(0.13)	(0.046)	(0.15)	(0.034)	(0.068)	(0.068)	(0.047)	(0.040)	(0.12)	(0.093)	(0.11)	(0.13)	(0.088)	(0.099)	(0.11)
Civil Servant	0.11*	0.040	0.014	0.0097	0.022	0.031	-0.0041	0.0074	0.036	0.057	0.021	0.053	0.12	-0.0074	0.087	0.073
	(0.043)	(0.038)	(0.027)	(0.075)	(0.021)	(0.029)	(0.047)	(0.027)	(0.026)	(0.058)	(0.043)	(0.045)	(0.065)	(0.031)	(0.069)	(0.050)
Work Experience	-0.013	0.015	0.0032	-0.0072	-0.00042	0.0045	-0.0014	-0.0051	0.0022	-0.019	0.0012	0.00091	-0.022	0.0027	0.00068	0.016
	(0.0091)	(0.012)	(0.0053)	(0.014)	(0.0041)	(0.0073)	(0.0085)	(0.0054)	(0.0040)	(0.020)	(0.0084)	(0.011)	(0.016)	(0.0066)	(0.011)	(0.011)
Age: 36-50 (Ref.: Age: 18-35)	0.0089	0.18***	0.061*	0.033	0.047*	-0.0071	0.092*	0.052*	0.059*	0.13**	0.13**	0.074*	0.039	0.057*	0.095	0.12*
	(0.031)	(0.050)	(0.024)	(0.032)	(0.020)	(0.042)	(0.038)	(0.023)	(0.024)	(0.040)	(0.042)	(0.036)	(0.046)	(0.025)	(0.069)	(0.049)
Age: 51-67 (Ref.: Age: 18-35)	-0.013	0.12	0.066*	0.044	0.043	0.020	0.086	0.018	0.070*	0.053	0.047	0.068	0.0026	0.088*	0.15	0.14*
	(0.045)	(0.074)	(0.033)	(0.074)	(0.025)	(0.049)	(0.047)	(0.033)	(0.029)	(0.10)	(0.051)	(0.053)	(0.061)	(0.035)	(0.098)	(0.066)
Women	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Married	-0.035	-0.059	0.046	0.17	0.036*	0.0074	-0.0038	-0.060*	0.0086	0.079	-0.0089	-0.0012	0.041	-0.0059	0.0024	0.059
	(0.038)	(0.048)	(0.030)	(0.12)	(0.018)	(0.025)	(0.039)	(0.027)	(0.021)	(0.050)	(0.032)	(0.027)	(0.070)	(0.042)	(0.056)	(0.034)
Child(ren) in Household	-0.013	-0.076	-0.031	-0.0093	-0.051***	-0.057**	-0.048	-0.039*	-0.033	-0.077	-0.0010	-0.017	-0.072**	-0.0094	0.0057	-0.050
	(0.027)	(0.045)	(0.020)	(0.055)	(0.014)	(0.022)	(0.027)	(0.019)	(0.018)	(0.069)	(0.024)	(0.029)	(0.025)	(0.023)	(0.049)	(0.036)
No Migration History	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
German Citizenship	0.12	0.073	-0.0059	-0.22	0.071	-0.052	0.14	0.017	-0.057	0.31	0.076	0.21	0.62***	-0.076	0.11	-0.12
	(0.074)	(0.090)	(0.050)	(0.19)	(0.053)	(0.11)	(0.074)	(0.047)	(0.042)	(0.19)	(0.095)	(0.17)	(0.083)	(0.12)	(0.12)	(0.12)
2015 (Ref.: 2014)	0.034	0.040	0.023	-0.0088	0.012	0.024	0.029	0.048***	0.024**	0.049	0.0088	0.039*	0.054	0.033*	0.036	0.024
	(0.020)	(0.022)	(0.012)	(0.031)	(0.0084)	(0.013)	(0.018)	(0.010)	(0.0083)	(0.037)	(0.019)	(0.020)	(0.031)	(0.014)	(0.022)	(0.021)
2016 (Ref.: 2014)	0.088**	0.061*	0.061***	0.041	0.048***	0.040*	0.054*	0.088***	0.052***	0.12**	0.059*	0.069**	0.074	0.072***	0.038	0.021

	(0.027)	(0.028)	(0.014)	(0.038)	(0.011)	(0.017)	(0.023)	(0.013)	(0.010)	(0.042)	(0.023)	(0.025)	(0.042)	(0.018)	(0.027)	(0.028)
2017 (Ref.: 2014)	0.16***	0.081*	0.078***	0.12*	0.072***	0.069**	0.078**	0.11***	0.078***	0.16**	0.11***	0.12***	0.15**	0.099***	0.085*	0.054
	(0.034)	(0.037)	(0.019)	(0.056)	(0.013)	(0.022)	(0.029)	(0.017)	(0.013)	(0.051)	(0.027)	(0.032)	(0.048)	(0.022)	(0.034)	(0.036)
2018 (Ref.: 2014)	0.20***	0.11*	0.12***	0.14*	0.12***	0.11***	0.11**	0.17***	0.11***	0.22***	0.18***	0.13**	0.24***	0.15***	0.13**	0.075
	(0.040)	(0.047)	(0.023)	(0.060)	(0.016)	(0.028)	(0.034)	(0.021)	(0.017)	(0.065)	(0.031)	(0.041)	(0.061)	(0.027)	(0.041)	(0.044)
2019 (Ref.: 2014)	0.26***	0.11*	0.15***	0.14*	0.16***	0.13***	0.18***	0.22***	0.16***	0.28***	0.21***	0.20***	0.30***	0.20***	0.17***	0.11*
	(0.047)	(0.054)	(0.027)	(0.070)	(0.019)	(0.034)	(0.041)	(0.025)	(0.020)	(0.080)	(0.037)	(0.052)	(0.073)	(0.032)	(0.050)	(0.052)
2020 (Ref.: 2014)	0.31***	0.14*	0.19***	0.19*	0.19***	0.15***	0.19***	0.23***	0.18***	0.35***	0.26***	0.22***	0.37***	0.23***	0.20***	0.13*
	(0.052)	(0.066)	(0.030)	(0.074)	(0.023)	(0.038)	(0.046)	(0.029)	(0.023)	(0.098)	(0.044)	(0.060)	(0.084)	(0.037)	(0.058)	(0.061)
2021 (Ref.: 2014)	0.34***	0.18*	0.22***	0.28**	0.25***	0.18***	0.24***	0.30***	0.21***	0.36**	0.31***	0.26***	0.42***	0.26***	0.29***	0.16*
	(0.058)	(0.072)	(0.034)	(0.087)	(0.026)	(0.045)	(0.056)	(0.033)	(0.026)	(0.12)	(0.050)	(0.071)	(0.099)	(0.043)	(0.065)	(0.068)
Constant	6.90***	6.66***	7.21***	7.22***	7.00***	6.80***	7.28***	7.54***	7.13***	7.46***	6.63***	7.48***	6.94***	6.80***	6.92***	6.97***
	(0.74)	(0.22)	(0.15)	(0.27)	(0.12)	(0.28)	(0.21)	(0.14)	(0.11)	(0.59)	(0.19)	(0.33)	(0.49)	(0.30)	(0.51)	(0.26)
Control for individual labor-market characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Control for individual socio-demograph. characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Control for year	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3522	1755	9747	702	20280	6886	4847	11980	16382	824	3597	3576	1938	6138	3325	3543
Individuals	741	409	2110	170	4393	1592	1047	2619	3568	181	821	754	395	1233	695	733

Note: Results of panel data fixed effects regression models including all control variables as specified in Model 6. Robust standard errors clustered at the individual level are used;
The whole sample is subdivided by Federal State; Standard errors in parentheses. Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

C.9. Regression results - Collective bargaining power and individual wages by federal state cross-sectional weight

Table C15: Collective bargaining power and individual wages by federal state, Alternative model specification with cross-sectional weight

Dependent Variable: Log(wage)	Schles-wig-Hol-stein	Ham-burg	Lower Saxony	Bremen	North-Rhine-West-falia	Hessen	Rhine-land-Pfalz	Baden-Wuertte mberg	Bavaria	Saarland	Berlin	Branden-burg	Meckl.-Vorpom.	Saxony	Saxony-Anhalt	Thurin-gia
Collective Wage Agreement	0.12**	0.0097	0.15***	0.25**	0.099***	0.12***	0.18**	0.11***	0.088***	0.079	0.052	0.18***	0.21***	0.18***	0.46***	0.25***
	(0.048)	(0.063)	(0.039)	(0.096)	(0.027)	(0.035)	(0.058)	(0.033)	(0.026)	(0.097)	(0.051)	(0.052)	(0.060)	(0.035)	(0.064)	(0.043)
Union Membership	0.053	0.24**	0.081*	-0.25	0.11***	0.031	0.10*	0.093**	0.14***	0.045	0.065	0.084	0.16*	0.096	0.17*	0.048
	(0.053)	(0.078)	(0.037)	(0.14)	(0.028)	(0.042)	(0.048)	(0.034)	(0.027)	(0.12)	(0.051)	(0.065)	(0.069)	(0.050)	(0.069)	(0.052)
Manufacturing (Ref.: Construction)	0.19*	0.089	0.18*	0.41*	0.094	0.11	0.036	0.087	0.068	0.11	-0.012	-0.031	0.065	0.058	0.23	0.14
	(0.072)	(0.12)	(0.076)	(0.20)	(0.050)	(0.087)	(0.063)	(0.056)	(0.047)	(0.21)	(0.13)	(0.10)	(0.10)	(0.059)	(0.18)	(0.099)
Service Sector (Ref.: Construction)	-0.26***	-0.18	-0.066	0.014	-0.22***	-0.10	-0.23***	-0.17**	-0.15**	-0.067	-0.27	-0.16	-0.33**	-0.093	-0.13	-0.069
	(0.065)	(0.11)	(0.078)	(0.19)	(0.049)	(0.087)	(0.061)	(0.061)	(0.048)	(0.20)	(0.14)	(0.097)	(0.11)	(0.064)	(0.18)	(0.11)
Public Sector (Ref.: Construction)	-0.26**	-0.081	-0.13	0.18	-0.26***	-0.22*	-0.44***	-0.16*	-0.18**	0.0065	-0.23	-0.20	-0.27*	-0.12	-0.15	-0.054
	(0.095)	(0.17)	(0.083)	(0.19)	(0.059)	(0.092)	(0.12)	(0.074)	(0.062)	(0.20)	(0.14)	(0.10)	(0.13)	(0.069)	(0.18)	(0.11)
Agriculture (Ref.: Construction)	0.041	0.19	-0.072	0.31	-0.020	-0.081	-0.11	-0.20	-0.31**	-0.30	-0.74***	-0.24	-0.27*	-0.11	0.081	0.0035
	(0.15)	(0.19)	(0.083)	(0.30)	(0.071)	(0.17)	(0.089)	(0.10)	(0.11)	(0.24)	(0.20)	(0.13)	(0.13)	(0.068)	(0.20)	(0.15)
Secondary Education (Ref.: Primary or Less Education)	0.35***	0.31*	0.35***	-0.014	0.32***	0.31***	0.096	0.18**	0.24***	0.34**	0.13	0.32***	0.57*	0.18	0.32	0.22
	(0.10)	(0.15)	(0.090)	(0.15)	(0.066)	(0.062)	(0.066)	(0.057)	(0.070)	(0.13)	(0.097)	(0.089)	(0.28)	(0.11)	(0.20)	(0.13)
Tertiary Education (Ref.: Primary or Less Education)	0.60***	0.76***	0.70***	0.54***	0.75***	0.74***	0.59***	0.52***	0.72***	0.78***	0.53***	0.70***	1.00***	0.51***	0.67**	0.54***
	(0.11)	(0.16)	(0.100)	(0.15)	(0.076)	(0.073)	(0.085)	(0.060)	(0.071)	(0.17)	(0.090)	(0.10)	(0.29)	(0.12)	(0.21)	(0.14)
Public Service (Ref. Blue Collar Worker)	0.64***	0.64***	0.46***	0.46*	0.43***	0.35***	0.53***	0.34***	0.48***	0.36*	0.46***	0.56***	0.31	0.24*	0.81***	0.58***
	(0.094)	(0.17)	(0.087)	(0.21)	(0.057)	(0.083)	(0.13)	(0.064)	(0.088)	(0.18)	(0.14)	(0.12)	(0.17)	(0.098)	(0.14)	(0.10)
White Collar Worker (Ref. Blue Collar Worker)	0.41***	0.49***	0.35***	0.41**	0.30***	0.40***	0.42***	0.28***	0.31***	0.25**	0.42***	0.34***	0.22**	0.26***	0.59***	0.35***
	(0.063)	(0.11)	(0.051)	(0.14)	(0.030)	(0.058)	(0.075)	(0.038)	(0.042)	(0.087)	(0.12)	(0.068)	(0.079)	(0.045)	(0.085)	(0.062)
Full-time employed	0.28***	0.33***	0.30***	0.35*	0.33***	0.30***	0.27***	0.45***	0.40***	0.22*	0.26***	0.33***	0.16*	0.28***	0.23***	0.36***
	(0.056)	(0.095)	(0.037)	(0.17)	(0.028)	(0.045)	(0.057)	(0.036)	(0.034)	(0.097)	(0.057)	(0.060)	(0.070)	(0.049)	(0.060)	(0.067)
Marginal Employment	-1.21***	-1.19***	-1.38***	-1.11***	-1.27***	-1.37***	-1.25***	-1.20***	-1.21***	-1.51***	-1.49***	-1.21***	-1.24***	-1.36***	-1.25***	-1.15***
	(0.077)	(0.18)	(0.059)	(0.22)	(0.044)	(0.075)	(0.090)	(0.064)	(0.056)	(0.20)	(0.076)	(0.11)	(0.13)	(0.090)	(0.12)	(0.14)
Civil Servant	0.020	-0.035	0.10*	0.035	0.10*	0.17***	0.22**	0.033	-0.0023	-0.11	0.14**	0.058	0.17*	0.15***	-0.11	0.020
	(0.082)	(0.10)	(0.047)	(0.14)	(0.041)	(0.040)	(0.074)	(0.059)	(0.051)	(0.090)	(0.050)	(0.066)	(0.074)	(0.046)	(0.12)	(0.057)
Work Experience	0.014***	0.022***	0.016***	0.024***	0.018***	0.018***	0.021***	0.013***	0.016***	0.020***	0.018***	0.015***	0.018***	0.017***	0.037***	0.015***
	(0.0030)	(0.0046)	(0.0023)	(0.0063)	(0.0017)	(0.0026)	(0.0026)	(0.0018)	(0.0017)	(0.0060)	(0.0036)	(0.0034)	(0.0043)	(0.0033)	(0.0046)	(0.0041)
Age: 36-50 (Ref.: Age: 18-35)	0.025	0.088	0.029	0.065	0.00053	0.020	-0.19*	0.10**	0.065	-0.16	0.10	0.0017	-0.0074	-0.082	-0.35**	-0.078
	(0.063)	(0.084)	(0.049)	(0.17)	(0.040)	(0.049)	(0.088)	(0.038)	(0.039)	(0.15)	(0.055)	(0.066)	(0.095)	(0.052)	(0.11)	(0.067)
Age: 51-67 (Ref.: Age: 18-35)	-0.15	-0.38**	-0.18**	-0.27	-0.17***	-0.16*	-0.26***	-0.12*	-0.13*	-0.36	-0.23*	-0.22*	-0.39*	-0.38***	-0.87***	-0.27*
	(0.096)	(0.13)	(0.068)	(0.19)	(0.047)	(0.068)	(0.076)	(0.049)	(0.051)	(0.21)	(0.11)	(0.10)	(0.17)	(0.10)	(0.14)	(0.11)
Women	-0.21***	-0.19**	-0.22***	-0.21	-0.16***	-0.23***	-0.14*	-0.25***	-0.18***	-0.28*	-0.075	-0.16**	-0.12	-0.11*	-0.074	-0.11*
	(0.060)	(0.067)	(0.041)	(0.13)	(0.034)	(0.040)	(0.059)	(0.041)	(0.045)	(0.13)	(0.051)	(0.052)	(0.084)	(0.044)	(0.069)	(0.052)
Married	0.040	-0.065	0.011	0.16	0.027	0.044	0.12**	0.067*	0.048	0.056	0.12**	-0.035	0.11*	0.078*	0.15**	0.11*
	(0.047)	(0.10)	(0.033)	(0.12)	(0.027)	(0.036)	(0.047)	(0.034)	(0.030)	(0.10)	(0.042)	(0.043)	(0.051)	(0.040)	(0.057)	(0.048)
Child(ren) in Household	0.092*	-0.16*	-0.0081	0.030	0.056*	0.053	0.047	-0.014	-0.038	-0.010	0.0069	0.11*	0.037	0.052	0.14*	0.12**
	(0.046)	(0.078)	(0.037)	(0.11)	(0.026)	(0.038)	(0.046)	(0.031)	(0.029)	(0.090)	(0.054)	(0.048)	(0.068)	(0.033)	(0.069)	(0.043)
No Migration History	0.070	0.096	0.11*	0.23*	0.068	0.076	-0.0021	0.075	0.048	0.39***	0.050	0.34	-0.018	-0.036	0.0033	0.24
	(0.077)	(0.11)	(0.054)	(0.12)	(0.047)	(0.082)	(0.068)	(0.044)	(0.044)	(0.097)	(0.061)	(0.26)	(0.12)	(0.084)	(0.18)	(0.21)
German Citizenship	-0.017	0.17	0.058	0.013	-0.041	0.055	0.071	0.10*	0.063	-0.13	0.086	-0.24	0.22	-0.010	0.12	-0.21
	(0.13)	(0.15)	(0.11)	(0.15)	(0.051)	(0.086)	(0.081)	(0.052)	(0.072)	(0.12)	(0.087)	(0.26)	(0.15)	(0.16)	(0.21)	(0.23)
2015 (Ref.: 2014)	0.020	0.052	0.027	-0.076	-0.017	0.0070	-0.0088	0.011	-0.0059	-0.022	-0.026	0.075*	0.034	0.027	-0.040	0.079
	(0.031)	(0.034)	(0.023)	(0.080)	(0.014)	(0.029)	(0.042)	(0.022)	(0.018)	(0.049)	(0.039)	(0.034)	(0.053)	(0.022)	(0.044)	(0.044)
2016 (Ref.: 2014)	-0.014	0.072	0.032	-0.10	0.0028	0.028	-0.0048	0.047*	0.0094	-0.0078	0.018	0.11**	-0.014	0.029	-0.10*	0.044

	(0.031)	(0.041)	(0.028)	(0.090)	(0.019)	(0.033)	(0.042)	(0.021)	(0.019)	(0.052)	(0.042)	(0.035)	(0.063)	(0.021)	(0.046)	(0.045)
2017 (Ref.: 2014)	0.056	0.098*	0.063*	-0.053	-0.0019	0.0088	0.0046	0.056*	0.0084	0.092	0.057	0.11***	0.0067	0.048	-0.071	0.080*
	(0.041)	(0.039)	(0.027)	(0.15)	(0.019)	(0.038)	(0.042)	(0.022)	(0.022)	(0.057)	(0.039)	(0.032)	(0.072)	(0.028)	(0.055)	(0.034)
2018 (Ref.: 2014)	0.029	0.15**	0.059*	-0.028	0.044*	0.052	0.025	0.067*	0.024	0.12	0.14***	0.10**	0.11	0.092***	0.017	0.15***
	(0.041)	(0.049)	(0.027)	(0.11)	(0.019)	(0.033)	(0.046)	(0.027)	(0.022)	(0.064)	(0.038)	(0.037)	(0.069)	(0.028)	(0.050)	(0.037)
2019 (Ref.: 2014)	0.059	0.15**	0.080**	0.00085	0.082***	0.046	0.064	0.10***	0.051*	0.12	0.12**	0.17***	0.17*	0.15***	0.044	0.18***
	(0.040)	(0.051)	(0.029)	(0.10)	(0.020)	(0.036)	(0.043)	(0.024)	(0.023)	(0.067)	(0.040)	(0.039)	(0.068)	(0.029)	(0.061)	(0.039)
2020 (Ref.: 2014)	0.076	0.20***	0.095**	-0.017	0.097***	0.057	0.047	0.073**	0.073**	0.14*	0.13*	0.18***	0.19**	0.21***	0.074	0.25***
	(0.042)	(0.057)	(0.030)	(0.083)	(0.022)	(0.039)	(0.047)	(0.026)	(0.024)	(0.069)	(0.052)	(0.046)	(0.063)	(0.030)	(0.064)	(0.049)
2021 (Ref.: 2014)	0.10	0.23**	0.15***	0.082	0.17***	0.077	0.072	0.094*	0.094**	0.043	0.19***	0.18**	0.20**	0.24***	0.12	0.30***
	(0.056)	(0.079)	(0.038)	(0.11)	(0.023)	(0.046)	(0.064)	(0.042)	(0.033)	(0.089)	(0.046)	(0.058)	(0.075)	(0.038)	(0.092)	(0.051)
Constant	6.70***	6.44***	6.43***	6.17***	6.70***	6.58***	6.79***	6.73***	6.65***	6.75***	6.63***	6.46***	6.22***	6.74***	5.95***	6.35***
	(0.15)	(0.26)	(0.15)	(0.23)	(0.089)	(0.13)	(0.11)	(0.11)	(0.13)	(0.27)	(0.17)	(0.16)	(0.29)	(0.18)	(0.26)	(0.19)
Control for individual labor-market characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Control for individual socio-demograph. characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Control for year	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3493	1743	9722	700	20136	6827	4833	11941	16306	824	3590	3558	1938	6138	3325	733
Individuals	735	405	2102	169	4361	1579	1044	2611	3554	181	820	750	395	1233	3326	3545

Note: Results of regression model including all control variables as specified in Model 6 using a cross-sectional weight created by SOEP; Robust standard errors clustered at the individual level are used;
The whole sample is subdivided by Federal State. Standard errors in parentheses. Significance levels * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. Source: SOEP (2023).

D. DFL Decomposition Analysis

D.1. Inequality measurements following DFL decomposition based on wages

Table D16: Distributional statistics and inequality measurements following DFL Decomposition based on wage

	Collective wage agreement			Union membership		
	Covered	Not Covered	Counterfactual	Covered	Not Covered	Counterfactual
1% Percentile	5.52	4.61	4.81	5.66	4.79	5.01
5% Percentile	6.11	5.52	5.86	6.91	5.91	6.11
10% Percentile	6.91	6.06	6.11	7.30	6.11	6.78
25% Percentile	7.49	6.95	7.17	7.74	7.17	7.50
50% Percentile	7.90	7.65	7.78	8.07	7.74	7.91
75% Percentile	8.22	8.16	8.19	8.32	8.16	8.26
90% Percentile	8.52	8.67	8.56	8.58	8.56	8.59
95% Percentile	8.67	8.92	8.78	8.73	8.78	8.82
99% Percentile	8.96	9.39	9.21	9.10	9.21	9.29
Observations	57194	49591	99042	14614	92171	99042
Sum of wgt.	57194	49591	99461	14614	92171	96086
Mean	7.77	7.47	7.59	7.97	7.58	7.78
Std. dev.	0.70	1.05	0.91	0.63	0.91	0.82
Variance	0.49	1.09	0.83	0.40	0.84	0.66
Skewness	-1.29	-0.75	-0.96	-1.75	-1.00	-1.35
Kurtosis	5.90	3.74	4.19	9.16	4.59	6.16
Percentile ratios						
p90/p10	5.00	13.49	11.56	3.59	11.56	6.14
p90/p50	1.85	2.76	2.17	1.66	2.26	1.98
p10/p50	0.37	0.21	0.19	0.46	0.20	0.32
p75/p25	2.09	3.36	2.77	1.79	2.69	2.14
GE(-1)	0.39	1.16	0.73	0.32	0.81	0.60
GE(0)	0.19	0.44	0.33	0.15	0.33	0.25
GE(1)	0.16	0.37	0.27	0.13	0.27	0.21
GE(2)	0.16	0.53	0.32	0.14	0.36	0.24
Gini	0.31	0.46	0.39	0.27	0.40	0.34
Atkinson indices, A(e), where e > 0 is the inequality aversion parameter						
A(0.5)	0.08	0.18	0.14	0.07	0.14	0.11
A(1)	0.18	0.36	0.28	0.14	0.28	0.22
A(2)	0.44	0.70	0.59	0.39	0.62	0.54

Note: Percentiles and distributional Statistics are based on logarithm of the monthly gross income in euros, the following inequality measurements are based on the monthly gross income in euros; Generalized Entropy indices GE(a) defined as a = income difference sensitivity parameter; Atkinson indices is defined as A(e), where e > 0 is the inequality aversion parameter; The first three columns report the decomposition based on the individuals' coverage of a Collective Wage Agreement; the following three columns present the same analysis based on the individuals' coverage of a Union Membership; Source: SOEP (2023).

D.2. Inequality measurements following DFL Decomposition based on hourly wage

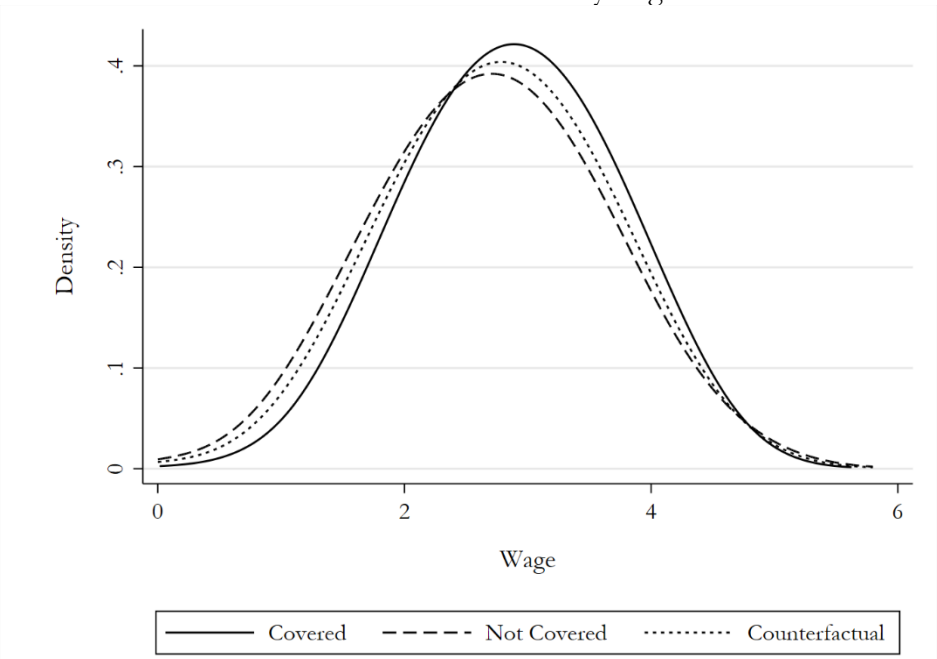
Table D17: Distributional statistics and inequality measurements following DFL Decomposition based on hourly wage

	Collective wage agreement			Union membership		
	Covered	Not Covered	Counterfactual	Covered	Not Covered	Counterfactual
1% Percentile	1.53	0.37	0.75	1.77	0.84	1.58
5% Percentile	2.10	1.66	1.88	2.23	1.86	2.12
10% Percentile	2.28	2.00	2.12	2.45	2.11	2.25
25% Percentile	2.59	2.30	2.40	2.74	2.40	2.59
50% Percentile	2.89	2.67	2.76	3.01	2.76	2.91
75% Percentile	3.19	3.09	3.14	3.27	3.14	3.22
90% Percentile	3.46	3.55	3.50	3.52	3.49	3.55
95% Percentile	3.62	3.78	3.70	3.67	3.70	3.74
99% Percentile	3.91	4.21	4.09	4.02	4.09	4.14
Observations	56846	48152	97980	14530	90468	97980
Sum of wgt.	56846	48152	98112	14530	90468	95574
Mean	2.88	2.68	2.76	2.99	2.76	2.90
Std. dev.	0.49	0.68	0.61	0.45	0.61	0.52
Variance	0.24	0.47	0.38	0.20	0.37	0.28
Skewness	-0.64	-0.70	-0.75	-0.44	-0.80	-0.31
Kurtosis	7.23	7.37	6.64	6.18	8.05	5.61
Percentile ratios						
p90/p10	3.25	4.69	3.97	2.91	3.98	3.64
p90/p50	1.76	2.40	2.08	1.67	2.07	1.89
p10/p50	0.54	0.51	0.52	0.57	0.52	0.52
p75/p25	1.82	2.19	2.11	1.69	2.11	1.87
Generalized Entropy indices GE(a), where a = income difference sensitivity parameter, and Gini coefficient						
GE(-1)	0.18	0.50	0.28	0.12	0.36	0.18
GE(0)	0.11	0.22	0.17	0.10	0.17	0.14
GE(1)	0.11	0.22	0.17	0.10	0.17	0.14
GE(2)	0.14	0.29	0.22	0.12	0.22	0.18
Gini	0.26	0.35	0.31	0.24	0.31	0.28
Atkinson indices, A(e), where e > 0 is the inequality aversion parameter						
A(0.5)	0.06	0.10	0.08	0.05	0.08	0.07
A(1)	0.11	0.20	0.16	0.09	0.16	0.13
A(2)	0.26	0.50	0.36	0.19	0.42	0.26

Note: Percentiles and distributional Statistics are based on logarithm of the contractual hourly wage, the following inequality measurements are based on the contractual hourly wage; Generalized Entropy indices GE(a) defined as a = income difference sensitivity parameter; Atkinson indices is defined as A(e), where e > 0 is the inequality aversion parameter; The first three columns report the Decomposition based on the individuals' coverage of a Collective Wage Agreement, the following three columns present the same analysis based on the individuals' coverage of a Union Membership; Source: SOEP (2023).

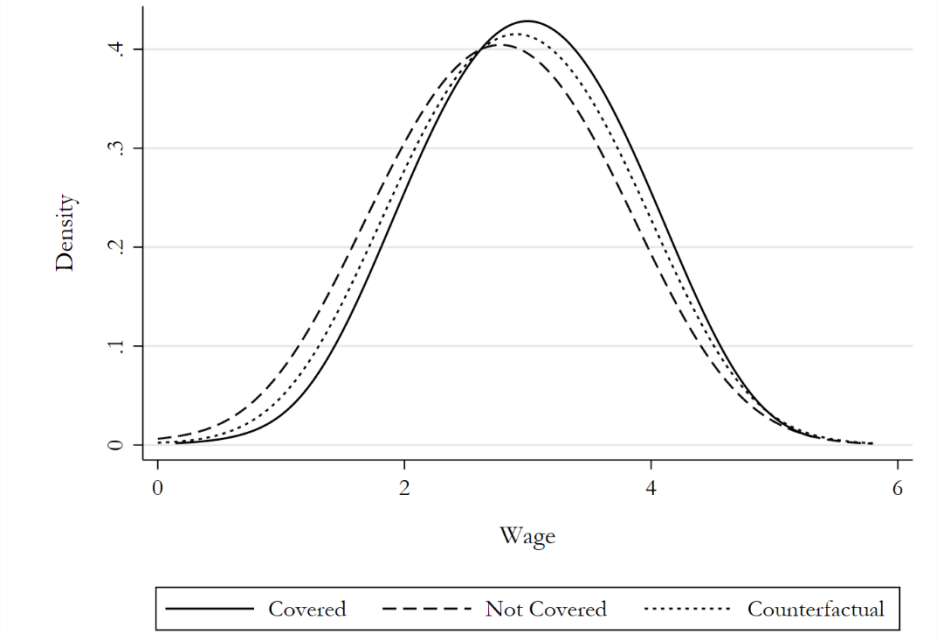
D.3. Visualizations DFL Decomposition based on Contractual Hourly Wage

Figure D8: DFL Decomposition for collective wage agreement coverage based on contractual hourly wage



Note: This figure shows kernel density estimates of logarithmic wages for three groups: individuals covered by collective wage agreement, not covered by a collective wage agreement and the counterfactual distribution for individuals not covered with the characteristics of those who are. Densities are estimated using a biweight kernel and bandwidth of 2.
Source: own calculations, data: SOEP (2023).

Figure D9: DFL Decomposition for union membership coverage based on contractual hourly wage



Note: This figure shows kernel density estimates of logarithmic wages for three groups: union members, no union members and the counterfactual distribution for no union members with the characteristics of those who are. Densities are estimated using a biweight kernel and bandwidth of 2.
Source: own calculations, data: SOEP (2023).

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